

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER

GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

32nd

STUDENT RESEARCH WEEK

20/20 Visions of Biochemistry



TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™
Graduate School of Biomedical Sciences

*32nd Annual Student Research Week
March 10-13, 2020
Texas Tech University Health Sciences Center (TTUHSC)
Lubbock, Texas*

The Graduate School of Biomedical Sciences 2020 Student Research Week Committee

Director: Bradley Schniers

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Vice Director of Poster Competition: Rachel Washburn

Vice Director of Operations & Judging: Ryan Sweazey

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*Student Research Week Banquet: Korac K, Graduate School of Biomedical Sciences Graduate Student Association;
Velia Martinez, Graduate School of Biomedical Sciences*

The 2020 Student Research Week Committee would like to extend their warmest thanks to the following for their contributions and support in making Student Research Week a great success this year:

The Graduate School of Biomedical Sciences staff: Leslie Fowler, Pam Johnson, Ashlee Rigsby and Velia Martinez

The Office of Student Life: Deidra Satterwhite

The Office of Communications and Marketing: Suzanna Cisneros, Amy Skousen and Kami Hunt

The Office of the President: Bryce Looney

The School of Medicine Office of the Dean: Charity Donaldson

Educational Media Services: Neal Hinkle

The departments of cell biology and biochemistry, pharmacology and neuroscience, immunology and molecular microbiology, cell physiology and molecular biophysics, medical education and graduate medical education; Graduate School of Biomedical Sciences at Lubbock, Abilene, and Amarillo, the School of Medicine, the School of Nursing, the School of Health Professions, the School of Pharmacy, the Office of Interprofessional Education, and Texas Tech University.

Lou Diekemper Endowment fund for providing a travel scholarship.

Dr. Beverly Chilton for establishing the Bette B. Chilton scholarship in honor of her mother.

We also are very grateful to all the TTUHSC faculty and staff for their guidance and support.

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Information about TTUHSC, including information about the Graduate School of Biomedical Sciences, can be found at www.ttuhscc.edu.

Friday, March 13, 2020

KEYNOTE LECTURES

Ernest Marshall Wright, Ph.D., D.Sc.

Time: 11:15 a.m. - 12:15 p.m.

Maralice Conacci-Sorrell, Ph.D.

Time: 1:15 - 2:15 p.m.

STUDENT SPEAKERS

Time: 9 - 11 a.m.

Using Formative Exams in Clinically Oriented Anatomy: Identifying At-Risk Students and Reducing Stress

Megh Gore, Graduate Student, Lubbock

A Novel Mechanism of Assembly in the Functional CRES Amyloid

Rebecca Kusko, Medical Student, Lubbock

Endothelial small GTPase RhoA regulates bFGF-induced angiogenesis: A potential target for anti-angiogenic therapy

Fatema Tuz Zahra, Graduate Student, Amarillo

Mechanism of Antimony Drug Resistance in Leishmania Parasites

Sneider Gutierrez, visiting Graduate Student, Lubbock

Progesterone Receptor Membrane Component 1 communicates with classical steroid hormone signaling to promote breast cancer growth

Diego Pedroza, Graduate Student, El Paso

Multi-color immunophenotyping of M1 and M2 polarized macrophages and monocytes in primary mouse tissue that has vast application in mouse models including transplantation

Kandis Wright, Medical Student, Lubbock

Acetylation of conserved DVL-1 lysines regulates its nuclear translocation and binding to gene promoters in triple-negative breast cancer

Monica Sharma, Graduate Student, Lubbock

Pancreatic tumor growth suppression through induction of autophagy by a novel anti-Parkinson drug Pimavanserin

Sharavan Ramachandran, Graduate Student, Abilene

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TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER™

Greetings!

It is my great pleasure to welcome everyone to the 2020 Student Research Week on March 10th-13th. The theme for this year's 32nd Annual Student Research Week event is "SRW 2020: Visions of Biochemistry." We are extremely proud this year to host two outstanding and highly distinguished keynote speakers: Dr. Ernest Wright, DSc, professor of physiology and Mellinkoff Professor in Medicine at the David Geffen School of Medicine at UCLA, and 2005 Fellow to the Royal Society; and Dr. Maralice Conacci-Sorrell PhD, Virginia Murchison Linthicum Scholar in Medical Research and Professor in the Department of Cell Biology at University of Texas Southwestern.

I am extremely indebted to the 2019 Student Research Week Organizing Committee: Bradley Schniers (Director), Mariacristina Mazzitelli (Director of Marketing), Ryan Sweazey (Director of Operations), Rachel Washburn (Poster Competition Coordinator), Ksenija Korac (GSA President) and Morgana Kellogg (GSA Vice-President). They have all done a tremendous job! I am particularly grateful for the hard work and assistance from Leslie Fowler, Pam Johnson, Deidra Satterwhite, Amy Skousen, Sharla Cook, Nerissa Farris, the Department of Cell Biology & Biochemistry, and the entire GSBS staff. They have all done a terrific job! Also special thanks to Dr. Ganapathy, the host department chair, and Dr. Betsy Jones for coordinating activities with the School of Medicine, all faculty, staff, and GSBS students for their efforts and time. Finally, I would like to thank Interim President Lori Rice-Spearman, Dean Berk, Dean Evans, Dean Smith, and Drs. Varma, Prien, Sizer, Grisham, Altenberg, Byrd, Philips, Thekkumkara, Neugebauer, Abbruscato, Dissanaik, Jumper, Srivastava, and Bergeson for their support that has made this event possible.

In addition, the GSBS and the GSA are very excited about hosting the seventh annual Student Research Week Banquet-Roaring 20's. Funds raised from donations and a silent auction will be used to support student scholarships. Special thanks to all donors for their help in making this special event possible. Our guest speakers will once again treat us with their "Reflections on Graduate Studies," with music, entertainment and dancing to follow! Special thanks to the GSA committee, especially GSA president Ksenija Korac, for organizing and hosting the event this year.

In conclusion, our event kicks off with the Vendor Show and Career Fair on Tuesday, March 10th. Please come and attend all the great presentations. It is a wonderful opportunity to meet our students, learn about their work, and discuss research in general. Let's greet all of our speakers and celebrate our 32nd Annual Student Research Week with a fully packed lecture hall. Thanks much and all the best!

Brandt L. Schneider, Ph.D.

Dean of the Graduate School of Biomedical Sciences



TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER™

Welcome!

On behalf of the Student Research Week (SRW) committee, we'd like to welcome you to the 32nd annual Student Research Week 2020: "Visions of Biochemistry". This is an annual event organized by the Texas Tech University Health Sciences (TTUHSC) Graduate School of Biomedical Science (GSBS), Lubbock Campus. SRW is an incredible event that brings together students from different TTU and TTUHSC schools and campuses; giving them the opportunity to present their research, win awards, and meet with keynote speakers throughout the week. During SRW, students have the opportunity to visit with biomedical vendors, present a poster detailing their research, and learn about scientific discoveries from distinguished visiting keynote speakers.

Each year, SRW features a new theme highlighting advances in various areas of biomedical research. This year's theme is "SRW 2020: Visions of Biochemistry" and is hosted by the Department of Cell Biology and Biochemistry. Two outstanding biomedical scientists will give keynote addresses on Friday, March 13th, highlighting their research in the field of Cell Biology and Biochemistry. Ernest Wright, D.Sc., is a professor of physiology and Mellinkoff Professor in Medicine at the David Geffen School of Medicine at UCLA, and also a Fellow to the Royal Society. Wright, a native of Belfast, Ireland, earned his doctorate degrees in physiology from London University and Sheffield University in England. He joined the faculty at the UCLA medical school in 1967, and became chair of the physiology department in 1987. In his research over transporters and kidney function, Wright's career in science has yielded several important discoveries over SGLT transporters, the SLC5A family of transporters, as well as the structure and function of other transporters. Maralice Conacci-Sorrell, Ph.D., earned her B.S in Biology, and a master's degree in Morphology from the University of Sao Paulo in Brazil, followed by graduate studies in Cell Biology at the Weizmann Institute of Science in Israel. Conacci-Sorrell is very dedicated to research in her role as the Virginia Murchison Linthicum Scholar in Medical Research within the Department of Cell Biology at the University of Texas Southwestern. Her current research looks to understand the fundamental functions of Myc in cancer cell biology. In addition, it explores the role of protein acetylation as a key coordinator of cancer cell survival and migration. These scientists are outstanding researchers and we encourage everyone to attend their seminars Friday, followed by the poster awards ceremony and Coffee with the Speakers.

The SRW poster competition, starting the afternoon of Tuesday, March 10th, gives students the opportunity to present their research and view the research of other students in a conference-like atmosphere. There will be students from all TTU and TTUHSC campuses, with over 250 students presenting their research this year. We would like to invite everyone to attend the open poster sessions from 12-1pm Tuesday through Thursday in the Academic Event Center to learn about ongoing student research projects.

SRW would not be possible without the tireless and dedicated efforts of numerous people working to make it the success it is. We would like to thank the faculty and staff of the GSBS, the Offices of Student Services and Marketing and Communications, the School of Medicine, and the Department of Cell Biology and Biochemistry. We would also like to thank interim President Rice-Spearman and Drs. Scheider, Prien, Ganapathy, Berk, Varma, Ashcraft, and Jones. Lastly, we'd like to thank all of the participants in the 32nd annual Student Research Week, whose ideas and shared research are what make this such a successful event each year.

Sincerely,
The 32nd Annual Student Research Week Committee

Bradley Schniers, Mariacristina Mazzitelli, Rachel Washburn, Ryan Sweazey

32ND ANNUAL TTUHSC STUDENT RESEARCH WEEK SCHEDULE

TUESDAY, MARCH 10, 2020

9:00am - 3:00pm	<i>Vendor Show</i>	ACB Lobby
12:00pm - 1:00pm	<i>Open Poster Exhibit I</i>	Academic Event Center
1:00pm - 4:00pm	<i>Poster Session I</i>	Academic Event Center

WEDNESDAY, MARCH 11, 2020

8:30am - 12:00pm	<i>Poster Session II</i>	Academic Event Center
12:00pm - 1:00pm	<i>Open Poster Exhibit II</i>	Academic Event Center
1:00pm - 4:00pm	<i>Poster Session III</i>	Academic Event Center

THURSDAY, MARCH 12, 2020

8:30am - 12:00pm	<i>Poster Session IV</i>	Academic Event Center
12:00pm - 1:00pm	<i>Open Poster Exhibit III</i>	Academic Event Center
1:00pm - 4:00pm	<i>Poster Session V</i>	Academic Event Center
6:00pm	<i>SRW Banquet</i>	McKenzie-Merket Alumni Center

FRIDAY, MARCH 13, 2020

8:00am - 8:45am	<i>Continental Breakfast</i>	ACB Lobby
9:00am - 11:00am	<i>Select Student Presentations</i>	Academic Event Center
11:15am - 12:15pm	<i>Maralice Conacci-Sorrell, Ph.D.</i>	Academic Event Center
12:15pm - 1:15pm	<i>Lunch & Case Study</i>	Academic Event Center
1:15pm - 2:15pm	<i>Ernest Wright, D.SC.</i>	Academic Event Center
2:15pm - 3:15pm	<i>Awards Ceremony</i>	Academic Event Center
3:15pm - 4:15pm	<i>Students' Coffee with the Speakers</i>	Academic Event Center

Maralice Conacci-Sorrell, Ph.D.

Virginia Murchison Linthicum Scholar,
Professor,
University of Texas Southwestern

Dr. Maralice Conacci-Sorrell's academic training encompasses multiple fields ranging from Environmental Biology to Medical Sciences. She received a B.S. in Biology, and a master's degree in Morphology (human anatomy, histology, developmental biology, and cell biology) from the University of Sao Paulo in Brazil.

To pursue graduate studies in Cell Biology, Dr. Conacci-Sorrell joined the lab of Dr. Avri Ben-Ze'ev in the Department of Cellular and Molecular Biology at the Weizmann Institute of Science in Israel. There, my work focused on the interplay between Wnt signaling and cell-cell adhesion. Her work was among the first to address the mechanisms of tumor cell proliferation and metastasis induced by oncogenic beta-catenin. Together her studies contributed to our understanding of how cell-cell adhesion regulates the Wnt pathway, and in turn, how the Wnt pathway controls the expression of adhesion molecules.

With the goal of identifying a common signature employed by different oncogenes in order to drive tumorigenesis, Dr. Conacci-Sorrell received an EMBO fellowship and joined the lab of Dr. Robert Eisenman at the Fred Hutchinson Cancer Research Center for her postdoctoral studies. There she discovered a new pathway for regulating Myc levels and function in normal and in cancer cells. She found that Myc proteins are targeted by calcium-dependent calpain proteases, which convert Myc into a cytoplasmically active protein, that she named Myc-nick. In 2013, this work was recognized with the Darrel Goll award at the FASEB meeting "The biology of Calpains in health and disease". Her subsequent research showed that Myc-nick is highly expressed in cancer cells, where it appears to drive tumor progression by promoting both survival and motility in response to metabolic stress.

Ernest Marshall Wright, Ph.D., D.Sc.

Professor,
UCLA, School of Medicine

Ernest Wright, professor of physiology and Mellinkoff Professor in Medicine at the David Geffen School of Medicine at UCLA, has been named a 2005 Fellow to the Royal Society, an honor considered one of the highest accolades a scientist can achieve next to the Nobel Prize. Born in Belfast, Ireland, Wright joined the faculty of the medical school in 1967, and was tapped to chair the physiology department in 1987. His research focuses on the structure, function and genetics of transport proteins, which act as gatekeepers for the body by carrying essential molecules in and out of cells. In 2003, his research team identified a new protein that senses changes in glucose, the blood sugar that fuels body function. The UCLA discovery could lead to the development of new drugs to control diabetes and obesity. In his 38-year tenure at UCLA, Wright has mentored more than 40 postdoctoral fellows and graduate students. During his career, he received the Senator Jacob K. Javits Neuroscience Investigator Award from the National Institutes of Health from 1985 to 1992, and was named the Walter B. Cannon Distinguished Lecturer by the American Physiological Society in 1989, the G.W. Harris Lecturer by the British Physiological Society in 1990 and a Fellow of the Biophysical Society in 2005. He has served on the editorial boards for several physiology journals, consults for the National Institutes of Health, and is a scientific advisor to the Eli and Edythe L. Broad Medical Foundation in Los Angeles. Wright earned his doctorate degrees in physiology from London University and Sheffield University in England, and conducted his research fellowship at Harvard University in Boston.

JUDGES

Pradeepkiran Jangampalli Adi, Ph.D.

Internal Medicine

Sandhya Annamaneni

Pharmaceutical Sciences

Duke Appiah, Ph.D.

Public Health

Emily Bailey

Public Health

Jeremy Bailoo, Ph.D.

Pharmacology and Neuroscience

Susan Bergeson, Ph.D.

Pharmacology and Neuroscience

Kishor Bhende, M.D.

Pediatrics

Yangzom D. Bhutia, Ph.D., D.V.M.

Cell Biology and Biochemistry

Keith Bishop, Ph.D.

Medical Education

Michael Blanton, Ph.D.

Pharmacology and Neuroscience

Ion Alexandru Bobulescu, M.D.

Cell Biology and Biochemistry

Jean-Michel Brismée, ScD

Physical Therapy

Greg Brower, Ph.D., DVM

Medical Education

Theresa Byrd, DrPH

Public Health

Isabel Castro, Ph.D.

Immunology and Molecular Microbiology

Jane Colmer-Hamood, Ph.D.

Medical Education

Gail Cornwall, Ph.D.

Cell Biology and Biochemistry

John W. Culberson, M.D.

Family and Community Medicine

Hemalata Deshmukh

Qyunh Hoa Do, Ph.D.

Cell Physiology and Molecular Biophysics

Jannette Dufour, Ph.D.

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Anna Eiring, Ph.D.

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Derek Fleming, Ph.D.

Immunology and Molecular Microbiology

John Griswold, M.D.

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Petar Grozdanov, Ph.D.

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Josee Guindon, Ph.D., DVM

Pharmacology and Neuroscience

Abdul Hamood, Ph.D.

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Cell Biology and Biochemistry

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Cell Physiology and Molecular Biophysics

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Internal Medicine

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Pharmacology and Neuroscience

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Garrison Institute on Aging

Margaret Vugrin, MPH

Public Health

Hannah Zhao-Fleming

Surgery

CRITERIA FOR CASE PRESENTATIONS

ANALYSIS/SYNTHESIS:

1. Includes data from 4 or more sources (explicitly stated in the case study)
2. Reveals student's strengths, weaknesses, etc.

DIAGNOSIS:

1. Detailed description of consistencies or patterns leading to summary of the problem or situation.
2. Describes possible causes.
3. Includes other significant characteristics of the student.

INTERVENTIONS:

1. Includes five to six sessions.
2. Detailed summary of strategies and techniques used.
3. Strong plan.

EVALUATION:

1. Detailed summary of results.
2. Includes strong pre- and post-test evidence.
3. Includes decision for termination or referral.

REFLECTION:

1. Thoughtful description of the experience, the challenges, and the successes.

MICELLANEOUS:

1. Text is well written.
2. Sections are labeled.
3. Minimal grammar or spelling errors.

CRITERIA FOR SCIENTIFIC RESEARCH

SIGNIFICANCE/ INTRODUCTION:

1. Significance of the work and why it is important to conduct this research is addressed.
2. Background information is clearly presented.
3. Hypothesis is clearly stated. (for science categories only)

ORGANIZATION

1. Methods utilized are clearly explained.
2. Presentation is well organized.
3. Student shows knowledge of the subject.

RESULTS:

1. Tables or graphs are used to enhance the presentation.
2. Presenter explains the figures and results.
3. Figures are appropriately formatted and clearly understood.

DISCUSSION/CONCLUSIONS:

1. Presenter summarizes findings clearly.
2. Presenter clearly explains what the findings mean and their significance.
3. Directions for future investigation or management of similar cases are indicated/discussed.

PRESENTATION /RESPONSE TO QUESTIONS:

1. Overall style of the presentation is effective (delivery/eye contact).
2. Presenter uses time effectively.
3. Presenter answers questions in an organized, concise, and accurate fashion.

COMMERCIALIZATION (IF APPLICABLE):

1. Presenter states how their research impacts the world.
2. Presenter states how the research could be a product.
3. Presenter states steps they would take to pursue commercialization.

PARTICIPANTS

GS1-2	Burrow, Trevor	PHAR	Bhalerao, Aditya	MS1-2	George, Asher
GS1-2	Butler, Megan	PHAR	Chowdhury, Ekram Ahmed	MS1-2	Gore, Megh
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GS3+	Brown, Timothy	MS1-2	Brown, Ellen	MS1-2	Merida-Morales, Noriko
GS3+	Elmassry, Moamen	MS1-2	Carey, Michael	MS1-2	Miears, William
GS3+	Enriquez, Josue	MS1-2	Castaneda, Karen	MS1-2	Mittal, Nitish
GS3+	Gutierrez, Sneider	MS1-2	Chandahas, Sheila	MS1-2	Mohammed, Tijani
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GS3+	Redman, Whitney	MS1-2	Eboh, Stanley	MS1-2	Payberah, Ebrahim
GS3+	Ristic, Bojana	MS1-2	Elmore, Blair	MS1-2	Perez-Arnold, Laura
GS3+	Roberts, Emma	MS1-2	Endsley, Avery	MS1-2	Perry, Cody
GS3+	Schniers, Bradley	MS1-2	Fain, Kristen	MS1-2	Peterson, Christopher
GS3+	Sharma, Monica	MS1-2	Fang, Chih Yu	MS1-2	Peterson, Joshua
GS3+	Sikder, Mohd Omar Faruk	MS1-2	Fort, Callie	MS1-2	Provost, Kenna
GS3+	Sweazey, Ryan	MS1-2	Freedle, Caroline	MS1-2	Rafael, John
GS3+	Wright, Emily	MS1-2	Fulton, Alec	MS1-2	Rahesh, Jasmin
GS3+	Young, Victoria	MS1-2	Galvan, Bernardo	MS1-2	Ramirez, Michael
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PHAR	Anderson, Sarah	MS1-2	Gaschen, Paul	MS1-2	Rossettie, Stephen

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MS1-2	Snitman, Annie	MS3-4	Lloyd, Nathan	SHP	Sanders, Emma
MS1-2	Solis, Jessica	MS3-4	Maniam, Ganesh	SHP	Steven, Khalid
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MS1-2	Tidwell, Dalton	MS3-4	Moreno, Tanir	UNDG	Ball, Reagan
MS1-2	Tsou, Po-Yang	MS3-4	Mueller, Karl	UNDG	Delgado, Betsaida
MS1-2	Uke, Nkemjika	MS3-4	Nguyen, Emily	UNDG	Ibrahim, Andrew
MS1-2	Upadhyay, Aksha	MS3-4	Osemwengie, Bradley	UNDG	Kariampuzha, William
MS1-2	Vo, Diana	MS3-4	Rajasegaran, Abirami	UNDG	Kjellgren, Abbey
MS1-2	Vories, Bridget	MS3-4	Rouse, Mary	UNDG	Lopez, Andrea
MS1-2	Wagstaff, Rachel	MS3-4	Singh, Simran	UNDG	Ostermaier, Emily
MS1-2	Wakil, Anisa	MS3-4	Sorensen, Grant	UNDG	Reynolds, Landrye
MS1-2	Weaver, Preston	MS3-4	Stewart, Caleb	UNDG	Schneider, Rebecca
MS1-2	Wei, Brandon	MS3-4	Tangela, Nikita	UNDG	Wolpert, John
MS1-2	Wilson, Ellen	MS3-4	Tran, Timothy	UNDG	Young, Kobe
MS1-2	Wu, Winnie	MS3-4	Umelo, Jonathan	UNDG	Zhu, Charles
MS1-2	Yamashiro, Justine	MS3-4	Von Spronsen, Nicole		
MS1-2	Yang, Samuel	MS3-4	Walterscheid, Brooke		
MS1-2	Yim, Vivian	MS3-4	Wilkerson, Hannah		
		MS3-4	Wright, Kandis		
MS3-4	Aeley, Udhaya	R&CF	Boothe, William		
MS3-4	Ahnood, Elmira	R&CF	Cooper, Claire		
MS3-4	Al Dogom, Sara	R&CF	Cox, Brittany		
MS3-4	Alhaj, Sara	R&CF	Cox, Cameron		
MS3-4	Anderson, Brittany	R&CF	Daniele, Christopher		
MS3-4	Arispe, Ryan	R&CF	Hamdi, Anas		
MS3-4	Banerjee, Avantika	R&CF	Kumar, Manish		
MS3-4	Beaman, Erica	R&CF	Loveless-Hoffman, Kelsea		
MS3-4	Bihari, Sanyukta	R&CF	Metzler, Shane		
MS3-4	Bramnik, Avery	R&CF	Milab, Moheb		
MS3-4	Cooper, Chloe	R&CF	Nguyen, Jeannie		
MS3-4	D’Cunha, Ruth	R&CF	Patel, Panna		
MS3-4	Dean, Ryan	R&CF	Roach, Jenna		
MS3-4	Deleon, Sabrina	R&CF	Ruiz, Anastasia		
MS3-4	Dhir, Nikita	R&CF	Sarangi, Ashish		
MS3-4	Dixon, Timothy	R&CF	Seckel, Shannon		
MS3-4	Domingo-Johnson, E.L.	R&CF	Sharp, Leigha		
MS3-4	Egan, Alec	R&CF	Shoji, Eri		
MS3-4	Fisher, John	R&CF	Stanley, Russell		
MS3-4	Frost, Joshua	R&CF	Wallis, Daniel		
MS3-4	Gates, Megan	R&CF	Wu, Amy Ruomei		
MS3-4	Guerrero Criado, Andres				
MS3-4	Hope, Brianna	SHP	Bassett, Cameron		
MS3-4	Hope, Landon	SHP	Drusch, Alex		
MS3-4	Hsu, Chia	SHP	Giles, Jennifer		
MS3-4	Kalayilparampil, Bella				

JUDGING GROUPS

Judging Group 1A - Tuesday, March 10, 2020

(All the following times are PM!)

Poster	Time	Name
TU1	1:30-1:45	Hibler, Taylor
TU2	1:45-2:00	Washburn, Rachel
TU3	2:00-2:15	Jaramillo-Martin, Valeria
TU4	2:15-2:30	Willms, Joshua
	BREAK	
TU5	2:45-3:00	Kellogg, Morgana
TU6	3:00-3:15	Kopel, Jonathan
TU7	3:15-3:30	Martinez-Marin, Dalia
TU8	3:30-3:45	Mohiuddin, Ismail

Judging Group 2A - Tuesday, March 10, 2020

(All the following times are PM!)

Poster	Time	Name
TU9	1:30-1:45	Jackson, Benjamin
TU10	1:45-2:00	Navarro, Stephany
TU11	2:00-2:15	Presto, Peyton
TU12	2:15-2:30	Sniegowski, Colton
TU13	2:30-2:45	Burrow, Trevor
	BREAK	
TU14	3:00-3:15	Rahman Omy, Tasmin
TU15	3:15-3:30	Katz, Courtney

Judging Group 3A - Tuesday, March 10, 2020

(All the following times are PM!)

Poster	Time	Name
TU16	1:30-1:45	McDaniel Mim, Brianyell
TU17	1:45-2:00	Schniers, Bradley
TU18	2:00-2:15	Roberts, Emma
TU19	2:15-2:30	Gutierrez, Sneider
TU20	2:30-2:45	Hein, Matthew
	BREAK	
TU21	3:00-3:15	Blanton, Henry
TU22	3:15-3:30	Bisht, Karishma
TU23	3:30-3:45	Mazzitelli, Mariacristina

Judging Group 4A - Tuesday, March 10, 2020

(All the following times are PM!)

Poster	Time	Name
TU24	1:30-1:45	Korac, Ksenija
TU25	1:45-2:00	Sharma, Monica
TU26	2:00-2:15	Redman, Whitney
TU27	2:15-2:30	Macha, Shawn
	BREAK	
TU28	2:45-3:00	Bounds, Kayla
TU29	3:00-3:15	Liu, Xiaobo
TU30	3:15-3:30	Enriquez, Josue
TU31	3:30-3:45	Young, Victoria

Judging Group 5A - Tuesday, March 10, 2020

(All the following times are PM!)

Poster	Time	Name
TU32	1:30-1:45	Ristic, Bojana
TU33	1:45-2:00	Bass, Kevin
TU34	2:00-2:15	Elmassry, Moamen
TU35	2:15-2:30	Myers, Caitlyn
TU36	2:30-2:45	Wright, Emily
	BREAK	
TU37	3:00-3:15	Brown, Timothy
TU38	3:15-3:30	Sweazey, Ryan
TU39	3:30-3:45	Hernandez, Sarah

Judging Group 1A - Wednesday, March 11, 2020

(All the following times are AM!)

Poster	Time	Name
W1	8:30-8:45	Reynolds, Landrye
W2	8:45-9:00	Schneider, Rebecca
W3	9:00-9:15	Wolpert, John
W4	9:15-9:30	Young, Kobe
W5	9:30-9:45	Zhu, Charles
	BREAK	
W6	10:00-10:15	Kariampuzha, William
W7	10:15-10:30	Kjellgren, Abbey
W8	10:30-10:45	Lopez, Andrea
W9	10:45-11:00	Ostermaier, Emily
W10	11:00-11:15	Perez, Andrea
W11	11:15-11:30	Ball, Reagan
W12	11:30-11:45	Delgado, Betsaida
W13	11:45-12:00	Ibrahim, Andrew

Judging Group 2A - Wednesday, March 11, 2020**(All the following times are AM!)**

Poster	Time	Name
W25	8:30-8:45	Boothe, William
W26	8:45-9:00	Cooper, Claire
W27	9:00-9:15	Cox, Brittany
W28	9:15-9:30	Daniele, Christopher
BREAK		
W29	9:45-10:00	Ruiz, Anastasia
W30	10:00-10:15	Metzler, Shane
W31	10:15-10:30	Nguyen, Jeannie
W32	10:30-10:45	Patel, Panna
W33	10:45-11:00	Seckel, Shannon
W34	11:00-11:15	Shoji, Eri
W35	11:15-11:30	Roach, Jenna

Judging Group 3A - Wednesday, March 11, 2020**(All the following times are AM!)**

Poster	Time	Name
W46	8:30-8:45	Cox, Cameron
W47	8:45-9:00	Kumar, Manish
W48	9:00-9:15	Loveless-Hoffman, Kelsea
W49	9:15-9:30	Milad, Moheb
W50	9:30-9:45	Ruomei Wy, Amy
BREAK		
W51	10:00-10:15	Sarang, Ashish
W52	10:15-10:30	Sharp, Leigha
W53	10:30-10:45	Stanley, Russell
W54	10:45-11:00	Wallis, Daniel
W55	11:00-11:15	Hamdi, Anas

Judging Group 4A - Wednesday, March 11, 2020**(All the following times are AM!)**

Poster	Time	Name
W66	8:30-8:45	Gore, Megh
W67	8:45-9:00	Fulton, Alec
W68	9:00-9:15	Almaguer, Joey
W69	9:15-9:30	Provost, Kenna
W70	9:30-9:45	Sellers, Jake
W71	9:45-10:00	Vories, Bridget
BREAK		
W72	10:15-10:30	Mohammed, Tijani
W73	10:30-10:45	Ochoa, Ozman
W74	10:45-11:00	Jones, Daemar
W75	11:00-11:15	McCabe, Parker
W76	11:15-11:30	Coleman, Boone
W77	11:30-11:45	Credo, Roald

Judging Group 1B - Wednesday, March 11, 2020**(All the following times are PM!)**

Poster	Time	Name
W14	1:30-1:45	Solis, Jessica
W15	1:45-2:00	Rafael, John
W16	2:00-2:15	Vo, Diana
W17	2:15-2:30	Wakil, Anisa
BREAK		
W18	2:45-3:00	Yamashiro, Justine
W19	3:00-3:15	Nwaneri, Rachel
W20	3:15-3:30	Endsley, Avery
W21	3:30-3:45	Uke, Nkemjika
W22	3:45-4:00	Weaver, Preston
W23	4:00-4:15	Wei, Brandon
W24	4:15-4:30	Wu, Winnie

Judging Group 2B - Wednesday, March 11, 2020**(All the following times are PM!)**

Poster	Time	Name
W36	1:30-1:45	Peterson, Joshua
W37	1:45-2:00	Perry, Cody
W38	2:00-2:15	Tidwell, Dalton
W39	2:15-2:30	Tsou, Po-Yang
W40	2:30-2:45	Ramirez, Michael
BREAK		
W41	3:00-3:15	Rossettie, Stephen
W42	3:15-3:30	Sawant, Neha
W43	3:30-3:45	Schrader, Kaylee
W44	3:45-4:00	Shepherd, Jessica
W45	4:00-4:15	Snitman, Annie

Judging Group 3B - Wednesday, March 11, 2020**(All the following times are PM!)**

Poster	Time	Name
W56	1:30-1:45	Miears, William
W57	1:45-2:00	Merida-Morales, Noriko
W58	2:00-2:15	Telchik, Collin
W59	2:15-2:30	Onyejebu, Dubem
W60	2:30-2:45	Pasha, Nimra
W61	2:45-3:00	Patel, Bianca
BREAK		
W62	3:15-3:30	Patel, Dhruv
W63	3:30-3:45	Perez-Arnold, Laura
W64	3:45-4:00	Abraham, Jonathan
W65	4:00-4:15	Peterson, Christopher

Judging Group 4B - Wednesday, March 11, 2020**(All the following times are PM!)**

Poster	Time	Name
W78	1:30-1:45	Jain, Neil
W79	1:45-2:00	Doan, Jeremy
W80	2:00-2:15	Holder, Katherine
W81	2:15-2:30	John, Albin
	BREAK	
W82	2:45-3:00	Kroll, Alexander
W83	3:00-3:15	Kusko, Rebecca
W84	3:15-3:30	Lovelace, Jessica
W85	3:30-4:45	Loy, Sydney
W86	3:45-4:00	Ludwig, Cameron
W87	4:00-4:15	Garcia, Ana
W88	4:15-4:30	Fang, Chih Yu

Judging Group 5B - Wednesday, March 11, 2020**(All the following times are PM!)**

Poster	Time	Name
W89	1:30-1:45	Carey, Michael
W90	1:45-2:00	Galvan, Bernardo
W91	2:00-2:15	George, Asher
W92	2:15-2:30	Abidi, Hussain
W93	2:30-2:45	Agusaia, Veena
	BREAK	
W94	3:00-3:15	Ali, Kiran
W95	3:15-3:30	Patel, Shree
W96	3:30-3:45	Swinney, Seth
W97	3:45-4:00	Kharbat, Adburrahman
W98	4:00-4:15	Harvey, Bailey

Judging Group 1A - Thursday, March 12, 2020**(All the following timings are AM!)**

Poster	Time	Name
TH1	8:30-8:45	Alkul, Mahmud
TH2	8:45-9:00	Armin, Sabiha
TH3	9:00-9:15	Bettioli, Patrick
TH4	9:15-9:30	Wilson, Ellen
TH5	9:30-9:45	Rahesh, Jasmine
	BREAK	
TH6	10:00-10:15	Upadhyay, Aksha
TH7	10:15-10:30	Hanson, Frances
TH8	10:30-11:45	Eboh, Stanley
TH9	10:45-11:00	Fain, Kristen
TH10	11:00-11:15	Fort, Callie
TH11	11:15-11:30	Freedle, Caroline
TH12	11:30-11:45	Bayless, Sarah

Judging Group 2A - Thursday, March 12, 2020**(All the following timings are AM!)**

Poster	Time	Name
TH25	8:30-8:45	Nevels, Anna
TH26	8:45-9:00	Kashyap, Cimron
TH27	9:00-9:15	Yim, Vivian
TH28	9:15-9:30	Neighbors, Lexi
TH29	9:30-9:45	Klar, Janine
TH30	9:45-10:00	Kopacz, Avery
TH31	10:00-10:15	Payberah, Ebrahim
	BREAK	
TH32	10:30-10:45	O'Suoji, Chibuzo
TH33	10:45-11:00	Drinnon, Kyle
TH34	11:00-11:15	Rojas, Alexsandra
TH35	11:15-11:30	Rosqvist, Sterling
TH36	11:30-11:45	Chu, Victoria

Judging Group 3A - Thursday, March 12, 2020**(All the following timings are AM!)**

Poster	Time	Name
TH49	8:30-8:45	Gaschen, Paul
TH50	8:45-9:00	Anand, Rohan
TH51	9:00-9:15	Blakely, Summre
TH52	9:15-9:30	Brown, Ellen
TH53	9:30-9:45	Castaneda, Karen
	BREAK	
TH54	10:00-10:15	Chow, Nathan
TH55	10:15-10:30	Kishan, Raina
TH56	10:30-10:45	Covell, Jared
TH57	10:45-11:00	Yang, Samuel
TH58	11:00-11:15	De La Cruz, Noah
TH59	11:15-11:30	Graham, Derrick
TH60	11:30-11:45	Chow, Danielle

Judging Group 4A - Thursday, March 12, 2020**(All the following timings are AM!)**

Poster	Time	Name
TH73	8:30-8:45	Harris, Michelle
TH74	8:45-9:00	Garcia, Omar
TH75	9:00-9:15	Ahmed, Hijab
TH76	9:15-9:30	Elmore, Blair
TH77	9:30-9:45	Kamilar, Elizabeth
TH78	9:45-10:00	Chandahas, Sheila
TH79	10:00-10:15	Wagstaff, Rachel
	BREAK	
TH80	10:30-10:45	Ivos, Mia
TH81	10:45-11:00	Mittal, Nitish
TH82	11:00-11:15	Aljah, Sara
TH83	11:15-11:30	Kelley, John
TH84	11:30-11:45	Aelety, Udhaya
TH85	11:45-12:00	Rajasegaran, Abirami

Judging Group 5A - Thursday, March 12, 2020**(All the following timings are AM!)**

Poster	Time	Name
TH97	8:30-8:45	Mueller, Karl
TH98	8:45-9:00	Hope, Landon
TH99	9:00-9:15	Route, Mary
TH100	9:15-9:30	Gates, Megan
TH101	9:30-9:45	Lloyd, Nathan
BREAK		
TH102	10:00-10:15	Dhir, Nikita
TH103	10:15-11:30	Tangella, Nikita
TH104	10:30-11:45	D'Cunha, Ruth
TH105	10:45-11:00	Dean, Ryan
TH106	11:00-11:15	Deleon, Sabrina
TH107	11:15-11:30	Bihari, Sanyukta
TH108	11:30-11:45	Al Dogom, Sara
TH109	11:45-12:00	Lee, Shanshan

Judging Group 1B - Thursday, March 12, 2020**(All the following timings are PM!)**

Poster	Time	Name
TH13	1:30-1:45	Bassett, Cameron
TH14	1:45-2:00	Drusch, Alex
TH15	2:00-2:15	Giles, Jennifer
TH16	2:15-2:30	Liu, Yilan
TH17	2:30-2:45	Murphy, Brandi
BREAK		
TH18	3:00-3:15	Pingsterhaus, Ashly
TH19	3:15-3:30	Sanders, Emma
TH20	3:30-3:45	Steven, Khalid
TH21	3:45-4:00	Vintimilla, Antonio
TH22	4:00-4:15	Natesan, Karthick
TH23	4:15-4:30	Sikder, Mohd Omar
TH24	4:30-4:45	Pedroza, Diego

Judging Group 2B - Thursday, March 12, 2020**(All the following timings are PM!)**

Poster	Time	Name
TH37	1:30-1:45	Akwii, Racheal Grace
TH38	1:45-2:00	Raut, Snehal
TH39	2:00-2:15	Kaushik, Itishree
TH40	2:15-2:30	Ramachandran, Sharavan
TH41	2:30-2:45	Bhalerao, Aditya
TH42	2:45-3:00	Zahra, Fatema Tuz
BREAK		
TH43	3:15-3:30	Chowdhury, Ekram Ahmed
TH44	3:30-3:45	Shahbazi Nia, Siavash
TH45	3:45-4:00	Shahi, Sadisna
TH46	4:00-4:15	Sivandzade, Farzane
TH47	4:15-4:30	Anderson, Sarah
TH48	4:30-4:45	Butler, Megan

Judging Group 3B - Thursday, March 12, 2020**(All the following timings are PM!)**

Poster	Time	Name
TH61	1:30-1:45	Singh, Simran
TH62	1:45-2:00	Moreno, Tanir
TH63	2:00-2:15	Tran, Timothy
TH64	2:15-2:30	Dixon, Timothy
TH65	2:30-2:45	Modi, Trisha
BREAK		
TH66	3:00-3:15	Fisher, John
TH67	3:15-3:30	Umelo, Jonathan
TH68	3:30-3:45	Frost, Joshua
TH69	3:45-4:00	Wright, Kandis
TH70	4:00-4:15	Van Spronsen, Nicole
TH71	4:15-4:30	Arispe, Ryan
TH72	4:30-4:45	Seah, Hannah

Judging Group 4B - Thursday, March 12, 2020**(All the following timings are PM!)**

Poster	Time	Name
TH86	1:30-1:45	Cooper, Chloe
TH87	1:45-2:00	Lin, Christine
TH88	2:00-2:15	Beaman, Erica
TH89	2:15-2:30	Sorensen, Grant
TH90	2:30-2:45	Khandelwal, Jaanki
BREAK		
TH91	3:00-3:15	Egan, Alec
TH92	3:15-3:30	Guerrero Criado, Andres
TH93	3:30-3:45	Bramnik, Avery
TH94	3:45-4:00	Kalyilparampil, Bella
TH95	4:00-4:15	Osemwengie, Bradley
TH96	4:15-4:30	Anderson, Brittany

Judging Group 5B - Thursday, March 12, 2020**(All the following timings are PM!)**

Poster	Time	Name
TH110	1:30-1:45	Maveddat, Ashley
TH111	1:45-2:00	Banerjee, Avantika
TH112	2:00-2:15	Hope, Brianna
TH113	2:15-2:30	Walterscheid, Brooke
BREAK		
TH114	2:45-3:00	Stewart, Caleb
TH115	3:00-3:15	Hsu, Chia
TH116	3:15-3:30	Domingo-Johnson, E.L.
TH117	3:30-3:45	Ahnood, Elmira
TH118	3:45-4:00	Nguyen, Emily
TH119	4:00-4:15	Wilkerson, Hannah
TH120	4:15-4:30	Maniam, Ganesh

GRADUATE STUDENTS YEARS 1-2

GS1-2 BURROW, TREVOR

Detection of Alternative Lengthening of Telomeres Phenotype via C-Circle Assay in EDTA and Heparinized Plasma

Trevor Burrow, Erin K. Barr, Shawn Macha, C. Patrick Reynolds

The alternative lengthening of telomeres (ALT) mechanism is present in approximately 20% of high-risk neuroblastoma tumors, conferring an indolent, but often lethal prognosis. C-circles, self-primed circular telomeric DNA repeats, are a sensitive and specific biomarker for ALT+ cancers. Plasma-derived cell-free DNA (cfDNA) has been shown to be a potentially useful biomarker in many cancers, including neuroblastoma. We hypothesized that C-circles could be detected in cfDNA collected in both EDTA and heparinized tubes to identify ALT+ neuroblastoma patients.

ALT+ DNA was seeded into 2 ml of fresh plasma using serial dilutions (1000, 100, 10, and 1 ng/ml). Plasma was collected in EDTA and lithium heparin BD Vacutainer tubes, and cfDNA was extracted using the QIAamp Circulating Nucleic Acid Kit. C-circles were readily detected down to 10 ng/ml in plasma using EDTA as an anticoagulant. The CCA failed in heparinized samples, likely, as heparin is a polymerase inhibitor. C-circles, however, could be detected in heparinized samples that were pre-treated with ecteola cellulose (50-55mg) to remove heparin, but this required a larger reaction volume due to diminished sensitivity. Use of Bacteroides Heparinase I (24 units) did not overcome heparin inhibition of CCA. The CCA was positive in bone marrow plasma with metastatic neuroblastoma that grew a CCA+ neuroblastoma cell line and in peripheral blood plasma from a patient with an ATRX-mutant neuroblastoma.

Detection of C-circles in plasma provides an alternative to obtaining tumor tissue in order to identify ALT+ neuroblastoma patients. Use of EDTA as an anticoagulant is optimal, but heparin depletion enables use of the CCA in heparinized plasma, though with diminished sensitivity.

School: Graduate School of Biomedical Sciences

GS1-2 BUTLER, MEGAN

Pizotifen, an anti-migraine drug, suppresses glioblastoma cell growth by inducing apoptosis

Megan Butler, Sahdeo Prasad, Sanjay K Srivastava

Glioblastoma multiforme (GBM) is considered as one of the most common and aggressive brain tumors. The 5-year survival rate is 5%, making it a major health problem. The current standard of treatment consists of surgical resection, followed by radiation and chemotherapy with temozolomide (TMZ). However, over 50% of patients do not respond to TMZ therapy, therefore, novel therapeutic options are urgently required. We identified pizotifen, a blood-brain barrier permeable drug currently used for the treatment of migraines, and investigated its anti-cancer effects on SF188, a human pediatric GBM cell line, and further evaluated the molecular mechanisms. Our results demonstrate that treatment of SF188 cells with pizotifen for 24-72 hours significantly suppressed the survival of SF188 cells in a concentration and time-dependent manner, with IC₅₀ ranging from 32-60 μ M. Our results also indicate that pizotifen induced apoptosis in a dose-dependent manner as analyzed by Annexin V/APC assay. Apoptosis was further confirmed by cleavage of caspase-3 and PARP by western blotting. Our results also show that pizotifen treatment resulted in reduced phosphorylation of STAT3 at Tyr 705. The expression of pro-apoptotic protein Bax was increased whereas anti-apoptotic protein Bcl-2 expression was decreased in response of pizotifen treatment. Bcl-2 is known to be transcriptionally regulated by STAT3. Taken together, our results indicate that the growth inhibition of GBM cells was possibly associated with the inhibition of STAT3 signaling. Further mechanistic studies are in progress.

School: Graduate School of Biomedical Sciences

GS1-2 HIBLER, TAYLOR

SMAD2/3, IL-10, and you: A Sertoli cell's guide to promoting allograft survival

Taylor Hibler, Dr. Gurvinder Kaur, Dr. Kandis Wright, and Dr. Jannette Dufour

Current treatment for Type I Diabetes, insulin replacement, has limited success as it is difficult to achieve glucose homeostasis and is increasingly expensive. A promising alternative treatment is islet transplantation. Clinical transplantation of islets can successfully produce insulin in response to elevated blood glucose, allowing 80% of recipients to remain insulin independent for upwards of a year. However, this procedure requires harmful immunosuppressive drugs and, even with these drugs, the grafts are nearly completely rejected by five years post-transplantation. Therefore, advances in islet transplantation are needed. Our lab focuses on improving islet transplant survival by co-grafting them with primary Sertoli cells (pSC), an immune protective cell type found in the testes, instead of relying on harsh immunosuppressive drugs. When co-transplanted with islets, 60% of grafts survived upwards of 100 days. Understanding the mechanism by which pSC protect co-transplant islets will help us improve islet graft survival to 100% without the use of immune suppressive drugs. Previously, our lab has found that Tregs play an important role in pSC graft survival. To further understand the mechanism by which pSC induce Tregs, we investigated the role of the TGF β /SMAD signaling pathway and IL-10, both known to generate Tregs, in SC graft survival. pSC isolated from 20-day old BALB/c mice were transplanted into SMAD2/3 or IL-10 knockdown B6 mice. Immunohistochemical analysis was performed on graft tissue using a WT-1 specific antibody to determine pSC survival. 100% of SMAD2/3 and IL-10 knockdown mice experienced graft rejection by day 20. Grafts in control mice, however, survived throughout the study. This demonstrates that both the TGF β /SMAD signaling pathway and IL-10 are critical for survival of pSC grafts and suggests they are necessary to induce immune tolerance.

School: Graduate School of Biomedical Sciences

GS1-2 JACKSON, BENJAMIN

Chemically modified minocycline as a novel therapeutic for rheumatoid arthritis

Benjamin Jackson, Joshua Willms, Brent Kisby, Katheryn Furr, Brianyell McDaniel, Josue Enriquez, Ted W. Reid, Matthew B. Grisham, and Susan E. Bergeson

Reports of off-label use of tetracycline derivatives for the treatment of rheumatoid arthritis (RA) in murine models have shown efficacy. Anti-inflammatory, immunomodulatory, and chondro-protective properties of minocycline are posited to play a key role in RA treatment success. However, an obstacle for the long-term use of antibiotics is the negative side-effects on the gastrointestinal microbiota. Here, we report the anti-inflammatory activity of a chemically modified minocycline (CMM) analog with no antibiotic activity in a murine model of RA. Joint inflammation was induced in male and female DBA/1J mice via injection (i.p.) of a cocktail of 5 monoclonal antibodies directed against different epitopes in collagen type II followed 3 days later by an injection (i.p.) of 50 μ g *E. coli* lipopolysaccharide. Control animals were treated with saline. Following the development of RA symptoms, treatment groups were injected with saline or 75mg/kg MMC (i.p.) every other day through day 21. RA was quantified using caliper measurements and volume displacement for paw swelling, infrared heat signatures for inflammation, and both hotplate (42 °C) and von Frey filament assays measured nociceptive sensitivity. Endpoint determinations of RA severity was measured using histopathological analysis as well as complete blood cell count and serum concentrations of inflammatory cytokines. We found that CMM attenuated many of the local and systemic symptoms associated with joint inflammation. These data suggest that CMM may be a promising new pharmacotherapeutic treatment for RA.

School: Graduate School of Biomedical Sciences

GS1-2 JARAMILLO-MARTINEZ, VALERIA

Expression of functional human Na⁺- coupled citrate transporter (SLC13A5) in the yeast Pichia pastoris

Valeria Jaramillo-Martinez, Vadivel Ganapathy, Ina L. Urbatsch

The human Na⁺-coupled citrate transporter (Solute carrier SLC13A5) assists in the uptake of Na⁺ and citrate³⁻ ions into the cell. SLC13A5 is a plasma membrane transporter expressed in brain, liver and testis. In the brain, SLC13A5 is mostly expressed in neurons, where citrate might serve as an energy source and also as a precursor for synthesis of the neurotransmitters acetylcholine, GABA, and glutamate. Furthermore, loss-of-function mutations in SLC13A5 are associated with early infantile epileptic encephalopathy. This is an autosomal recessive disease which affects females and males equally. Children with this rare disease develop seizures shortly after birth, which continues throughout their life. Symptoms include speech difficulty, and slow and limited motor skills. The purpose of this research is to express and purify human SLC13A5 for biochemical and biophysical studies. Yeast *Pichia Pastoris* is a well-established protein expression system that produces high cell density growth at affordable cost. Moreover, different eukaryotic membrane proteins showed successful expression in this system. To facilitate cellular localization and purification N-terminal and C-terminal tags were engineered and tested to support transport function. An N-terminal His₁₀-SUMO domain was tested for its ability to enhance solubility and protein folding. A C-terminal GFP –Twin-Strep-tag was engineered to facilitate cellular localization studies and protein purification. Fluorescence microscopy showed His₁₀-SUMO- SLC13A5-GFP-Strep localized to the endoplasmic reticulum and plasma membrane in *P. pastoris* cells. Using [¹⁴C]-citrate, we demonstrate Na⁺-coupled citrate transport in cells. Thus, *P. pastoris* may provide excellent source material for future protein purification.

School: Graduate School of Biomedical Sciences

GS1-2 KATZ, COURTNEY

Conformational Changes during the ATP Hydrolysis Cycle of the Multidrug Transporter P-glycoprotein in Response to Substrate Binding

Courtney L. Katz, Mariana C. Fiori, Benjamin T. Jackson, Ina L. Urbatsch and Guillermo A. Altenberg

Department of Cell Physiology and Molecular Biophysics, Department of Cell Biology and Biochemistry, and Center for Membrane Protein Research, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

P-glycoprotein (Pgp) is a multidrug transporter consisting of two transmembrane domains (TMDs) and two nucleotide binding domains (NBDs) that are involved in an efflux of a wide variety of compounds, including many chemotherapeutic agents. Energy from ATP binding to the NBDs constitute hydrolysis resulting in conformational changes seen throughout the entire protein. Understanding these conformational changes during ATP hydrolysis will provide insight to the structural mechanism for binding and exporting these drugs and toxins. Using luminescence resonance energy transfer (LRET) under near-physiological conditions (Pgp reconstituted in nanodisc and studied at 37°C) different conformational changes are thought to be seen within the NBDs in the presence of substrates and inhibitors suggesting varying binding pockets within the TMDs. A cysteine-less Pgp with two cysteines introduced at two positions in the NBDs (N607C/T1252C mutant, Pgp-NT) was used for labeling with LRET probes, Tb³⁺ chelate-maleimide (donor) and Bodipy FL-maleimide (acceptor). Verapamil was previously reported to decrease the distance between NBDs indicating two main conformations, closed NBDs dimers and more separated NBDs. Substrates, verapamil, valinomycin and taxol, show a smaller difference in donor-acceptor distances (d₂-d₁) at around 13-15 Å coinciding with a higher percentage of molecules showing a closed NBD dimer (M1) of about 45%. Inhibitors, tariquidar and zosuquidar, showed opposite to be true resulting in larger d₂-d₁ distances and a decreased percentage of closed NBD dimers during hydrolysis. This information can be used to better understand the movement and mechanism of Pgp during substrate and inhibitor binding.

School: Graduate School of Biomedical Sciences

GS1-2 KELLOGG, MORGANA

Decoding the Molecular Mechanism of SRP Subunits' Involvement in RAPP

Morgana K. Kellogg, Elena B. Tikhonova, Kevin Bass, Paul D'Cunha, Andrey L. Karamyshev

The signal recognition particle (SRP) recognizes and targets secretory proteins with an N-terminal signal peptide to the endoplasmic reticulum. This process is essential and its disruption, caused by mutations in the signal sequences or by defects in the SRP itself, is connected with multiple human diseases. When SRP is not able to recognize signal sequences, the Regulation of Aberrant Protein Production (RAPP) pathway is initiated. This leads to specific mRNA degradation of secretory proteins to prevent accumulation of aberrant products in the cells. SRP consists of six protein subunits and one noncoding RNA. We hypothesize that individual subunits have distinct functions for SRP complex stability and the RAPP response. To test this hypothesis, we “dissected” the SRP complex by knockdowns of individual subunits and analyzed their stability and effect on RAPP in cultured human cells. Our data demonstrates that SRP54 is unique in its crucial role of mRNA protection, while SRP19, 68, and 72 have moderate supportive function, and SRP9/14 appear nonessential in RAPP. We also discovered that depletion of some SRP subunits affect expression of other subunits. Thus, heterodimer-forming subunits of SRP9/14 and SRP68/72 affect each other's protein level, suggesting their coherent biogenesis. SRP54 protein expression was affected by SRP19, 68, and 72 silencing, and SRP19 protein expression was affected only by SRP68 and SRP72 knockdown. Interestingly, the mRNA levels of each individual SRP subunits were not affected by the depletion of others suggesting that the effect is connected with the stability of proteins. Our data also suggests the involvement of the lysosomal, rather than proteasomal, degradation pathway in this process. In conclusion, our results demonstrate that the SRP54 subunit has a primary role in mRNA protection, regulation of the RAPP pathway, and that the SRP biogenesis and stability depend on the expression of individual subunits.

School: Graduate School of Biomedical Sciences

GS1-2 KOPEL, JONATHAN

The Hepatic Plasma Membrane Citrate Transporter NaCT (SLC13A5) as a Molecular Target for Metformin

Jonathan Kopel, Kei Higuchi, Bojana Ristic, Toshihiro Sato, Sabarish Ramachandran, and Vadivel Ganapathy

Metformin is the first-line treatment for type 2 diabetes. Inhibition of hepatic gluconeogenesis is the primary contributor to its anti-diabetic effect. Metformin inhibits complex I and I-glycerophosphate shuttle, and the resultant increase in cytoplasmic NADH/NAD⁺ ratio diverts glucose precursors away from gluconeogenesis. These actions depend on metformin-mediated activation of AMP kinase (AMPK). Here we report on a hitherto unknown mechanism. Metformin inhibits the expression of the plasma membrane citrate transporter NaCT in HepG2 cells and decreases cellular levels of citrate. 5-Aminoimidazole-4-carboxamide ribonucleotide (AICAR), an AMPK activator, elicits a similar effect. The process involves a decrease in maximal velocity with no change in substrate affinity. The decrease in NaCT expression is associated with decreased mRNA levels. AMPK inhibits mTOR, and the mTOR inhibitor rapamycin also decreases NaCT expression. The transcription factor downstream of AMPK that is relevant to cAMP signaling is CREB; decreased levels of phospho-CREB seem to mediate the observed effects of metformin on NaCT. Citrate is known to suppress glycolysis by inhibiting phosphofructokinase-1 and activate gluconeogenesis by stimulating fructose-1,6-bisphosphatase; therefore, the decrease in cellular levels of citrate would stimulate glycolysis and inhibit gluconeogenesis. These studies uncover a novel mechanism for the anti-diabetic actions of metformin.

School: Graduate School of Biomedical Sciences

GS1-2 MARTINEZ-MARIN, DALIA

Assessing GD3 synthase and B4GALNT4 as potential mechanisms of diminished dinutuximab binding in Neuroblastoma

Dalia Martinez-Marin, Michelle Heid (Ph.D), Patrick Reynolds (M.D,Ph.D)

Neuroblastoma (NB) is the most frequent extracranial solid tumor in children, accounting for about 10% of all pediatric cancer deaths. NB patients with high-risk disease (identified by age, degree of spread, and molecular markers) are treated with cytoreductive induction chemotherapy, intensive myeloablative chemotherapy, and then maintenance therapy with 13-cis-retinoic acid and the anti-GD2 antibody dinutuximab + cytokines. Children who develop recurrent NB are often treated with chemotherapy + dinutuximab. Our laboratory has shown that patients with relapse NB often have diminished expression of GD2, the disialoganglioside that binds dinutuximab. We have also shown that similar to what is observed in patients, dinutuximab combined with chemotherapy enhances responses and survival of mice with NB PDXs that have high dinutuximab binding. However, dinutuximab does not contribute to activity of chemoimmunotherapy in mice carrying NB PDXs with low dinutuximab binding. As low GD2 expression appears to promote resistance to chemoimmunotherapy of NB we sought to determine the molecular mechanism(s) underlying low GD2 expression. We conducted RNA-sequencing on NB patient-derived cell lines and patient-derived xenografts (PDXs) established prior to therapy and at relapse and analyzed the data using the EdgeR package in R language to identify differentially expressed genes (DEGs) between diagnosis and relapse samples. RNAseq data show that expression of the ST8Sial1 gene (encodes for GD3 synthase, an immediate precursor to GD2) and the B4GALNT4 gene, a family member of B4GALNT1 (encodes for the final enzyme step in GD2 synthesis) are both downregulated ($p < 0.005$, $p < 0.0005$) in progressive disease NB samples compared to those obtained at diagnosis. Dinutuximab binding was assessed by flow cytometry in NB PDXs, and demonstrated a strong correlation to GD3 synthase expression. Examination of transcription factors known to bind to the ST8Sial1 promoter revealed that ETS1 and NFkB1 mRNA also correlate with GD3 mRNA expression. These data point toward diminished expression of both GD3 synthase and B4GALNT4 as potential mechanisms of diminished dinutuximab binding to NB. Future studies will determine if forced down-regulation of these genes confers resistance to chemoimmunotherapy of NB and if overexpression of these genes can reverse such resistance.

School: Graduate School of Biomedical Sciences

GS1-2 MOHIUDDIN, ISMAIL

A cell-based screening assay to identify novel DNA-dependent Protein Kinase inhibitors

Ismail Syed Mohiuddin, Sung-Jen Wei, Min H. Kang

The majority of the FDA-approved kinase inhibitors target ATP binding sites of kinases. Despite their activity against tumorigenesis, these therapies are often non-specific and are susceptible to chemoresistance. In this study, we introduce a strategy to enhance the selectivity and to overcome resistance of these compounds by identifying inhibitors that target kinase-substrate interactions. c-MYC overexpression and deregulation has been implicated in many cancers. We have previously identified that OCT4 binds to the MYC promoter/enhancer region to transcriptionally activate c-MYC. DNA-PKcs was identified as a mediator of OCT4 activity in this pathway. We identified the domains of DNA-PKcs necessary to bind and phosphorylate OCT4. The current project aims to develop an assay to identify compounds that prevent the DNA-PKcs-OCT4 interaction and to validate their selectivity and efficacy. In order to target the protein-kinase interaction related to c-MYC transcriptional activation, we co-expressed the fragments of OCT4 required for c-MYC expression and the fragments DNA-PKcs required to activate OCT4 to 1) confirm the interaction between DNA-PKcs and OCT4; 2) develop a cell-based assay to screen novel compounds that prevent this interaction. We co-transduced the crucial fragments of DNA-PKcs and OCT4 tagged with luminescent probes in HEK 293FT cells. We then screened a chemical library of compounds to identify "hits" that inhibited luminescence (thus our kinase-substrate protein interaction). 67 compounds inhibited the luminescence interaction between the tagged OCT4 and DNA-PKcs protein fragments. We validated these 67 hits by confirming: 1) a decrease in pOCT4S93 and c-MYC expression; 2) the inhibition of binding between DNA-PKcs and OCT4 by co-immunoprecipitation. In conclusion, we have identified 7 novel compounds that 1) impair DNA-PKcs-mediated phosphorylation of OCT4; 2) inhibit the DNA-PKcs-OCT4 kinase-substrate interaction.

School: Graduate School of Biomedical Sciences

GS1-2 NAVARRO, STEPHANY

Characterizing the growth of Lactobacillus and Gardnerella species in medium simulating vaginal fluid, which closely mimics the vaginal environment

Stephany Navarro, Jane A. Colmer-Hamood, Gary Ventolini, and Abdul N. Hamood

Bacterial vaginosis (BV), the most common vaginal infection in women of reproductive age, is associated with increased risk of sexually transmitted diseases. The exact cause of BV is still unknown, yet previous studies have shown that, in women diagnosed with BV, a rise in vaginal pH to ≥ 4.5 is accompanied by a population shift in Lactobacillus and Gardnerella species. The potential interaction between these bacteria and their relationship to the pH change is not known. Lactobacillus plantarum (LP) and Gardnerella vaginalis (GV) are often grown in de Man, Rogosa and Sharpe medium (MRS) and New York City III medium (NYC), respectively. However, the medium simulating vaginal fluid (MSVF) more closely resembles the vaginal environment. We hypothesized that MSVF is more suitable to assess the potential interaction between LP and GV. Using an initial inoculum of 104 colony forming unit (CFU), we compared the growth of LP and GV individually in MSVF with growth in MRS and NYC, respectively, at both pH 4 and pH 5 at 24, 48, 72, and 96 h post inoculum. In MRS-pH4, LP CFU dropped slightly at 24 and 48 h, and to 102 at 72 h with no CFU recovered at 96 h; in MRS-pH5, LP CFU increased to 108 at 24 h and declined to 106 at 72 and 105 at 96 h. In contrast, in MSVF under both pH conditions, LP CFU increased to 106 at 24 h and remained constant to 96 h. In NYC-pH4, the initial inoculum of GV decreased to 102 at 24 h, with no recoverable CFU at 48 h and after; in NYC-pH5, the CFU increased to 105 at 24 h and held at 107 at 48, 72, and 96 h. In contrast, GV failed to grow in MSVF-pH4; while in MSVF-pH5, GV CFU dropped slightly at 24 h, returned to 104 at 48 h and rose to 106 by 72 and 96 h. These results suggest that, at these two pH conditions, the growth of LP and GV in MSVF is significantly different from that in their respective laboratory media and that the shift of the pH from 4 to 5 is critical for the survival of GV in MSVF as it is for recovery of GV from the vagina.

School: Graduate School of Biomedical Sciences

GS1-2 OMY, TASMIN RAHMAN

RAD6 inhibition attenuates DNA repair and stem cell signaling and overcomes acquired chemoresistance in ovarian cancer

Tasmin R. Omy (1), Shirisha Jonnalagadda (1), Mark Reedy (2) and Komaraiah Palle (1)

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Ovarian cancer (OC) is one of the most lethal gynecological malignancies and fifth leading cause of cancer-related deaths in women. In OC, the first-line treatment involves debulking surgery followed by platinum-based chemotherapy (such as carboplatin). However, ~70% of OC patients relapse and develop chemoresistance to platinum therapy. Studies show that RAD6, an E2 ubiquitin-conjugating enzyme, is significantly overexpressed in ovarian tumors. RAD6 is associated with increased proliferation, tumorigenesis, promote stem cell characteristics, chemoresistance to platinum drugs, and leads to poor prognosis in OC patients. Our data show that RAD6 overexpression leads to an increase in DNA damage response proteins such as FANCD2, PCNA, RAD18, and γ H2AX after carboplatin therapy. RAD6 upregulation also promotes increased expression of cancer stem cell signaling proteins ALDH1A1 and SOX2 in OC cell lines, which contributes to cancer recurrence and chemoresistance. Downregulation of RAD6 using siRNA or small molecule inhibitor TZ9 attenuated the expression of DNA damage response and stem cell signaling proteins and results in resensitization of chemoresistant OC cell lines to carboplatin. Collectively, these findings show that RAD6 could be an important therapeutic target for the treatment of chemoresistant OC and improve disease free survival of OC patients. Future studies include synthesis and evaluation of novel RAD6 inhibitors to increase the efficacy and those that work in synergy with carboplatin.

School: Graduate School of Biomedical Sciences

GS1-2 PRESTO, PEYTON

HMGB1 as a potential therapeutic target in neuropathic pain management

Peyton Presto, Christine Prater, Igor Ponomarev, Volker Neugebauer

Chronic pain is a prevalent national healthcare issue, yet many knowledge gaps exist in regard to brain mechanisms of pain. Although alterations in neuroimmune signaling have been linked to chronic pain, neuroinflammation in the brain in the development of a pathological pain state and underlying molecular mechanisms remain to be determined. The amygdala is a limbic brain center that has emerged as a key component in the emotional-affective dimensions of pain and pain modulation. High mobility group box 1 (HMGB1) is a proinflammatory molecule that has been linked to neuroinflammation in the amygdala via the TLR4/NF- κ B signaling pathway, but its role in amygdala pain mechanism has not been explored. Here we dissected the amygdala from adult male rats four weeks after inducing neuropathic pain via the well-established spinal nerve ligation (SNL) model, and RNA sequencing was used to obtain gene expression profiles from this region (transcriptomics). Tissues from SNL rats showed increased expression of HMGB1 when compared to those who underwent sham surgery. Therefore, we tested the hypothesis that HMGB1 activation within the amygdala contributes to the transition from normal to a chronic pain state, and that pharmacological inhibition of HMGB1 can reduce pain-related behaviors. Sensory thresholds, emotional responses, and anxiety- and depression-like behaviors were measured in SNL and sham rats before and after the administration of HMGB1 inhibitors. Our findings identified HMGB1 as a useful target for pain inhibition, providing a better understanding of neuroinflammatory mechanisms within the amygdala and yielding novel therapeutic targets for chronic neuropathic pain management.

School: Graduate School of Biomedical Sciences

GS1-2 SEAH, HANNAH

Therapeutic Targeting and Characterization of CD105 in a Murine Model of Renal Cell Carcinoma CD105 in Renal Cell Carcinoma

Hannah Seah, Min Xie, Britney Reese, Mariam Oladejo, Vikram Mavinkurve, and Laurence M. Wood

Renal cell carcinoma (RCC) is the most prevalent type of malignant kidney cancer in the U.S with a maximum 5-year survival rate below 20% if diagnosed at an advanced stage. Additionally, RCC is resistant to traditional treatments showing only 4-5% success rates for chemotherapy and radiotherapy. Fortunately, RCC has shown responsiveness to immunotherapy. However, current immunotherapies, such as PD-1 blocking antibody, can result in severe systemic adverse effects, underlining a need for a more focused approach that specifically targets tumor-associated antigens expressed by RCC such as CD105. Both the RCC tumor cells and its vasculature express CD105, making it a unique therapeutic target. While its role is well-characterized in angiogenesis, its impact on the tumor phenotype is still unclear. However, a previous study utilizing human RCC cells in vitro did find that CD105 likely potentiates tumor stem-cell behavior and resistance to chemotherapy. The goal of our project, therefore, is to determine role of CD105 in tumor cell growth and metastasis utilizing a syngeneic murine RCC tumor model, Renca, and to determine if we can therapeutically target CD105-expressing RCC tumors with a CTL-based immunotherapy. In fact, our preliminary data suggests that CD105 mediates Renca tumor cell metastatic potential and that therapeutic targeting of CD105 can reduce RCC tumor growth in vivo. Studies are continuing to further characterize the role of CD105 in RCC tumors growth in a syngeneic mouse model, and the importance of tumor cell-specific CD105 expression in the efficacy of CD105 targeted therapy.

School: Graduate School of Biomedical Sciences

GS1-2 SNIEGOWSKI, COLTON

Targeted Carbon Chain Length Modifications Alter Minocycline Therapeutic Properties to Reduce Alcohol Consumption

Colton Sniegowski, Benjamin Jackson, Joshua Willms, Xiaobo Liu, Maritza Brito, William Kariampuzha, Madhu Narasimhan, Ted W. Reid, and Susan E. Bergeson

Background: Minocycline, a derivative of tetracycline, has antibiotic properties as a result of binding to the bacterial ribosome and inhibiting protein synthesis. While this binding is essential for antibiotic properties, minocycline also has anti-inflammatory, neuroprotective, and immunomodulatory properties, which is why it has been tested for efficacy in other such disorders, including Alcohol Use Disorder (AUD). Therapeutic benefits of minocycline in non-infectious diseases have been limited due to its strong antibiotic effects on healthy gut microbiota. We hypothesized that adding carbon chains of increasing length to key regions of minocycline would remove its antimicrobial properties by preventing it from binding to the ribosome, yet maintain the desirable anti-inflammatory, neuroprotective, and immunomodulatory properties.

Methods: Verification of the chemically modified minocycline (CMM) analogs was done via Nuclear Magnetic Resonance spectroscopy and Liquid Chromatography-Mass Spectrometry after initial identification via Thin-layer Chromatography. Zone of inhibition (ZOI) and colony forming unit (CFU) assays were used to assess the antibacterial efficacy of our CMM analogs in *E. coli* cell culture. To evaluate ethanol and/or water consumption, Drinking-in-the-Dark (DID) and Two Bottle Choice (2BC) procedures were utilized in both female and male C57BL/6J mice.

Results: A series of 4 CMM analogs were found to have loss of antimicrobial action and reduction of ethanol consumption vary with increase of chain length.

Conclusion: CMMs that reduce antimicrobial action and retain efficacy to reduce ethanol consumption may be useful as a treatment for AUD.

School: Graduate School of Biomedical Sciences

GS1-2 WASHBURN, RACHEL

Sertoli cell inhibition of the complement system may improve xenograft viability

Rachel L. Washburn, Gurvinder Kaur, Jannette M. Dufour

Transplantation is used to treat many conditions by improving quality of patient life, as in pancreatic islet transplants to treat Type I Diabetes Mellitus, and by saving lives, as in the case of organ failure. In 2017 there were over 117,000 patients awaiting transplants while just under 35,000 transplants were actually performed. Xenotransplantation, such as transplanting porcine tissue to humans, offers an endless supply of tissue, yet rejection of xenografts is a concern even when using transgenic animals. Immunosuppressive drugs are prescribed to prolong transplant survival. As these drugs are administered long-term, they cause harsh side effects including elevated blood pressure, increased incidence and severity of infections, and organ failure. Hyperacute rejection of xenotransplanted tissue occurs primarily by antibody activation of the complement system. Complement is a series of proteolytic enzymes culminating with either opsonization or lysis of the target cell. Sertoli cells (SCs), a cell type found in mammalian testicles that protects spermatogonia from the immune system, survive xenotransplantation and hyperacute rejection without the use of immunosuppressive drugs by creating an immune privileged environment. SCs produce elevated levels of complement regulatory proteins (CRP) that inhibit the complement cascade including C1 inhibitor, membrane cofactor protein (MCP), decay-accelerating factor (DAF), CD59, and clusterin. Preliminary data from our lab suggests that MCP and DAF are critical to the survival of porcine SCs in vitro. We intend to investigate CRPs produced by SCs and confirm their role in SC-mediated complement inhibition in vivo, along with measuring the concentrations of complement anaphylatoxins to confirm the points at which SCs block the complement cascade. Data gained from these experiments will be critical in determining the mechanism of SC immune privilege and will translate clinically to increase transplant viability in patients.

School: Graduate School of Biomedical Sciences

GS1-2 WILLMS, JOSHUA

Reduction of Ethanol Consumption by Chemically Modified Minocycline Compounds

Joshua O. Willms, Benjamin Jackson, Colton Sniegowski, Xiaobo Liu, Maritza Brito, William Kariampuzha, Myank Shastri, Phat Tran, Ted W. Reid and Susan E. Bergeson

Background—Alcohol Use Disorder (AUD) is the third leading cause of preventable morbidity in the United States, but less than 20% of patients who receive pharmacologic intervention with the currently FDA approved medications achieve sustained remission. Minocycline, a derivative of tetracycline, an antibiotic, is known to reduce ethanol consumption in mice; but long-term use for AUD carries the risk for generating antibiotic resistance and gastrointestinal disturbance. We hypothesize that targeted modifications to the chemical structure of minocycline will remove the antimicrobial action and improve the efficacy to reduce ethanol consumption.

Methods—Fifteen chemically modified minocycline (CMM) analogs were made. Nuclear Magnetic Resonance spectroscopy and Liquid Chromatography–Mass Spectrometry were used to validate the chemical structure and purity of the CMM compounds. Zone of inhibition and colony forming unit assays were used to evaluate the loss of antimicrobial action. Drinking-In-the-Dark (DID) and Two Bottle Choice (2BC) paradigms were used to measure ethanol consumption in adult female and male C57BL/6J mice. Mice were administered CMM or vehicle 20 h prior to a 4 h period of ethanol drinking.

Results—A) Five CMM compounds both lost their antimicrobial activity and significantly reduced ethanol consumption, B) one CMM reduced ethanol consumption, but still needs to be tested for antimicrobial activity, and C) eight CMM compounds retained some antimicrobial activity. D) One CMM was toxic.

Conclusion— Structure-function correlation allowed the design and production of new CMMs, which remains ongoing. The results led to the determination of three lead compounds that will now undergo additional tests for pharmacological efficacy and toxicology. The findings show promise for treatment of AUD with CMMs.

School: Graduate School of Biomedical Sciences

GRADUATE STUDENTS 3+ YEARS

GS3+ BASS, KEVIN

GPR109A for Prevention/Treatment of Breast Cancer: Ketogenic Diet versus Niacin

Kevin Bass, Sabarish Ramachandran, and Vadivel Ganapathy

The classical ketogenic diet (KD) was developed to treat intractable epilepsy in the 1920s and is defined by a ratio of 4:1 or 3:1 grams of fat to combined grams of carbohydrate and protein. A modified and currently popular version of the KD is defined as carbohydrate intake of $50\text{--}100$ grams per day and elevated blood levels of beta-hydroxybutyrate (BHB, a ketone) of >math>0.5</math> mM (normal levels, 0.1 mM). This KD has been proposed as an effective treatment for many diseases, including cancer. BHB is an agonist for the G-protein-coupled receptor GPR109A. Previously published reports from our lab have shown that GPR109A functions as a tumor suppressor in colon and in mammary gland, which can be activated by niacin. The hypothesis that GPR109A is a tumor suppressor is further strengthened by TCGA omics data showing a direct correlation between the level of GPR109A expression in tumors and the overall survival of the patients. Therefore, BHB could also function as a tumor suppressor by activating this receptor. We find that the niacin administered orally increase the time of onset of breast cancer in a spontaneous, transgenic breast cancer model in C57Bl/6J mice, as well as the tumor load over time, with trends toward a lower tumor burden and weight at time of sacrifice, while the ketogenic diet (compared to standard chow) shows less benefit. BHB is also a substrate for mitochondrial oxidation to generate ATP, which could promote tumor growth, possibly explaining this paradoxical outcome. Interestingly, niacin does not have any direct role as an energy-generating molecule in breast and colon cancer models. Quite unexpectedly, we find that mice with GPR109A knockout show decreased tumor volumes in two xenograft models. We hypothesize that niacin supplement might provide a better strategy than a KD for prevention of breast cancer. Testing this hypothesis is the goal of our project.

School: Graduate School of Biomedical Sciences

GS3+ BISHT, KARISHMA

Impact of Temperature-Dependent Phage Reactivation on Pseudomonas aeruginosa Biofilm Formation

K. Bisht, J. L. Moore, R. M. Caprioli, E. P. Skaar, C. A. Wakeman

With the emergence of antibiotic resistance in formerly treatable infectious microbes, new drug targets and treatment options must be identified. Bacteriophages are an exciting area of exploration for therapeutic potential because these bacteria-targeting viruses can eradicate recalcitrant microbial populations such as those growing within biofilms and/or associated with certain infections. Conversely, some bacteriophages have recently been found to contribute to the structural integrity of biofilm via incorporation into the extracellular polymeric substance (EPS) matrix, which aids in biofilm adherence to surfaces and tolerance to stress conditions. *Pseudomonas aeruginosa*, an opportunistic pathogen is a serious threat due to its high level of antibiotic resistance, especially when growing in its clinically relevant biofilm form. Previous studies have demonstrated that *P. aeruginosa* biofilms can be targeted for eradication by some phages whereas reactivation of other phages within its genome can contribute to a biofilm matrix that is tolerant to desiccation and certain antibiotics. We hypothesize that stress conditions associated with the temperature shifts that *P. aeruginosa* experiences as it transitions from the external environment into the host will contribute to differential phage reactivation that impacts biofilm formation.

Using MALDI IMS, we have demonstrated that biofilms grown under different temperature conditions exhibit dramatically different protein expression profiles. Our transcriptomic data also supports a temperature-based regulation mechanism for the phage proteins which could potentially be participating in the biofilm function. We are further exploring the role of these temperature-responsive phage proteins within *P. aeruginosa* EPS using genetics and microscopy techniques to potentially identify novel therapeutic strategies to exploit biofilm-targeting phages while combatting the effects of biofilm-strengthening phage proteins.

School: Texas Tech University

GS3+ BLANTON, HENRY

Anti-inflammatory effects of SU-3327, a JNK inhibitor are sex and dose-dependent and shows sex-specific mechanisms of action involving CB1 and/or CB2 cannabinoid receptors

Henry Blanton, Agata Pietrzak, Melissa Mchann, Jennifer Breilsfoar, Josée Guindon

Introduction: Cannabinoids are known to alleviate inflammatory pain in preclinical models. However their effectiveness in the clinic has been debated. Our group has recently demonstrated sex differences in inflammatory pain models. The development of novel targeted therapies against inflammatory pain while taking into consideration potential sex-differences are imperative. Our laboratory has demonstrated the antinociceptive properties of c-Jun N-terminal kinase (JNK) inhibitor (SP600125) in inflammatory pain. However, a complete understanding of the mechanisms underlying JNK analgesic effect in inflammatory pain processes have not been investigated and remains elusive as whether sex hormones are involved.

Methods: The objective of our current work is to assess in wild-type female and male mice whether JNK antinociceptive effects is sex and dose-dependent. Moreover, we will also evaluate the potential involvement of CB1, CB2 and μ -opioid receptors in this anti-inflammatory effect. Different (0.3, 1, 3, 10, 30 mg/kg ip) doses of SU-3327 were evaluated in the formalin test (10 μ l of 2.5 % formalin intraplantar) in male and female wild-type mice. We also investigated the mechanisms of action of this anti-inflammatory effect by administration of AM251 (3 mg/kg ip), AM630 (3 mg/kg ip) or Naloxone (10 mg/kg ip) 30 minutes prior to SU-3327 (1 or 10 mg/kg ip). Data were analyzed using analysis of variance (ANOVA) for repeated measures or one-way ANOVA as appropriate followed by Bonferroni post hoc tests using SPSS statistical software (version 21.0).

Results: Our study found the anti-inflammatory effect of SU-3327 is sex and dose-dependent. Indeed, in females, only 10 and 30 mg/kg were anti-inflammatory in both the acute and inflammatory phases of the formalin test. This anti-inflammatory effect was mediated by CB2 cannabinoid receptor. CB1 cannabinoid receptor and opioid receptor antagonists failed to reverse the SU-3327 anti-inflammatory effect in female mice. In males, in the acute phase, 3, 10 and 30 mg/kg doses and in the inflammatory phase, 0.3, 1, 3, 10 and 30 mg/kg doses showed anti-inflammatory effects using the formalin test. Moreover, CB1 and CB2 cannabinoid receptor as well as opioid-receptor antagonists failed to reverse this anti-inflammatory effect of SU-3327 (dose of 10 mg/kg). This dose was inducing hypothermia and locomotor effects. Therefore, we evaluated a lower dose (1 mg/kg) of SU-3327 in male and found that this anti-inflammatory effect of SU-3327 (1 mg/kg) is mediated by both CB1 and CB2 cannabinoid receptors.

Conclusions: These results illustrate the sex and dose-dependent anti-inflammatory effect of SU-3327 and demonstrate as well the sex-specific mechanism of action. This highlight the important role of sex-hormones in the modulation of inflammatory pain. Further studies are needed to evaluate how these hormonal changes are influencing cannabinoid and opioid receptors in inflammatory pain processes.

GS3+ BOUNDS, KAYLA

BlastX wound gel influences the wound healing process in an S. aureus infected wound

Kayla Bounds¹, Vivian Yim², Jane Colmer-Hamood^{2,3}, Matthew Myantti⁴, Randall Jeter¹, and Abdul Hamood^{3,5}

Chronic wounds, which include pressure ulcers and diabetic foot ulcers, affect approximately 6.5 million persons with a high annual cost for treatment. *Staphylococcus aureus*, one of the bacteria commonly isolated from infected chronic wounds, prevents or slows wound healing. Previously, we showed that BlastX wound gel (BX), eliminates *S. aureus* bioburden from an infected wound. Besides its antimicrobial effect, BX may promote wound healing. Using the murine model of wound infection, we examined the influence of BX on the healing of a *S. aureus*-infected wound. Full-thickness wounds were generated, infected with *S. aureus* for 8 h, and covered with sterile gauze (untreated wound, UTW), gauze coated with polyethylene glycol base (PEG-treated wound, PTW), or gauze coated with BX gel (BX-treated wound, BTW). The wound bed and margins were excised at 1, 3, and 7 days post-treatment. Formalin-fixed tissues were processed, sectioned, and stained with H&E for general histological observations. On day 1, all treatments showed neutrophilic infiltrate (PMN) and edema throughout the wound beds, while a blood clot had formed in the wound margin of the BTW. By day 3, the level of epidermal hyperplasia was substantial within the margin of BTW but minimal in UTW and PTW. PMN infiltrate and edema were present throughout the wound beds of UTW and PTW, while BTW showed the beginning of crust formation and PMNs present throughout the wound. On day 7, UTW and PTW revealed the presence of epidermal hyperplasia and a compact crust formation across the wound bed. In contrast, BTW showed advanced epidermal hyperplasia, organized crust formation with PMN infiltrate across the wound bed, and formation of blood vessels indicative of neovascularization. On all days, BX eliminated *S. aureus* from the wound bed (6-log reduction). These results suggest that application of BX accelerated the healing of infected wounds and eliminated the wound bioburden.

School: Texas Tech University

GS3+ BROWN, TIMOTHY

Expression of the peptide transporter PEPT1 in breast cancer and its relation to tumor microenvironment and Warburg effect

Timothy Brown, Sabarish Ramachandran, Vadivel Ganapathy

Lactate and protons accumulate in the tumor microenvironment as a result of aerobic glycolysis in tumor cells. The resultant acidic environment creates an inwardly directed H⁺ gradient across the tumor cell plasma membrane. We hypothesized that tumor cells can exploit this naturally occurring H⁺ gradient as a driving force to fuel H⁺-coupled nutrient transporters to effectively meet their nutritional needs. One such transporter is the peptide transporter PEPT1 (SLC15A1). Expression of PEPT1 is normally limited to small intestine but has recently been found to be highly expressed in pancreatic and colon cancers. Until now there are no published reports on PEPT1 in breast cancer. PEPT1 would be very relevant for rapidly growing tumors because collagen in the extracellular matrix has to be digested to make room for tumors to grow. Additionally, metastatic breast cancer invasion of bone requires breakdown of collagen. When extracellular matrix proteins are degraded by tumor-secreted metalloproteinases, peptides would be generated in situ in the proximity of the tumor cells. These peptides could serve as the substrates for PEPT1. To test the validity of this concept, we first analyzed PEPT1 mRNA in several spontaneous transgenic mouse models of breast cancer. To our surprise, PEPT1 expression was limited to MMTV-Neu Tg mice, but absent in normal mammary gland and also in mouse breast tumors representing other subtypes. To further investigate a possible connection between the oncogenic neu and PEPT1, we determined PEPT1 mRNA in human breast cancer cell lines encompassing three different subtypes. As with our findings in transgenic mice, PEPT1 was expressed only in SK-BR-3 cells, a Her2⁺ breast cancer cell line. No PEPT1 expression was detected in the ER⁺ MCF-7 cell line or triple-negative MDA-MB-231 cell line. These data demonstrate a molecular connection between PEPT1 and Her2 in breast cancer, where PEPT1 might contribute to amino acid nutrition of tumor cells.

School: Graduate School of Biomedical Sciences

GS3+ ELMASSRY, MOAMEN

Malonate metabolism regulates quorum sensing, virulence factors, and antibiotic resistance of Pseudomonas aeruginosa

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We recently showed that the growth of *Pseudomonas aeruginosa* strain UCBPP-PA14 (PA14) in whole blood from trauma patients significantly influenced the expression of more than 250 genes. Among the genes whose expression was significantly induced were those constituting the malonate utilization operon. Whether malonate, a dicarboxylic acid involved in the biosynthesis of fatty acids, influences virulence gene expression is unknown. We hypothesized that malonate, if used as a sole carbon source, influences the expression of PA14 virulence genes. Using RNA-seq analysis, we examined the effect of growth in M9 minimal medium supplemented with either malonate (MM9) or glycerol (GM9) as a sole carbon source on the expression of PA14 genes. Compared with its growth in GM9, the growth of PA14 in MM9 differentially regulated the expression of 3,436 genes. Malonate induced the expression of several virulence genes, including those involved in *Pseudomonas* quinolone signal (PQS) biosynthesis, pyocyanin and cyanide production, flagellum synthesis, and the efflux pumps mexGHI-opmD and mexPQ-opmE. In contrast, malonate repressed the expression of genes involved in type III secretion, synthesis of pyoverdine, and the efflux pump mexXY-oprM. Using lacZ-transcriptional fusion analysis, we confirmed the effect of malonate on some of those genes. As a sole carbon source, malonate significantly enhanced the production of pyocyanin, catalase, and PQS but significantly reduced pyoverdine production by PA14. In addition, malonate reduced biofilm formation and expression of the biofilm-associated Pel polysaccharide biosynthesis genes. Malonate also increased PA14 sensitivity to norfloxacin, a fluoroquinolone antibiotic. In *P. aeruginosa*, resistance to fluoroquinolones is associated with the function of MexXY-OprM efflux pump. These results suggest that, as a sole carbon source, malonate influences *P. aeruginosa* by significantly altering the expression of different virulence genes.

School: Texas Tech University

GS3+ ENRIQUEZ, JOSUE

Susceptibility of genetically diverse outbred mice to acute graft vs. host disease

Josue Enriquez, Brianyell McDaniel Mims, Kathryn Furr and Matthew B. Grisham

A major limitation with use of hematopoietic stem cell transplantation to treat hematological malignancies is the development of a potentially lethal, multi-organ inflammatory disorder called acute graft versus host disease (aGVHD). Mice are the primary animal of choice for modeling aGVHD. One aspect of these mouse models that may limit translation of promising therapeutic strategies to patient treatment is the use inbred mice as surrogates for genetically diverse human populations. Objective: Quantify and compare tissue inflammation and injury in inbred vs. outbred mice using a well-characterized model of aGVHD-mediated bone marrow (BM) failure and spleen hypoplasia. Methods: C57Bl6 (B16) CD4⁺ T cells (20,000 T cells/g b.w.) were injected (i.p.) into sub-lethally irradiated B16-H2-Ab1bm12 (BM12) recipients (B16→BM12) or into Collaborative Cross (CC) or CD1 outbred recipients. Results: Adoptive transfer of allogeneic B16 T cells into BM12 recipients induced marked weight loss (25%) at 20 days post T cell transfer that was associated with dramatic reductions in hematocrit as well as significant decreases in circulating granulocytes, platelets and erythrocytes when compared to their syngeneic controls (BM12→BM12). Total cell numbers in BM and spleen were also found to be dramatically reduced in these mice. Histopathological inspection confirmed severe hypocellularity in BM and spleen whereas no aGVHD was present in the lungs, liver, skin and colon. In contrast, adoptive transfer of B16 T cells into sub-lethally irradiated CC or CD1 outbred mice induced little or no weight loss at 25-30 days post T cell transfer and no significant reductions in hematocrit, circulating leukocytes, erythrocytes or platelets. BM- and spleen-associated cell numbers were not reduced when compared their CC controls. Conclusions: Genetically diverse outbred mice are resistant to aGVHD-mediated BM failure and spleen hypoplasia. The translational implications of this study will be discussed.

School: Graduate School of Biomedical Sciences

GS3+ GUITERREZ, SNEIDER

Mechanism of Antimony Drug Resistance in Leishmania Parasites

Sneider Alexander Gutierrez Guarnizo, Elena B. Tikhonova, Elkin Galeano, Carlos Muskus, Zemfira N. Karamysheva, Andrey L. Karamyshev

The leishmaniasis is one of the major tropical disease that affects about twelve million people worldwide with estimated two million new cases per year. It is caused by Leishmania parasites, unicellular protozoa that are able to infect human and other vertebrates. During the last 60 years, the pentavalent antimonials (SbV) have been used as a major treatment. However, it was a significant decrease in the drug efficacy associated with development of resistance of the clinical Leishmania isolates to antimonials (SbV-resistance) demanding an urgent need to understand the molecular mechanism of Leishmania drug resistance to improve the disease treatment. The major goal of this project is to elucidate the molecular mechanism of resistance to SbV in Leishmania parasites. We hypothesized that drug resistance in Leishmania parasites is associated with differential gene expression caused by drug treatment. The Leishmania species lacks transcriptional regulation and gene expression is mostly regulated on translational level thus making challenging the identification of the potential gene products involved in drug resistance by conducting transcriptome analysis. Therefore, in this project we combined methods to study translation in Leishmania with different phenotypic studies of drug resistant parasites. First, to identify mRNAs that are preferably translated in the drug resistant isolates we employed polysomal profiling technique and deep RNA sequencing of highly translated fractions of control and drug resistant cells. This method allows to identify the full set of mRNAs efficiently engaged in translation. At the same time, we showed that drug resistant parasites have higher tolerance to reactive oxygen species and show significant difference in metabolomic profile. In addition, our preliminary results reveal the difference in lipids profile in drug resistant cells suggesting that specific changes in plasma membrane could contribute to SbV resistance in Leishmania parasites.

School: Graduate School of Biomedical Sciences

GS3+ HEIN, MATTHEW

Kappa opioid receptor blockade restores inhibition of amygdala CRF neurons in a model of functional pain

Matthew Hein, Guangchen Ji, Edita Navratilova, Frank Porreca, Volker Neugebauer

Functional pain syndrome (FPS) is defined as a condition in which the pain cannot be attributed to tissue pathology. Mechanisms of FPS remain to be determined, but these conditions are typically triggered by stress, which can create a chronic pain condition. Corticotropin releasing factor (CRF) and its CRF1 receptor in the amygdala have been linked to emotional-affective behaviors and pain modulation. The amygdala is also a major site of opioid receptors. The central nucleus of the amygdala (CeA), in particular, serves as a major site of amygdala output, and exhibits high levels of expression of the G_{i/o}-coupled kappa opioid receptor (KOR). KOR activation by its endogenous ligand, dynorphin, or agonists can have adverse effects, but the mechanisms are not clear. Based on preliminary data, we hypothesize that KOR activation inhibits synaptic inhibition of CRF CeA neurons. Here we tested the hypothesis that blockade of KOR signaling restores inhibitory control of CRF neurons in a rat model of FPS.

Brain slice electrophysiology was used to measure the effects of a KOR antagonist (Nor-Binaltorphimine, nor-BNI) on CRF-CeA neurons, which can be visualized in brain slices from transgenic Crf-Cre rats. AAV5-ChR2-CaMKII-eYFP was injected into the lateral parabrachial area (LPB) to allow optical activation of glutamatergic synaptic input to CeA neurons, because LPB input provides nociceptive information to the amygdala. The FPS model was induced by morphine priming for 7 days followed 3 weeks later by 1 hour of restraint stress on 2 consecutive days. Whole-cell patch-clamp recordings of CRF-CeA neurons found that nor-BNI increased LPB-evoked glutamate-driven inhibitory synaptic currents (IPSCs) as well as spontaneous and miniature IPSC frequency, but not amplitude, while decreasing neuronal excitability. The data suggest that blockade of KOR signaling in a rodent model of FPS restores synaptic inhibition of CRF-CeA neurons through a presynaptic mechanism of action.

School: Graduate School of Biomedical Sciences

GS3+ HERNANDEZ, SARAH

Potential Targets in Parkinson's Disease Treatment: Uncovering New Interacting Partners of alpha-Synuclein

Sarah M. Hernandez, Kristen R. Baca, Elena B. Tikhonova, Andrey L. Karamyshev

Parkinson's disease (PD) is the second most common neurodegenerative disease and is rated as the 14th leading cause of death in the United States by the CDC. PD is part of a class of neurodegenerative diseases, referred to as Synucleinopathies, which are characterized by the presence of intracellular inclusions known as Lewy bodies. Lewy bodies are composed of aggregated protein alpha-Synuclein (aSyn). Protein misfolding and aggregation is a common cause for many human diseases. Our hypothesis is that alterations of aSyn interacting partners during translation leads to its misfolding and aggregation, causing disease. In PD, this alteration of interacting partners can be due to a mutation in aSyn itself (familial PD) or by defects in the interacting partners (sporadic PD). aSyn mutations (A30P, E46K, H50Q, G51D, A53E, and A53T) are all present within the first part of the protein, where early co-translational interaction events take place. The major goal of this study is to identify possible interacting partners during translation for both wild-type and mutated aSyn. The potential candidates include proteins that are associated with the ribosome or polypeptide nascent chain during translation- signal recognition particle (SRP), chaperones Hsp70 and Hsp90, chaperonin TRiC/CCT, modifying factors, and others. We found that depletion of the SRP subunit, SRP54, affects both mRNA and protein expression of WT and mutant aSyn. Our data suggest that the targeting factor SRP is involved in aSyn regulation at the level of translation. Determining co-translational interacting partners of aSyn is key in discerning the causes of aggregation and developing therapies against it.

School: Graduate School of Biomedical Sciences

GS3+ KORAC, KSENIJA

Pancreatic Cancer and Carbidopa

Ksenija Korac and Yangzom D. Bhutia

Pancreatic ductal adenocarcinoma (PDAC) is the most lethal of all cancers with a survival rate only in single digits. Our laboratory has identified SLC6A14 to be significantly upregulated in PDAC. Using alpha-methyl-L-tryptophan (a-MLT) as a blocker, we have demonstrated SLC6A14 to be a good therapeutic target for PDAC. PDAC is also characterized by an immune-suppressive environment wherein the antigen-presenting dendritic cells (DCs) and tumor-draining lymph nodes express higher indoleamine-2,3-dioxygenase 1 (IDO1). This contributes to immune-suppression. IDO1 is a tryptophan (Trp)-catabolizing enzyme; its increased activity in DCs depletes tryptophan in the surroundings, suppresses proliferation of T cells, and enables tumor cells to evade the immune system. Our question here is, can we target both SLC6A14 in the tumor cells and IDO1 in the immune cells, with a single agent, to treat PDAC. Though a-MLT is a potent blocker of SLC6A14, our aim here was to identify an FDA-approved drug that could target both SLC6A14 and IDO1. Recently, our laboratory identified Carbidopa, an FDA-approved drug to have an anticancer property. Carbidopa is an inhibitor of aromatic amino acid decarboxylase and is used to potentiate the therapeutic efficacy of the antiparkinsonian drug L-DOPA. Carbidopa's structural similarity to a-MLT (SLC6A14 blocker) and phenylhydrazine (IDO1 inhibitor) implicated that it could target both SLC6A14 and IDO1. Interestingly, our computational modelling suggested Carbidopa to be a highly potent blocker and inhibitor of SLC6A14 and IDO1, respectively. To validate our computational findings, we performed a radiolabeled glycine uptake and also a liquid chromatography/mass spectrometry (LC/MS/MS); surprisingly both the experiments showed Carbidopa to be neither a SLC6A14 blocker nor an IDO1 inhibitor. We then treated pancreatic cancer cell lines (BxPC-3, Capan-1, and CFPAC-1) with 20 mM Carbidopa for varying time points and performed a Real-time PCR, and Western blotting. To our surprise, we found that Carbidopa treatment significantly inhibited SLC6A14 and IDO1 expression, both at the mRNA and protein level. Further experiments demonstrated that Carbidopa induced inhibition of SLC6A14 led to amino acid deprivation, inhibition of mTORC1 signaling and thereby attenuation of pancreatic cancer growth. Currently, using in vivo animal model we are trying to extrapolate our in vitro findings and interrogate the efficacy of Carbidopa in the presence of either a single target or both the targets. Additionally, we are also trying to understand the molecular mechanisms responsible for SLC6A14 and IDO1 inhibition by Carbidopa. We conclude that SLC6A14 and IDO1 is a novel molecular target for Carbidopa and that this FDA-approved drug could be repurposed as a novel and targeted single-agent chemo-immunotherapy for pancreatic cancer.

School: Graduate School of Biomedical Sciences

GS3+ LIU, XIAOBO

Development of a mini-pig model of alcohol use disorder

Xiaobo Liu, Benjamin Jackson, Joshua Willms, Brittany Backus and Susan E. Bergeson

Alcohol Use Disorder (AUD) is a chronic relapsing brain disease characterized by compulsive alcohol use, loss of control over alcohol intake, and a negative emotional state when not using. There has been a limited translational success for AUD from mice to humans; therefore, it is important to develop new animal models. The purpose of the proposed work is to develop a mini-pig model of AUD that can be used as a translational tool.

We previously developed a swine model using a Two Bucket Choice (2BC) paradigm in adult farm pigs. Ethanol consumption, preference, and pharmacokinetic elimination indicated that the farm pig was more similar to human AUD than rodent model. Farm pigs reached intoxicating free-choice binge drinking levels and the development of a strong preference for ethanol over water. Minocycline reduced preference for ethanol better than naltrexone, the current AUD standard care. These data encouraged us to develop a mini-pig model because of the limitation of housing and the ability to complete brain imaging studies.

We are using Sinclair mini-pigs in a 2BC paradigm until they meet DSM-V criteria currently. Using a within-subject experimental design, all behavioral tests are done before, during and after the development. The sucrose preference test will be used to measure depression. Craving behavior will be tested by increased alcohol consumption after a period of withdrawal. We will use the measurement of work to access alcohol. Pharmacokinetic and pharmacodynamic tolerance to alcohol will be tested by ladder test as well as the lying to standing test and measurement of ethanol elimination over time. Overall symptoms of withdrawal will be evaluated based on the video. Body temperature, blood pressure, heart rate, and sleep cycle will be monitored for alcohol-related changes. Our hypothesis is that the model meets the DSM-V criteria. Our long-term goal is to test our newly developed drugs and the new promising compounds reported in the literature.

School: Graduate School of Biomedical Sciences

GS3+ MACHA, SHAWN

APR-246, which Restores p53 Function, is Highly Active against Alternative Lengthening of Telomere (ALT) Cell Lines and PDXs

Shawn Macha, Balakrishna Koneru, Cody Eslinger, Jonas Nance, Kristyn Mccoy, Charles Zhu, C. Patrick Reynolds

Most cancers proliferate by activating telomerase (TA+), while 15% of cancers employ the ALT mechanism. ALT has been associated with resistance to DNA damaging agents, p53 loss-of-function (p53LOF), and very poor survival. We showed that ATM kinase, which activates functional p53, is constitutively activated in ALT cell lines (CLs) and PDXs. We hypothesized that constitutive activation of ATM would selectively sensitize ALT cancers to p53 reactivation by APR-246. ALT, p53LOF CLs were significantly ($p < 0.0001$) less sensitive to DNA-damaging agents relative to TA+ p53LOF comparators. We observed higher ($p < 0.005$) phosphorylation of ATM/ATR kinases (involved in DNA-damage signaling) in ALT relative to TA+ CLs. ALT, p53LOF CLs showed significantly higher cytotoxicity in response to the p53 reactivator APR-246 ($p < 0.0001$) compared to TA+ p53LOF CLs. Induction of telomere dysfunction in a TA+, p53LOF CL using dominant-negative TRF2 (a shelterin protein that blocks ATM activation) activated ATM and sensitized the cells to APR-246 ($p < 0.01$). Chemical inhibition of ATM or ATR kinase antagonized APR-246 in ALT CLs with a mean 2.3-fold increase in APR-246 IC₅₀ ($p < 0.0001$). Knockdown of ATM kinase similarly antagonized APR-246 cytotoxicity. ALT CLs treated with APR-246 showed p53 phosphorylation and induction of the downstream p53 targets p21 and NOXA. APR-246 enhanced the cytotoxicity of irinotecan (as SN38) in ALT CLs in vitro significantly more than seen in TA+, p53LOF CLs ($p < 0.001$). APR-246 significantly ($p < 0.01$) increased event-free survival (EFS) of five ALT neuroblastoma, rhabdomyosarcoma and lymphoma CDXs/PDXs while APR-246+irinotecan combined caused most mice (28/31) to hit a complete response ($p < 0.0001$). APR-246+irinotecan had no significant effect ($p = 0.4$) on EFS in 2 TA+, p53LOF PDXs relative to irinotecan alone. The constitutive activation of ATM/ATR kinases together with p53 LOF found in ALT cancers results in a high sensitivity to restoring p53 function with APR-246.

School: Graduate School of Biomedical Sciences

GS3+ MAZZITELLI, MARIACRISTINA

Group II metabotropic glutamate receptors regulate synaptic transmission of amygdala CRF containing neurons in a model of arthritic pain

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The central nucleus of amygdala (CeA) serves major amygdala output functions, and receives nociceptive information via the external lateral parabrachial nucleus (PB). The CeA is also the main source for extra-hypothalamic corticotropin releasing factor (CRF). CRF-CeA containing neurons project to other brain regions involved in the modulation of behaviors and pain. Gi/o-coupled group II metabotropic glutamate receptors (mGluR2/3 subtypes) are expressed in different brain regions, including the amygdala. Their activation can decrease neurotransmitter release and regulate synaptic plasticity, but effects of the modulation of group II mGluRs and subtypes on CRF-CeA neurons remains to be determined. In this study we address this question in an arthritic pain model. Brain slice physiology was performed to determine the effects of a group II mGluR agonist (LY379268 disodium salt) and a positive allosteric modulator (PAM) selective for mGluR2 (LY487379 hydrochloride) on CRF-CeA neurons from normal and arthritic rats (5-6h postinduction of a monoarthritis). In order to visualize CRF-CeA neuron in brain slices, we used transgenic Crh-Cre rats. Whole-cell patch-clamp recordings of CRF neurons were used to measure monosynaptic excitatory postsynaptic currents (EPSCs) and glutamate-driven inhibitory postsynaptic currents (IPSCs) evoked by stimulation of PB inputs. Activation of group II mGluRs by LY379268 resulted in a reduction of the synaptic responses (EPSCs and IPSCs) evoked by PB stimulation, whereas selective activation of mGluR2 by LY487379 decreased EPSCs, but not IPSCs, in the pain model, suggesting a critical involvement of mGluR3 in the regulation of inhibitory transmission. These results suggest that amygdala group II mGluRs can regulate synaptic transmission of CRF neurons, and that mGluR2 and mGluR3 might be involved in different aspect of pain processing in the amygdala, which could make them valuable targets of pharmacological agents for pain relief.

School: Graduate School of Biomedical Sciences

GS3+ MCDANIEL MIMS, BRIANYELL

Prophylactic antibiotic treatment exacerbates Graft vs. Host Disease-induced bone marrow failure and spleen hypoplasia

Brianyell McDaniel Mims, Josue Enriquez, Kathryn Furr, and Matthew Grisham, Ph.D

Acute graft vs. host disease (aGVHD) is a major complication following hematopoietic stem cell transplantation. The majority of preclinical/ clinical studies suggest that intestinal injury caused by the toxic conditioning protocols such as irradiation and/or chemotherapy potentiates the onset and severity of aGVHD by enabling the translocation of intestinal bacteria and their products into the gut tissue where they activate donor T cells and initiate disease. However, we recently reported that aGVHD-induced bone marrow (BM) failure and splenic hypoplasia develops in the absence of gut damage suggesting that intestinal bacteria may not be required for disease pathogenesis. Objective: Determine whether prophylactic gut decontamination with broad spectrum antibiotics (Abx) affects the onset and/or severity of aGVHD-induced BM and spleen damage. Methods: Syngeneic (B16) or allogeneic (Balb/c) CD4+CD25- T cells (5x10⁶ cells) were injected (i.p.) into NK cell-depleted B16 RAG1^{-/-} recipients. Prior to T cell transfer, RAG1^{-/-} mice received water (ad libitum) containing aspartame (Asp) or an Abx cocktail containing Asp, neomycin and vancomycin for 7 days prior to and following T-cell transfer. Results: Both Asp- treated and Abx-treated mice lost approximately 20% of their body weight prior to sacrifice at 11-30 days post T cell transfer. Treatment of allogeneic mice with Abx reduced colonic bacterial load by more than 20-fold when compared to their Asp-treated counterparts. Abx treatment also resulted in large and significant reductions in BM- and spleen-residing T cells and myeloid cells as well as circulating erythrocytes, platelets and hematocrit when compared to Asp treated mice. These Abx-induced alterations were associated with significant increases (~4-fold) in serum IL-6 levels compared to Asp-treated mice. Conclusions: Prophylactic Abx treatment exacerbates aGVHD-induced BM failure and spleen hypoplasia in the absence of gut injury.

School: Graduate School of Biomedical Sciences

GS3+ MYERS, CAITLYN

The Epididymal Amyloid Matrix is a Novel Host Defense Structure

Caitlyn Myers and Gail Cornwall

The epididymis plays a critical role in protecting sperm from invading pathogens that can ascend the male tract. Due to the blood-epididymal barrier, the epididymis has a limited adaptive immune system and must rely heavily on the antimicrobial proteins (AMPs) of the innate immune system. It is not yet known mechanistically how these AMPs function. In other organs, some AMPs require an amyloid (cross- β -sheet) conformation for function, such as α -defensin 6 in the gut and A β in the brain whose amyloids form nets to trap pathogens. We previously established a nonpathological, functional amyloid matrix is in the epididymal lumen and contains the amyloid forms of the CRES subgroup (CRES, CRES2, CRES3, cystatin E2), a reproductive subgroup within the family 2 cystatins of cysteine protease inhibitors. We hypothesize the epididymal amyloid matrix is a novel host defense structure that uses its amyloid form to create a protective net around sperm that can trap and kill pathogens. To test our hypothesis, we incubated CRES monomer and various maturational states of CRES amyloid for two hours with wild type *E. coli* and uropathogenic *E. coli* and *S. aureus* strains in a colony forming unit (CFU) assay. These results showed the most pronounced antimicrobial activity was associated with CRES amyloid instead of its monomeric form. The endogenous amyloid matrix also caused a decrease in the survival of *E. coli*. To examine the antimicrobial mechanism, we performed a Live/Dead assay and observed CRES amyloid permeabilized bacterial membranes. Many functional host defense amyloids (i.e. biofilms, nanonets) contain a matrix made of amyloid and extracellular DNA (eDNA). Using DAPI (DNA) and thioflavin S (amyloid), we observed eDNA in the amyloid matrix from the epididymis. Further, when treated with DNase I, the matrix dispersed suggesting DNA is important for its infrastructure. Taken together, these studies suggest that the epididymal amyloid matrix is a novel host defense structure.

School: Graduate School of Biomedical Sciences

GS3+ PEDROZA, DIEGO

Progesterone Receptor Membrane Component 1 communicates with classical steroid hormone signaling to promote breast cancer growth

Diego A Pedroza, Venkatesh Rajamanickam, Ramadevi Subramani, Alejandra Bencomo, Adriana Galvez, Rajkumar Lakshmanaswamy

Introduction: Increased expression of the progesterone – receptor membrane component 1 (PGRMC1), a heme – binding protein with the ability to interact and stabilize epidermal growth factor receptor (EGFR), is frequently found in breast cancer tissue. Although progesterone (P4) and estradiol (E2) have been shown to stimulate and regulate cancer proliferation via the progesterone receptor (PR) and estrogen receptor (ER), the basis of the signaling mechanisms and communication between PR/ER/PGRMC1 remains largely unknown. We aim to identify classical and non-classical endocrine signaling mechanisms that can alter breast cancer cell proliferation.

Materials and Methods: A panel of non-malignant breast and breast cancer cell lines were cultured and screened for PGRMC1 expression and treated with E2, P4, Tamoxifen (anti-estrogen), RU-486 (anti-progestin), AG-205 (PGRMC1 antagonist). We also silenced ER, PR, and PGRMC1 using siRNAs. MTS, qRT-PCR, western blot, phospho-explorer antibody array, and luciferase reporter assay were performed.

Results: Increased PGRMC1 mRNA and protein levels were observed in ER-positive ZR-75-1 cells, these results were validated and compared to online RNA-seq based gene expression analysis of breast cell lines and breast tumor data sets. Treatment of E2 and P4 increased cell proliferation while tamoxifen, RU-486, and silencing ER, PR and PGRMC1 decreased cell proliferation. Phospho-proteome analysis demonstrated overall downregulation of the PI3K/AKT and EGFR signaling mechanisms following AG-205 and PGRMC1 silencing. Interestingly, silencing ER, PR, and PGRMC1 demonstrates the communications between classical and non-classical mechanisms.

Conclusion: Our data demonstrates that PGRMC1 plays a prominent role in regulating breast cancer growth and progression by altering the PI3K/AKT/EGFR mechanisms and interacts with the classical signaling pathway.

School: Graduate School of Biomedical Sciences

GS3+ REDMAN, WHITNI

The Utilization of Glycoside Hydrolase Alone or in Conjunction With Antibiotics to Clear Biofilm-Associated Infections

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85% of all bacterial infections are biofilm-associated. Biofilms are communities of microorganisms with a self-synthesized extracellular polymeric substance (EPS). EPS not only makes it difficult for immune cells to enter the biofilm, but also creates a challenge for antimicrobial agents to reach the infection. Previously we have shown that glycoside hydrolases (GHs) are effective in breaking the glycosidic linkages found within the EPS, dispersing the bacterial cells, and allowing antimicrobial agents access to dispersed microbes. This study focused on determining the most efficacious combination of GHs and antibiotics to clear biofilm-associated infections. 16 antibiotics from various classes were screened to determine their minimum inhibitory concentrations (MICs) for *Pseudomonas aeruginosa* (PAO1) and *Staphylococcus aureus* (SA31). The antibiotics that had an MIC lower than 300 μ g/mL were selected for further screening in addition with GHs that exhibited the highest dispersal efficacy in previous studies. 125 U/mL of the following GHs- amylase (from *A. oryzae*), alginate lyase (from various algae), amyloglucosidase (from *A. niger*), pectinase (from *Rhizopus* sp.), and xylanase (from *A. oryzae*) were used to treat bacteria either with or without antibiotics for 2hrs. SA31 or PAO1 was grown in 96-well plates and exposed to GHs, antibiotics, or GHs+antibiotics for 24hrs to determine if GHs were inactivating the antibiotics. Amylase and Pectinase decreased gentamicin sulfate efficacy. Next, SA31 or PAO1 was grown in 96-well MBEC[®] biofilm plates for 24hrs to allow biofilms to establish. The biofilms were then treated with various GH+antibiotic combinations for 2hrs. Following treatment, the biofilms were stained with crystal violet to determine the amount of biofilm present. Thus far, alginate lyase+ levofloxacin and amylase+ tetracycline have exhibited the highest efficacy. In conclusion, GHs in combination with antibiotics have a potential to combat biofilm infections.

School: Graduate School of Biomedical Sciences

GS3+ RISTIC, BOJANA

Hereditary hemochromatosis disrupts uric acid homeostasis and causes hyperuricemia via iron/heme-p53-ABCG2 axis

Bojana RISTIC, Sathish SIVAPRAKASAM, and Vadivel GANAPATHY

Hereditary hemochromatosis (HH) is mostly caused by mutations in the iron-regulatory gene HFE. The disease is associated with iron overload, resulting in liver cirrhosis/cancer, cardiomegaly, kidney dysfunction, diabetes, and arthritis. Fe²⁺-induced oxidative damage is suspected in the etiology of these symptoms. Here we examined, using Hfe^{-/-} mice, whether disruption of uric acid (UA) homeostasis plays any role in HH-associated arthritis. We detected elevated levels of UA in serum and intestine in Hfe^{-/-} mice compared to controls. Though the expression of xanthine oxidase, which generates UA, was not different in liver and intestine between wild type and Hfe^{-/-} mice, the enzymatic activity was higher in Hfe^{-/-} mice. We then examined various transporters involved in UA absorption/excretion. Glut9 expression did not change; however, there was an increase in Mrp4 (ABCC4) and a decrease in Abcg2 in Hfe^{-/-} mice. As ABCG2 is responsible for intestinal excretion of UA and mutations in ABCG2 cause hyperuricemia, we examined the potential connection between iron and ABCG2. We found p53-responsive elements in hABCG2 promoter and confirmed with chromatin immunoprecipitation that p53 binds to this promoter. p53 protein was markedly reduced in Hfe^{-/-} mouse intestinal tract. p53 is a heme-binding protein and p53-heme complex is subject to proteasomal degradation. We conclude that iron overload in HH leads to heme accumulation, promoting p53 degradation with consequent decrease in ABCG2 expression. As a result, intestinal excretion of UA via ABCG2 is decreased, causing serum and tissue accumulation of UA, a potential factor in the etiology of HH-associated arthritis.

School: Graduate School of Biomedical Sciences

GS3+ ROBERTS, EMMA

Zan VWD domain duplication and divergence reflect unique evolution of a speciation gene in myomorph rodents

Emma K. Roberts¹, Emily A. Wright¹, Robert D. Bradley^{1,2}, and Daniel M. Hardy³

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Internal tandem duplications of domains in mosaic proteins can produce rapid expansion of protein domain repeats that serve as a source of novel genetic material for adaptive divergence of species. The Eutherian speciation gene *Zan* encodes the mosaic protein zonadhesin that mediates species-specific gamete recognition. Tandem duplication of a *Zan* two-exon cassette has produced dramatic D3p domain expansions in the Myomorpha Suborder of Rodentia, with varying numbers of repeats among species. Here we characterized the relationship between myomorph phylogeny and the pattern of D3p expansion. Variation in the number of D3p domains generally reflected species richness of taxa in the more terminal branches of rodent phylogeny. Comparative analyses of 21 domain Groups and three additional novel domain Groups specific to murid species identified primitive tandem repeats based on their statistically supported association to each other and their presence in all but one of the myomorph species examined. The architecture of the domain Groups indicates that duplication events are occurring on the 5' end of the expansion, with progressively more primitive domains pushed downstream in proximity to the protein's C-terminus. The most primitive Groups did not diverge at the base of the phylogeny, and Groups with the least support among nodes in the phylogeny exhibited the greatest intensity of positive selection, suggesting an effect of differential positive selection on the evolution and functions of the corresponding domains. We conclude that: 1) a series of tandem D3p domain duplication events occurred since the divergence of myomorph rodents; 2) the duplication pattern reveals evidence of concerted gene evolution and pervasive and often intense positive selection within Groups; and 3) the extent of D3p domain expansion may be a useful criterion both for inclusion of species in Myomorpha and for placement of them within the various myomorph genera.

School: Texas Tech University

GS3+ SCHNIERS, BRADLEY

PepT1 modulates pancreatic cancer growth and is upregulated in response to its substrates

Bradley K. Schniers, Yangzom D. Bhutia

Pancreatic ductal adenocarcinoma (PDAC) is a lethal cancer. Our lab currently researches PepT1 (SLC15A1), a proton-coupled oligopeptide transporter that transports a wide array of di- and tri-peptides, as well as peptidomimetic drugs. Our preliminary data shows PepT1 to be upregulated in PDAC. The purpose of this study is to investigate the tumor promoting role of PepT1 and also to understand the mechanism of upregulation. To achieve this, PepT1 was knocked-out using a shRNA. AsPC-1 was used as the model cell line to generate AsPC-1-Ctrl and knockdown cell lines. After confirming PepT1 knockdown using 3H-GlySar uptake as a measure of its function, colony formation assay, migration and invasion assay, and subcutaneous xenograft were conducted to study its tumor promoting role. It was interesting to note that the absence of PepT1 reduced the colony formation ability, migration and the invasion capacity, and reduced the tumor volume compared to the control cells, suggesting its tumor promoting role. The mechanism of PepT1 upregulation in PDAC remains unknown. Interestingly, literature evidences have shown amino acids, dipeptides, hormones, certain pharmacological agents, and transcription factors like Sp1 and Cdx2 to regulate PepT1 expression. We hypothesize that the dipeptides available in the TME bind to Sp1 and Cdx2, leading to its nuclear translocation wherein Sp1 binds to the GC-rich region of the PepT1 promoter and regulates its expression. Our preliminary data shows that lactate upregulates MMPs and DPP1V expression. Also, amino acid deprivation and re-stimulation studies show that dipeptides upregulate PepT1 expression and function. Further, we plan to perform ChIP analysis to probe deeper into the mechanisms. In summary, PepT1 is upregulated in PDAC and promotes its growth but the molecular mechanisms needs further elucidation.

School: Graduate School of Biomedical Sciences

GS3+ SHARMA, MONICA

Acetylation of conserved DVL-1 lysines regulates its nuclear translocation and binding to gene promoters in triple-negative breast cancer

Monica Sharma, Deborah Molehin, Isabel Castro Piedras, and Kevin Pruitt

For the 32nd SRW at TTUHSC, I would like to present novel findings from my PhD research recently published in Scientific Reports (Nature). This study is the first to report that Dishevelled (DVL) nuclear entry and exit is controlled by post-translational lysine acetylation. This discovery has helped to redefine how we view DVL proteins since they have been almost exclusively studied as cytoplasmic regulators of Wnt signaling for the past 60 years. We are excited to have uncovered a novel, simple and elegant regulatory switch that controls DVL functions. These findings could help identify new therapeutic vulnerabilities in cancer biology.

Dishevelled proteins are central mediators of the Wnt signaling pathway and are versatile regulators of several cellular processes, yet little is known about their post-translational regulation. Acetylation is a reversible post-translational modification (PTM) which regulates the function of several non-histone proteins involved in tumorigenesis. Since we previously demonstrated that lysine deacetylase, SIRT-1, regulates DVL protein levels and its function, we reasoned that DVL could potentially be a substrate for SIRT-1 mediated deacetylation. To further examine the potential role of multiple families of lysine deacetylases in the regulation of DVL, we screened for novel acetylation sites using liquid chromatography mass-spectrometry analysis. Herein, we report 12 DVL-1 lysine residues that show differential acetylation in response to changes in oxygen tension and deacetylase inhibition in triple-negative breast cancer. PTMs are well documented to influence protein activity, and cellular localization. We also identify that acetylation of two key lysine residues, K69 and K285, promote nuclear over cytoplasmic localization of DVL-1, and influences its promoter binding and regulation of genes implicated in cancer. Collectively, these findings for the first time, uncover acetylation as a novel layer of regulation of DVL-1 proteins.

School: Graduate School of Biomedical Sciences

GS3+ SIKDER, MOHD OMAR FARUK

SLC6A14, a Na⁺/Cl⁻-coupled amino acid transporter, functions as a tumor promoter in colon and is a target for Wnt signaling

Mohd Omar Faruk Sikder, Satish Sivaprakasam, Vadivel Ganapathy

SLC6A14 is a Na⁺/Cl⁻-coupled transporter for neutral and cationic amino acids. It is expressed at basal levels in normal colon but is upregulated in colon cancer. However, the relevance of this upregulation to cancer progression and the mechanisms involved in the upregulation remain unknown. Here we show that SLC6A14 is essential for colon cancer and that its upregulation involves, at least partly, Wnt signaling. Upregulation of the transporter is evident in most human colon cancer cell lines and also in a majority of patient-derived xenografts. These findings are supported by publicly available TCGA (The Cancer Genome Atlas) database. Treatment of colon cancer cells with α -methyltryptophan (α -MT), a blocker of SLC6A14, induces amino acid deprivation, decreases mTOR activity, increases autophagy, promotes apoptosis, and suppresses cell proliferation and invasion. In xenograft and syngeneic mouse tumor models, silencing of SLC6A14 by shRNA or blocking its function by α -MT reduces tumor growth. Similarly, deletion of Slc6a14 in mice protects against colon cancer in two different experimental models (inflammation-associated colon cancer and genetically driven colon cancer). In colon cancer cells, expression of the transporter is reduced by Wnt antagonist or by silencing of I-catenin whereas Wnt agonist or overexpression of I-catenin shows the opposite effect. Finally, SLC6A14 as a target for I-catenin is confirmed by chromatin immunoprecipitation. These studies demonstrate that SLC6A14 plays a critical role in promotion of colon cancer and that its upregulation in cancer involves Wnt signaling. These findings identify SLC6A14 as a promising drug target for treatment of colon cancer.

School: Graduate School of Biomedical Sciences

GS3+ SWEAZEY, RYAN

The regulatory membrane protein FXYD6: Localization in the CNS and interaction with the Na⁺,K⁺ ATPase

Ryan Sweazey and Pablo Artigas

The Na⁺,K⁺-ATPase (NKA) is ubiquitous in the membranes of all animal cells where it generates the Na⁺ and K⁺ gradients necessary for cell excitability. It consists of one α and one β subunit, and often, a FXYD regulatory subunit. Seven FXYD family members may interact with $\alpha\beta$ dimers, which in turn may form by association of distinct $\alpha\beta$ combinations ($\alpha1$ - $\alpha4$, $\beta1$ - $\beta3$). Isoform expression presents with tissue-, cell- and subcellular specificity. Each FXYD isoform alters the apparent affinities for transported ions of $\alpha1\beta1$ isoforms. We used co-immunoprecipitation and confocal immunofluorescence microscopy in mouse hippocampus and cerebellum, as well as in human SH-SY5Y neuroblastoma cells, to determine the interaction and localization of the brain-specific FXYD6. FXYD6 polyclonal antibodies prominently stained the Purkinje cells (bodies and dendrites) and the molecular layers of the cerebellar cortex, as well as the CA1 pyramidal and the dentate gyrus of the hippocampus. The strongest FXYD6 staining appears to be perinuclear and intracellular. We performed co-immunoprecipitation followed by Western-blot analysis to determine whether FXYD6 has specific α interacting partners and found that in hippocampus, cerebellum and SH-SY5Y cells FXYD6 pulled down both $\alpha1$ and $\alpha3$ (reciprocally $\alpha1$ and $\alpha3$ pulled FXYD6 down). The kinetic effects of FXYD6 association with $\alpha1\beta1$ or $\alpha3\beta1$ were evaluated in oocytes expressing these isoforms, utilizing the two-electrode voltage clamp and patch clamp electrophysiology. FXYD6 produced several effects: 1) Significantly reduced (2-4-fold) the number of $\alpha1\beta1$ and $\alpha3\beta1$ at the membrane surface leading to diminished NKA current, 2) reduced the apparent Na⁺I affinity in $\alpha1\beta1$ (~2-fold) and 4) increased the turnover rate of $\alpha1\beta1$. Current experiments aim to refine FXYD6 cellular localization, protein interactions, and physiologic function with more accuracy.

School: Graduate School of Biomedical Sciences

GS3+ WRIGHT, EMILY

Allelic variation in PRNP exon 3, susceptibility to neurodegenerative prion disease, and implications for inter-species transmission

Emily A. Wright¹, Matthew J. Buchholz², Blake A. Grisham², Robert D. Bradley^{1,3}, Daniel M. Hardy⁴, Emma K. Roberts¹, and Warren C. Conway²

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The misfolding of prion protein gene (PRNP) products causes fatal neurodegenerative diseases called spongiform encephalopathies. Various prion amino acid polymorphisms have been associated with three categories of spongiform encephalopathy: 1) familial, where disease alleles are inherited, 2) sporadic, in which mutations arise spontaneously, and 3) transmissible, where the prion disease is infectious among mammalian organisms. The transmissible diseases can cross species barriers through consumption of affected tissue, as occurred in the outbreak of bovine spongiform encephalopathy during the 1990's that led to the first cases of human variant Creutzfeldt-Jakob Disease. In wild and captive cervids (deer species), prion misfolding causes an increasingly prevalent spongiform encephalopathy, Chronic Wasting disease (CWD), that is raising global biological, human health, and wildlife management concerns. While transmission to humans has not been documented, it remains possible that handling and consumption poses a risk to human health, especially considering that harvested, infected cervids may not be clinically symptomatic. Several known codon variants affect susceptibility to prion misfolding, some that spontaneously result in disease and others that can confer resistance. PRNP exon 3 encompasses the entire protein coding region, so we are currently characterizing exon 3 sequences among cervids and other mammals, in both wild and domestic populations, to identify potential codon variants that may affect susceptibility to disease and likelihood of transmission across species barriers. These analyses of PRNP sequences will provide insight into functionally important PRNP allelic variation relevant to disease management in cervids and prevention of potential transmission to humans.

School: Texas Tech University

GS3+ YOUNG, VICTORIA

The conformational dance of the Na⁺-pump studied with Voltage Clamp Fluorometry

Ryan Sweazey and Pablo Artigas

The Na⁺,K⁺-ATPase (NKA) is ubiquitous in the membranes of all animal cells where it generates the Na⁺ and K⁺ gradients necessary for cell excitability. It consists of one α and one β subunit, and often, a FXYD regulatory subunit. Seven FXYD family members may interact with $\alpha\beta$ dimers, which in turn may form by association of distinct $\alpha\beta$ combinations ($\alpha 1$ - $\alpha 4$, $\beta 1$ - $\beta 3$). Isoform expression presents with tissue-, cell- and subcellular specificity. Each FXYD isoform alters the apparent affinities for transported ions of $\alpha 1\beta 1$ isoforms. We used co-immunoprecipitation and confocal immunofluorescence microscopy in mouse hippocampus and cerebellum, as well as in human SH-SY5Y neuroblastoma cells, to determine the interaction and localization of the brain-specific FXYD6. FXYD6 polyclonal antibodies prominently stained the Purkinje cells (bodies and dendrites) and the molecular layers of the cerebellar cortex, as well as the CA1 pyramidal and the dentate gyrus of the hippocampus. The strongest FXYD6 staining appears to be perinuclear and intracellular. We performed co-immunoprecipitation followed by Western-blot analysis to determine whether FXYD6 has specific α interacting partners and found that in hippocampus, cerebellum and SH-SY5Y cells FXYD6 pulled down both $\alpha 1$ and $\alpha 3$ (reciprocally $\alpha 1$ and $\alpha 3$ pulled FXYD6 down). The kinetic effects of FXYD6 association with $\alpha 1\beta 1$ or $\alpha 3\beta 1$ were evaluated in oocytes expressing these isoforms, utilizing the two-electrode voltage clamp and patch clamp electrophysiology. FXYD6 produced several effects: 1) Significantly reduced (2-4-fold) the number of $\alpha 1\beta 1$ and $\alpha 3\beta 1$ at the membrane surface leading to diminished NKA current, 2) reduced the apparent Na⁺I affinity in $\alpha 1\beta 1$ (~2-fold) and 4) increased the turnover rate of $\alpha 1\beta 1$. Current experiments aim to refine FXYD6 cellular localization, protein interactions, and physiologic function with more accuracy.

School: Graduate School of Biomedical Sciences

PHARMACEUTICAL SCIENCES | SCHOOL OF PHARMACY

PHAR AKWII, GRACE RACHEAL

Formins: Mediators of Angiopoietin 2-induced, Tie2-independent lymphatic endothelial cell migration

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Angiopoietin-2 (Ang2) is considered a context-dependent agonist/antagonist of the Angiopoietin/Tie signaling pathway. Ang2 is highly expressed in regions of active vascular remodeling, such as ovaries, placenta and uterus in adulthood. Elevated Ang2 levels are present in inflammatory conditions, such as sepsis, acute lung injury, pneumonia, and tumors, where it promotes tumor growth and metastasis. Understanding the molecular processes of these diseases helps in their accurate recognition, diagnosis and treatment. Here, we investigated Ang2-driven effect and signaling pathways in lymphangiogenesis in vitro and in vivo.

Ang2 induced Human Dermal Lymphatic Endothelial Cell (HDLEC) migration and activated RhoA in a time- and dose-dependent manner. RhoA was pivotal for Ang2-induced cell migration, and required beta-1 integrin for its activation, which occurred upon GEF-H1 and PDZ-RhoGEF binding. Both FAK and Src were necessary for cell migration, however, Ang2 stimulation induced Src and pMLC, but not FAK and Akt phosphorylation. Ang2-induced cell migration was not blocked upon inhibition of ROCK, a downstream RhoA effector. Formins are actin-nucleators and are downstream targets of integrin and RhoA activation. Formin inhibition reduced cell migration even in the presence of Ang2. Knockdown experiments highlighted that FHOD1 was responsible for Ang2-induced cell migration. Ang2-induced lymphangiogenesis was supported by in vivo experiments using the ear sponge assay, and preliminary experiments in the same model show that endothelial RhoA is important for Ang2-induced lymphangiogenesis.

In conclusion, Ang2 induces HDLEC migration through integrin-mediated RhoA and FHOD1 activation, inducing actin filamentation/polymerization and leading to cell migration. This study reveals a novel pathway of Ang2-induced HDLEC migration, providing novel targets for a central process of pathological conditions, such as tumor angiogenesis, metastasis and inflammation.

School: Graduate School of Biomedical Sciences

PHAR ANDERSON, SARAH

Dental pulp-derived stem cells reduce inflammation and accelerate wound healing associated with Inflammatory Bowel Disease

Sarah Anderson and Hiranmoy Das

Inflammatory bowel disease (IBD) is a debilitating chronic inflammatory disease affecting the small and large intestine. IBD can be further subcategorized into Crohn's Disease and Ulcerative Colitis. In 2015, 3 million adults, about 1.3% of the US population had been diagnosed with IBD. There are significant problems when it comes to this disease. Its etiology is poorly understood, which leads to therapeutic challenges. There is currently no cure for IBD; treatments available focus on temporary management of the disease. IBD is characterized by chronic inflammation, a weakened intestinal barrier and dysbiosis of the microbiome. Recently, mesenchymal stem cells have gained attention as a potential therapy for IBD. Mesenchymal stem cells have immunomodulatory effects, angiogenic properties, and wound healing potential. Dental pulp-derived stem cells are a subtype of mesenchymal stem cell that can be extracted from human wisdom teeth. They are an attractive source for mesenchymal stem cells because they can be obtained from routine surgery as a medical byproduct. Our current study was undertaken to validate potential use of dental pulp-derived stem cells for the treatment of IBD using two different animal models and defining mechanisms herewith. As IBD is constantly experiencing a proinflammatory environment, we plan to investigate whether priming DPSC with proinflammatory signals has any impact on their behavior and function. In first step of our validation in vitro, we show that primed DPSCs with the bioactive reagents such as LPS, TNF- α , or IFN- γ , alter their immunologic properties by expressing higher levels of IL-10, HGF, IDO and IL-4. In addition, primed DPSCs also altered monocyte polarization towards immuno-suppressor phenotype (M2), where monocytes expressed higher levels of IL-4R, IL-6, and Ym1 upon co-culture with primed DPSC. Moreover, primed DPSCs induced accelerated wound healing determined by using a gut epithelial cell scratch wound assay. Wound healing of gut epithelial cells was mediated by inactivating constitutively active AKT, NF- κ B, STAT3 and ERK1/2 pathways when co-cultured with the primed DPSCs. Collectively these data provide evidence that DPSCs have potential to reduce inflammation, M2 polarization of myeloid cells, and healing damaged gut epithelial cells through inactivation of inflammation and constitutively active signaling pathways.

School: Graduate School of Biomedical Sciences

PHAR BHALERAO, ADITYA

HIV infection in the CNS – How smoking can lead to adverse outcomes

Aditya Bhalerao, Dr. Luca Cucullo

BACKGROUND - The rate of tobacco smoking is exceedingly high in HIV infected individuals (40-65%) when compared with the general population (15%). Furthermore, 50% of the HIV infected population exhibits neurological complications, including NeuroAIDS, which identifies a group of neurological disorders caused primarily by HIV-mediated damage to the central and peripheral nervous systems. The oxidative damage and inflammatory stress caused by chronic smoking on the cerebrovascular system is well established. In our lab, we have demonstrated that tobacco smoke is a potent oxidative and inflammatory stress-inducing agent that can facilitate the loss of BBB function and mitochondrial redox balance leading to a host of comorbidities. The HIV-1 envelope glycoprotein (gp120) is neurotoxic and is known to cause oxidative stress with direct implications for blood-brain barrier (BBB) impairment. However, whether a synergism exists between the two in the context of HIV infection in the CNS is not known. We hypothesize that the oxidative stress caused by tobacco smoking and HIV-1 envelope protein gp120 may have a contributory effect on the increasing burden of NeuroAIDS related morbidity and mortality in HIV infected individuals who smoke.

METHODS - We cultured Primary Human Brain Microvascular Endothelial Cells (HBMECs) and treated confluent monolayers with Tobacco Smoke Extract (TSE) and gp120 in individual and combination treatments for 24 h

RESULTS - Co-exposure to tobacco smoke extract (TSE) and HIV-1 gp120 (gp120) further aggravated the BBB endothelium dysfunction. We evaluated this by measuring Trans-Endothelial Electrical Resistance (TEER), permeability, TJ protein expression. We also evaluated antioxidant defense (NRF2), inflammatory response (NF κ B) expression and mitochondrial function.

CONCLUSIONS - Co-exposure to tobacco smoke extract (TSE) and HIV-1 gp120 (gp120) further aggravated the BBB endothelium dysfunction thereby worsening cerebrovascular condition.

School: School of Pharmacy

PHAR CHOWDHURY, EKRAM AHMED

Isoflurane increases blood brain barrier permeability without disrupting tight junctions

Ekram Ahmed Chowdhury

Introduction: Multiple studies have recently reported the volatile anesthetic agent isoflurane damages the blood-brain barrier (BBB). The disruption of tight junction proteins after prolonged exposure was deemed as the causative factor. We found a 2-fold increase in BBB permeability soon after anesthesia induction. Considering the rapid time course, we hypothesized that physicochemical effects on cell membranes may play a role. The goal of the present work was to assess changes in BBB upon anesthesia exposure in vitro and in vivo.

Methods: Permeability studies, TEER measurements and immunofluorescence were carried out on iPSC derived brain endothelial cells. Fluorescein loaded erythrocyte ghosts were exposed to anesthetic agents and differences between control and treated samples were analyzed by flowcytometry. Changes in membrane dynamics were assessed through fluorescent anisotropy based measurements on erythrocyte ghosts and liposomes. In vivo pharmacokinetic study to assess brain uptake clearance, K_{in} , of [^{13}C 12] sucrose and fluorescein as markers of permeability was done in anesthetized mice and compared against the awake condition.

Results: Immunofluorescence for tight junction proteins in cells did not show a difference between treatment conditions. Erythrocyte ghosts showed a significant decrease ($p < 0.05$) in fluorescence intensity in the isoflurane treated group. In different liposomal systems and erythrocyte ghosts, anisotropy decreased in a dose dependent manner after isoflurane exposure. Significant differences in permeability were observed both in vitro and in vivo between control and treatment groups ($p < 0.01$), which returned to basal levels after 24 hours.

Conclusion: The study provides evidence that isoflurane increases BBB permeability without tight junction disruption. Further studies are needed to determine whether similar effects are seen with neurotoxic drugs, such as gentamicin, which is currently used in surgical prophylaxis under anesthesia.

School: Graduate School of Biomedical Sciences

PHAR KAUSHIK, ITISHREE

Moxidectin, a novel therapeutic candidate for pediatric medulloblastoma

Itishree Kaushik and Sanjay k Srivastava

Medulloblastoma (MB) is one of the most malignant and common brain tumors in children. It has a profound impact on the morbidity and mortality of these patients. Sonic hedgehog (Shh) activated subgroup of MB is considered to be highly aggressive and metastatic in nature. Shh-MB is characterized by mutations in PTCH1, SMO and SuFu along with amplified activation of Gli1, a major transcription factor of this signaling pathway. In the current study, we have evaluated the anti-cancer effects of moxidectin. Several MB cell lines such as Daoy, UW426, UW228, ONS76, and PFSK1 were treated with moxidectin in a concentration and time dependent manner. Our results demonstrated that moxidectin treatment resulted in significantly reduced proliferation of MB cells. The IC₅₀ of moxidectin in all the MB cell lines ranged 10-17 μ M after 24, 48 and 72 hours of treatment. Moreover, moxidectin was able to induce 3-4 fold apoptosis in all the MB cell lines as evaluated by AnnexinV-FITC/PI assay, and increased cleavage of caspase 3 and PARP. Western blotting analysis demonstrated that moxidectin treatment significantly reduced the expression of Shh and Gli1 and their downstream effector molecules such as Pax-6, Oct-4, Sox-2 and Nanog. Efficacy of moxidectin was evaluated in an in vivo tumor model by subcutaneously injecting human Daoy MB cells in the right and left flank of the mice. Our results demonstrated that 5mg/kg and 10 mg/kg moxidectin by oral administration everyday suppressed the growth of Daoy tumors by 70% and 90% respectively. Conclusively, our results indicate that moxidectin effectively reduces the growth of MB tumors by inhibiting Shh signaling.

School: School of Pharmacy

PHAR RAMACHANDRAN, SHARAVAN

Pancreatic tumor growth suppression through induction of autophagy by a novel anti-Parkinson drug Pimavanserin

Sharavan Ramachandran and Sanjay K. Srivastava

Pancreatic cancer patients have limited treatment options in spite of several advanced treatment strategies. Pancreatic tumors exhibit high basal autophagy compared to other cancers. Several studies including from our lab reported that enhanced autophagy can lead to apoptosis in cancer cells. In this study, we have demonstrated that pimavanserin (PVT) suppresses pancreatic tumor growth by inducing autophagy mediated apoptosis. Our results indicated that PVT induced apoptosis and reduced the proliferation of pancreatic cancer cells with IC₅₀ ranging between 3-9 μ M after 24, 48 and 72 hours of treatment. In addition, PVT inhibited the colony formation of pancreatic cancer cells. Treatment of pancreatic cancer cells with increasing concentrations of PVT resulted in concentration dependent increase in autophagy as evaluated by acridine orange assay by flow-cytometry. PVT induced the expression of autophagy markers ULK1, FIP200, Atg101, Beclin-1, LC3A/B in a concentration dependent manner in several pancreatic cancer cells. Apoptotic effects of PVT in pancreatic cancer cells was validated by increase in cleavage of caspase3 and PARP. Oral administration of PVT suppressed BxPC3 tumor xenografts by 50% in athymic nude mice. In another in vivo experiment, PVT treatment inhibited the growth of orthotopically implanted PANC1 tumors by 77%. Autophagy and apoptosis was confirmed in the tumors of PVT treated mice by immunohistochemistry and western blotting. Chronic administration of PVT did not exhibit general signs of toxicity or behavioral side effects in mice. Moreover, long-term administration of PVT did not altered the clinical chemistry parameters like ALT, AST, albumin. Collectively, our results indicate that PVT mediated pancreatic tumor growth suppression was associated with induction of autophagy and apoptosis. Since, PVT is already available in clinic with an established safety profile, our results will accelerate its clinical development for pancreatic cancer therapy.

School: School of Pharmacy

PHAR RAUT, SNEHAL

Assessing the impact of Alzheimer's disease on the blood brain barrier in vitro using induced pluripotent stem cells (iPSCs)

Snehal Raut; Abraham Al-Ahmad

Alzheimer's disease is characterized by the presence of senile plaques and neurofibrillary tangles. Earlier research targeted A β plaques formation, including the generation of several transgenic animal models overexpressing mutated forms of APP and PSEN1. It failed to yield notable advances in the treatment of AD. Our hypothesis is to study the genetic mutation and abnormal peptides associated with AD will provide better understanding of disease pathophysiology. We aim to study the impact of PSEN mutation on BBB function using iPSC derived brain microvascular endothelial cells. We have used an isogenic in vitro model of the BBB based on patient iPSCs isolated diagnosed with FAD and with mutations in PSEN1 or PSEN2 genes. PSEN1-BMECs displayed a lower expression of tight junction proteins. PSEN1-BMECs showed impaired barrier function compared to control iPSC lines. PSEN1-derived BMECs showed a lower glucose uptake compared to controls and PSEN2-BMECs. PSEN1-BMECs failed to show inhibition of glucose uptake following treatment with glucose transporter inhibitor II. To investigate the impact of such impaired glucose uptake on cell metabolism, we studied changes in glycolysis in iPSC-derived BMECs. PSEN1-BMECs showed a notable decrease in acidic lysosomes compared to control-BMECs. Results showed an impaired mitochondrial function in PSEN-BMEC. Further, we evaluated the effect of A β peptides on glucose metabolism at the BBB using iPSC-derived BMECs. We observed the presence of a dose-dependent decrease in GLUT1 expression and glucose diffusion at the BBB following treatment with Ab peptides in a dose-dependent manner. We are investigating how the different A β 1-40 vs A β 1-42 impacts glucose metabolism at the BBB and identify by which signaling pathway such down-regulation in GLUT1 expression occurs. Our study constitutes the first report of the presence of BMEC phenotype associated with PSEN mutations at the BBB, in particular between PSEN1 and PSEN2 mutant carriers.

School: School of Pharmacy

PHAR SHAHBAZI NIA, SIAVASH

Pro-virulence potency of antimicrobial agents in P. aeruginosa

Siavash Shahbazi Nia, Mohammad Anwar Hossain, Nadezhda German

Pseudomonas aeruginosa (PA) is an opportunistic pathogenic bacterium capable of causing a wide array of acute and chronic infections. In addition to naturally occurring resistance of PA to many antibiotics, its ability to form virulence factors, such as biofilm and pyocyanin, further reduces the effectiveness of antimicrobial therapy. Moreover, multiple reports have shown that selected antibiotics at concentrations below the MIC levels (sub MIC) trigger the production of extracellular virulence factors, acting as inducers of bacterial resistance. Thus, a clear understanding of the mechanisms involved in these events is required to optimize the therapeutic regimen.

Bactericidal/bacteriostatic activity of an antibiotic *in vitro* is shown to be affected by several parameters, including a strain of bacteria, a composition of a growth media, and cell density. However, no data were reported analyzing the effect of the same parameters on the virulence-inducing activity of sub MIC levels of antimicrobial agents. Further, no cross-comparison of virulence potential among different antimicrobial agents was performed. In our study, we have evaluated selected antibiotics, meropenem, doripenem, ciprofloxacin, gentamicin, tobramycin, amikacin, colistin, and aztreonam, against three different strains of *P. aeruginosa*: PG02354 (clinical strain), PAO1 (reference strain), and PA14 (wild-type). The analyzed parameters include virulence potentiation at the sub MIC levels, the effect of cell density, media, and type of the strain on the bacterial activity induced by the sub MIC concentration of these antimicrobial agents. The virulence factors assessed in our study included biofilm formation and pyocyanin production; both are shown to have a pronounced effect on disease progression and treatment efficacy in clinical settings. As a result, we have identified several antimicrobial agents with the strong pro-virulence effects at sub MIC levels (up to $\frac{1}{2}$ MIC). In contrast, selected antibiotics have inhibited the production of biofilm and pyocyanin at the levels of $\frac{1}{4}$ MIC, suggesting the preferential use of later in the treatment of PA-induced infections.

School: Graduate School of Biomedical Sciences

PHAR SHAHI, SADISNA

Novel compounds for the treatment of triple-negative breast cancer with optimized toxicological profile

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Triple-negative breast cancer (TNBC) is an aggressive breast cancer type lacking the expression of estrogen receptor (ER), progesterone receptor (PR) and human epidermal growth factor receptor 2 (HER2) genes. Therefore, it renders hormonal therapy and HER2-based treatment ineffective. Epidemiological studies suggest that TNBC is more common in younger women, primarily of African-American and Hispanic descent. TNBC is characterized by higher metastatic and reoccurrence rates, as approximately 28% of TNBC patients suffer from the brain metastases, leading to decreased survival rates compared to other breast cancer types. At the same time, TNBC shows good response to chemotherapy, and search for novel anticancer agents is vital.

Recently, we identified a novel class of anticancer agents with cytotoxicity against MDA-MB-231 and MCF-7 cell lines, ability to cross the blood-brain barrier *in vitro* and *in vivo*, and optimized toxicological profile. We synthesized and analyzed a library of more than 40 compounds to elucidate the key features responsible for the anticancer activity of these analogs. In addition, we identified molecular targets for these compounds using standard immunoblotting techniques. Here, we report the current state of structure-activity relationship studies for this class of compounds and proposed mechanisms of action associated with their anticancer activity.

School: Graduate School of Biomedical Sciences

PHAR SIVANDZADE, FARZANE

Assessing Cerebrovascular and Neurological Impact of Chronic Smoking on Post Traumatic Brain Injury Outcome and Recovery

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Traumatic Brain Injury (TBI) is one of the most common causes of cerebrovascular and neurological damage worldwide. It has been recently suggested that premorbid conditions such as tobacco smoking (TS, one of the most addictive habit and main public health hazards) leads to exacerbation of TBI and retardation of post TBI recovery. The aim of the present study is to investigate and dissect out the pathophysiological mechanisms underlying the exacerbation of TBI (simulated using a head weight drop model) following chronic TS exposure. For this purpose, male C57BL/6J mice, age range 6–8 weeks were chronically exposed to TS for three weeks. Test animals were then subjected to TBI by guided vertical head weight drop using a 30 g metal weight free falling from an 80 cm distance before reaching the target. Physical activity and body weight of the mice were analyzed before TBI and 1 h, 24 h and 3 days post-injury. Finally, mice were sacrificed to collect blood and brain samples for subsequent biochemical and molecular analysis. Western blotting was applied to assess the expression of Nrf2 as well as tight junction proteins associated with BBB integrity including, ZO-1, Occludin, Claudin-5 from brain tissues homogenates. Levels of NF- κ B along with pro-inflammatory cytokines IL-6, IL-10 and TNF- α were measured by ELISA on blood samples. The results revealed that TS promoted significantly increased inflammation and loss of BBB integrity in TBI when compared to TS-Free test mice. Additionally, mice chronically exposed to TS prior to TBI experienced a more significant weight loss, behavioral, and motor activity deficiency and slower post-TBI recovery when compared to TS-free TBI mice. In conclusion, TS promotes a significant exacerbation of post-TBI neurovascular and neurological impairments. Whereas BBB impairment and pro-inflammatory vascular responses induced by chronic TS exposure are likely responsible for the retardation of post-traumatic recovery observed in these animals

School: Graduate School of Biomedical Sciences

PHAR ZAHRA, FATEMA TUZ

Endothelial small GTPase RhoA regulates bFGF-induced angiogenesis: A potential target for anti-angiogenic therapy

Fatema Tuz Zahra, Md Sanaullah Sajib, Racheal G. Akwii, Paul E. Tullar, Vasileios Oikonomou, Mihalis S. Lionakis, Laurence Wood, Constantinos M. Mikelis

Objective: Current antiangiogenic therapies target vascular endothelial growth factor (VEGF) or the VEGF-induced signaling pathways. However, development of resistance due to bFGF upregulation remains a serious disadvantage of current approaches, demanding efforts of simultaneous targeting of VEGF and FGF pathways. The small GTPase RhoA has been reported to regulate VEGF-induced angiogenesis. In the present study we investigate the role of endothelial RhoA in bFGF-induced angiogenesis to identify whether RhoA can be considered a common downstream target.

Methods: In vitro experiments (cell migration, 2D and 3D sprout formation) were performed to assess the impact of pharmacological inhibition or knockdown of endothelial RhoA on bFGF-induced angiogenesis in human umbilical vein endothelial cells (HUVECs). Pull-down experiments and other biochemical assays were performed to identify the molecular mechanism of bFGF-induced RhoA activation. In vivo, endothelial-specific inducible RhoA-deficient mice with a fluorescent reporter were used in a modified matrigel plug angiogenesis model.

Results: Pharmacological RhoA inhibition or RhoA knockdown abrogated bFGF-induced in vitro angiogenesis. In vivo, tamoxifen-induced endothelial RhoA-deficiency blocked bFGF-induced angiogenesis. Mechanistically, bFGF activates RhoA, through the RhoA-specific GEFs, such as GEFH1, P115, LARG and PDZrhoGEF. Among the bFGF receptors, FGFR1 is predominantly expressed in HUVECs and FGFR1 knockdown abrogated bFGF-induced RhoA activation and angiogenesis. Downstream, RhoA is partially involved in bFGF-induced JNK phosphorylation, however bFGF-induced ERK and p38 activation are not affected. Ongoing experiments are aimed to delineate the downstream signaling pathway of bFGF-induced RhoA activation.

Conclusion: Collectively, our data suggest that RhoA pathway participates in bFGF-induced angiogenesis highlighting its role as a common target for anti-angiogenic therapy.

School: Graduate School of Biomedical Sciences

MS1-2 ABIDI, HUSSAIN

Atraumatic Spontaneous Hemorrhagic Cholecystitis; an atypical presentation of a rare case

Hussain Abidi MBA, Jasmin Raresh MS, Ebrahim Payberah, Caroline Freedle, Vincent Athas MD, Linda Luong MD, Dayton Wong MD, Steven Brooks MD, Catherine Ronaghan MD, FAC

Introduction: Hemorrhagic cholecystitis is a rare subtype of acute cholecystitis with an incidence of 3.5%. Specific risk factors identified in the literature include history of trauma and anticoagulant use. It can also present in the settings of malignancy, cirrhosis, and renal failure. Diagnosis hinges on a high index of suspicion with confirmatory studies such as CT scan or ultrasound.

Methods: We present a case of a 48 year old female who underwent laparoscopic cholecystectomy in October of 2019 with literature review. Data and information were collected via chart review of EMR at UMC from the initial ER visit, the intrahospital course, as well as outpatient f/u at the surgery clinic.

Results: Patient presented on October 14, 2019 to the ER with severe acute RUQ abdominal pain and thoracic back pain, improved in left lateral decubitus position. She was awoken from sleep suddenly due to severe back pain. Because of her presentation, the emergency medicine physician ordered a stat CT scan aorta dissection protocol. CT showed a distended gallbladder with heterogeneous attenuation within. This prompted the ultrasound which demonstrated heterogeneous infiltration within the gallbladder lumen suspicious for malignancy or intraluminal hemorrhage. The patient was afebrile and without hemodynamic instability in the ER. Blood work and labs indicated an initial serum lactate of 2.4, WBC of 8, hemoglobin of 14.9, platelet count of 267, INR of 0.98, total bilirubin of 0.9, and a lipase of 16.

The patient was taken to the OR within 18 hours of admission for laparoscopic cholecystectomy. The gallbladder was decompressed because of extreme distention and blood clots were evacuated. Prolonged adhesiolysis was performed. Due to the size of the cystic duct, it was controlled with a 0-PDS Endoloop. The postoperative course was uncomplicated, and the patient was discharged on October 17, 2019.

Conclusion: Hemorrhagic cholecystitis is a medical emergency with a high rate of mo

School: School of Medicine

MS1-2 ABRAHAM, JONATHAN

Posterior Spinal Fusion with Instrumentation and Bone Autograft for Type I Congenital Kyphosis in a 10-month Male

Cody Beaver MD, Jon Wall MD, Jonathan Abraham

Introduction: Congenital Kyphosis is an uncommon disorder that is associated with a forward curvature of the spine of typically 30 – 60°. This deformity can be attributed to either a failure of formation of the anterior vertebrae (Type I), failure of segmentation of the anterior vertebrae (Type II), or a mixture of both (Type III). If untreated, Congenital Kyphosis can progress rapidly and lead to neurological symptoms including paraplegia.

Case Report: A 6-month old male presented to the clinic with curvature of the spine in the lumbar region. AP and Lateral views of the lumbar spine were consistent with Congenital Kyphosis with the apex at L2 and curvature of approximately 35°. Initial plan was for re-evaluation in 3 months with repeat films and MRI as well as echo and renal ultrasound studies to rule out cardiac and renal abnormalities. Films during follow up revealed progression of kyphosis to 50°. Surgical intervention was recommended in order to stop progression and correct deformity. The procedure involved posterior fusion of the T12 to L3 vertebrae with bilateral sublaminar wiring. Fluoroscopy was utilized for initial visualization of target vertebrae and assessment of posterior fusion. Autograft bone was placed on posterior elements after fusion appeared to be stable. Following procedure, patient was placed into custom clamshell TLSO brace. Post-op X-Rays were taken two weeks after confirming correction.

Conclusion: Patients with Congenital Kyphosis require quick diagnosis and surgical treatment due to the rapid progression associated with this deformity. Surgical correction can be quite difficult especially given this particular patient's age and size. This case study presents a potentially successful surgical approach to treating congenital Kyphosis in infants.

School: School of Medicine

MS1-2 AGUSALA, VEENA

Takotsubo Cardiomyopathy Presenting as an Acute Myocardial Infarction in a 71 year old Female

Dixon, Timothy, MSIV, Dhir, Nikita, MSIII, Agusala, Veena, MSI, Mateja Kirby, MSI

Takotsubo cardiomyopathy, named for its distinctive ballooning of the left ventricular apex, is a stress induced heart condition characterized by transient systolic and diastolic left ventricular dysfunction with a variety of regional wall-motion abnormalities. In some cases, it can be misdiagnosed as an acute myocardial infarction. Case Presentation: 71 year old female with a history of hypertension, liver dysfunction, and thrombocytopenia presented to the ER for weakness, fatigue, fever, and watery diarrhea. She had an episode of severe chest pain that resolved on its own. Her EKG showed her cardiac biomarkers as elevated. The next day, she was taken to the cath lab for invasive studying. Following the cath, she developed hypotension and narrowing pulse pressure with JVD. TTE showed pericardial effusion with tamponade physiology. The patient also exhibited severe ventricular systolic dysfunction, as well as a large apical aneurysm of LV. She was diagnosed with Takotsubo cardiomyopathy and cardiovascular surgery was consulted for an emergent pericardial window for cardiac tamponade. The next day, she had to undergo an emergency sternotomy for evacuation of the hemopericardium. Discussion: Takotsubo cardiomyopathy, like an acute myocardial infarction (AMI), is an acute cardiac syndrome that can be distinguished from an AMI from absence of a coronary arterial obstruction. However, TCM and AMI may have certain correlations that have not yet been discovered. On the other hand, the fact that TCM can present as an AMI along with evidence showing that these can occur simultaneously can complicate the workup of a patient. If a patient has TCM, undergoing an invasive procedure like cardiac catheterization can not only be an unnecessary expense, but also put a patient at risk for complications.

School: School of Medicine

MS1-2 AHMED, HIJAB

Examining potential bias in emergency department care among homeless and non-homeless individuals

Hijab Ahmed, MS; Jeff Dennis, Ph.D

Homeless individuals frequently use the Emergency Department (ED). Previous studies have shown that homeless individuals who visit ED are more likely to present with either mental health/substance use and injuries related to violence. A gap in knowledge exists about the triage process for homeless individuals presenting with mental health symptoms. This study aims to test whether homeless individuals receive different treatment in the ED compared to non-homeless individuals. This study combines data for individuals age 18 and up from the 2009-2017 National Hospital and Ambulatory Medical Care Survey, a nationally representative sample of U.S. ED visits. Homeless individuals were compared to those living in a private residence. Ordinary least squares regression tested differences between homeless and non-homeless individuals for triage, wait time, and length of visit outcomes. Separate regression models were run for specific symptom groups, including laceration, general pain, chest pain, headache/migraine, and mental health, adjusting for age, sex, race, and whether the person was seen in the ED in the previous 72 hours. The sample includes 51,166 patient encounters including only those listed as homeless or living in a private residence and those in the above symptom groups. Adjusted models showed homeless individuals presenting with general pain waited 13.6 minutes longer (95% CI: 2.16, 25.0, $p=0.020$) and had 43.9 minutes longer total visits (95% CI: 12.6, 75.1, $p=0.006$) than non-homeless individuals. Homeless individuals who presented for mental health reasons had 141.5 minutes longer total visit length (95% CI: 51.6, 231.5, $p=0.002$) than non-homeless individuals. There were no differences in wait time between homeless and non-homeless individuals. Also, there were no differences in triage. Preliminary findings do not suggest bias in triage or wait time among homeless individuals in the ED, consistent for both more and less urgent presenting symptoms.

School: School of Medicine

MS1-2 ALI, KIRAN

Is Alzheimer's a Lifestyle Disease: A Critical Assessment?

Kiran Ali^{1*}, Neha Sawant^{1*}, Subodh Kumar¹, Murali Vijayan¹, Bhagavathi Ramasubramanian¹, Pradeepkiran Jangampalli Adi¹, LisaAnn Gittner⁴, Hafiz Khan⁴ and P. Hemachandra Reddy^{1,2,3,4,5}

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Dementia is increasing worldwide except in a very few countries that are undergoing changes in everyday lifestyles, such as the United States. Dementia is characterized by memory problems, impaired communication abilities, and impaired reasoning faculties. There are many different types of dementia, including Lewy body dementia, frontotemporal dementia, vascular disorders, mixed dementia, or a combination of types. Alzheimer's disease (AD) is the most common disease associated with dementia. The purpose of our study is to critically assess lifestyle factors, such as healthy diets and regular exercise that affect progression of dementia and chronic diseases. Our study also carefully assessed genetic, environmental, metabolic risk factors that impact dementia.

We collected data on lifestyle factors, including healthy diets and/or diet supplements and exercise in animal models, elderly individuals and AD patients with different clinical severity, along with data on genetic, environmental and metabolic risk factors such as type 2 diabetes and/or cardiovascular and kidney diseases. We also assessed data on nutritional interventions such as calorie restriction, and various bioactive compounds on cognitive decline and dementia.

Our survey of current literature revealed that healthy diets delay dementia progression not only in elderly individuals but also AD patients. Data on mouse models of AD revealed that healthy and/or antioxidants enriched diet reduce AD pathologies (A β and phosphorylated Tau) and delay disease progression. Regular exercise reduces metabolic risk factors such as type 2 diabetes, cardiovascular and kidney diseases ultimately delay the progression of dementia and AD in elderly individuals. Overall, our survey findings strongly suggest that an improved lifestyle can delay chronic diseases and dementia progression and reduce the risk of AD in elderly individuals and reverse subjects with mild cognitive impairment to a non-demented state.

School: School of Medicine

MS1-2 ALKUL, MAHMUD

Transfollicular Elimination of Sebaceous Glands in a Patient with Disseminated and Recurrent Infundibulofolliculitis

Mahmud Alkul BS,^{^1} Austin Smith BS,^{^2} Jay Truitt MD, PhD, PharmD, MPH,^{^3} Michelle B Tarbox MD^{^3}

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A 37-year-old male presented to clinic with a 15-year history of >300 pruritic perifollicular papules on his back, buttocks, chest, legs, and elbows. He reported the papules first appeared when he was deployed in Afghanistan and are worsened by heat and sweat. He was previously diagnosed with papular eczema and later infundibulofolliculitis but was lost to follow-up. He had previously been treated with topical steroids, oral steroids, doxycycline, and tretinoin with mild relief of pruritus but without resolution of papules.

A 3 mm punch biopsy of one papule was performed to confirm prior diagnosis. Histologic examination was significant for complete transfollicular elimination of the sebaceous unit through the epidermis. The biopsy also showed an occluded dilated follicular sebaceous unit with chronic perifollicular inflammation and intracorneal neutrophils. Rare pityrosporum yeast were identified with GMS stain.

The diagnosis of disseminated and recurrent infundibulofolliculitis was confirmed. Treatment was started with fluconazole due to the finding of pityrosporum and has led to mild improvement. A course of oral isotretinoin is the planned next step in treatment.

This patient's case is significant due to the widespread area of involvement, lengthened clinical presentation, and the global transfollicular elimination of sebaceous glands seen on histology. This unique presentation has been scarcely published in the literature, but when reported was limited to only a small area on the back.^{^1}

^{^1}. Weigand DA. Transfollicular extrusion of sebaceous glands: natural phenomenon or artifact? A case report. *J Cutan Pathol.* 1976;3(5):239-44.

School: School of Medicine

MS1-2 ALMAGUER, JOEY

Fill-In Concept Maps as a Method of Active and Integrative Learning in Medical Education

Joey Almaguer and John Pelley, Ph.D.

Among the four blocks that comprise the first-year medical school curriculum at Texas Tech University Health Sciences Center School of Medicine, the class of 2022 medical students performed worst in Multiple Organ Systems (MOS), which covers physiology. In addition to this, out of the four NBME exams taken in the first year, the physiology NBME was the most challenging for the medical students. Because the study of physiology deals with complex interplay of many variables, we hypothesize fill-in concept maps to be the ideal at-home studying modality to facilitate both active and integrative learning. Fill-in concept maps have shown promise in the past, but have not yet been studied or applied on the medical school level. A packet of 16 fill-in concept maps, covering the foundational material taught in unit one of MOS, was provided to the class of 2023 medical students. Each concept map came in two forms: 1) partially completed (containing a key box) to be filled in by the student and 2) fully completed to be used as an answer sheet. The medical students were also directed to expand on the fully completed concept maps themselves in order to facilitate training in concept map development. Lastly, the medical students were provided with 20 practice questions to test their overall proficiency of unit one material. Survey results from the class of 2023 first-year medical students indicate that the fill-in concept maps were a useful studying tool in understanding physiology, integrating the concepts, and retaining the information. In addition to this, a majority of the respondents felt that the fill-in concept maps prepared them to answer the practice questions provided to them. However, there was no correlation indicating that the fill-in concept maps influenced the students to begin developing concept maps of their own for the remainder of the block.

School: Graduate School of Biomedical Sciences

MS1-2 ANAND, ROHAN

Gangrenous Appendicitis Contained within a Spigelian Hernia

Rohan Anand, Jasmin Rahesh, Caroline Chung, Karla Esparza MD, Abbie Schuster MD, Roy Jacobs MD, Steven E. Brooks, MD FACS, Catherine A. Ronaghan, MD FACS

Introduction: Spigelian hernias are a rare type of hernia which can commonly contain abdominal wall contents such as the bowel. It is defined as a focal weakness at the Spigelian aponeurosis between the linea semilunaris and rectus abdominus muscle. It can often go unnoticed as it does not cause the patient any significant or specific distress other than general abdominal pain. Treatment involves surgical intervention.

Objective: To present an atypical presentation of a rare condition of gangrenous appendicitis contained within a Spigelian hernia, with a thorough review of the literature and discussion of surgical management.

Methods: We present a case of a 66-year old male who underwent exploratory laparotomy in September 2019. Data and information were collected via chart review of EMR at UMC from the initial ER visit, the intrahospital course, and post-operative care.

Results: Patient presented to the ER on September 4, 2019 complaining of onset of RLQ abdominal pain 1 week ago and decreased appetite. He had a history RLQ hernia for 5 years with minimal discomfort. Labs revealed leukocytosis of 16.25 with left shift. A CT scan identified appendicitis within a Spigelian hernia. This was confirmed at the time of surgery that same day, where the patient underwent an exploratory laparotomy for appendectomy and repair of the Spigelian hernia. The appendix was found to be grossly necrotic and perforated, with purulent fluid in the hernia sac. Patient had post-operative ileus, but otherwise had an uneventful recovery, and was discharged on September 13, 2019.

Conclusion: Spigelian hernias comprise 0.1-2% of all abdominal hernias, with the incidence of appendicitis within the hernia even more rare. Additionally, these hernias often present either asymptotically, or with vague, unspecific symptoms that may be overlooked until incarceration or strangulation occurs. This case highlights the importance of early identification and exploration of this rare hernia.

School: School of Medicine

MS1-2 ARMIN, SABIHA

TB Meningitis in a Four-Month-Old Infant

Sabiha Armin BS; Fatma Levent, MD; Austin Healy, MD; Maninder Kaur, MD; Thivakorn Kasemsri, MD

Tuberculosis is a disease caused by *Mycobacterium tuberculosis*, with much of its prevalence amongst under-developed countries; TB meningitis remains an unusual cause of meningitis in children in the United States. Central nervous system tuberculosis in children presents commonly as tuberculous meningitis, hydrocephalus, and much more rarely as tuberculomas. In certain areas of the United States, more than 50% of the TB meningitis patients die with TB or have neurological sequelae and complications despite the availability of advanced health care.

We report the case of a four-month-old female who was transferred to the Texas Tech University Health Science Center Pediatric Infectious Disease clinic after 2 episodes of focal-like seizures and vomiting after feeds when she was seen at a community hospital in Hobbs, NM. She had no sick contacts other than her grandfather being diagnosed and treated for pneumonia. A head computed tomography (CT) scan revealed hydrocephalus and an external ventricular drain was placed at our facility. Lumbar puncture showed pleocytosis (WBC 99 with 96% lymphocytes, glucose 12, protein 147) and complete blood count with differential revealed leukocytosis. Initial laboratory evaluation included cerebrospinal fluid (CSF) studies for viral agents, bacterial, fungal, acid-fast bacilli (AFB), and viral cultures and serologic tests for viral pathogens. Empiric broad spectrum antibiotics and phenytoin were initiated. On the subsequent visit, the patient developed a left-sided upper and lower extremity motor weakness, left-sided loss of DTRs, and bilateral eye deviation. Imaging with Magnetic Resonance Imaging (MRI) revealed a brain mass with lepto-meningeal enhancement concerning for tubercular meningitis; a chest CT was done and showed a right-sided hilar mass contiguous with a right upper lobe mass. As bacterial and viral cultures remained negative, and the patient was not improving, a lung biopsy was done and showed necrotizing caseating granulomas consistent with tuberculosis, negative for malignancy. A Purified Protein Derivative (PPD) skin test was placed and had 10 mm induration, confirming the diagnosis. An exhaustive history for possible TB exposures revealed no concerns initially, but after diagnosis and contact investigation, the patient's grandfather was determined to be the source of infection. An appropriate anti-TB regimen of pyrazinamide, rifampin, isoniazid, and ethambutol, and dexamethasone was started. The patient's leukocytosis and CSF pleocytosis had improved with the start of the four-drug therapy and steroids, and the patient showed steady improvement of the left-sided weakness and eye deviation.

Our case highlights the need to maintain a high index of suspicion for tuberculosis, even in young patients that seem to have negative sick contacts. Rapid diagnosis and early treatment are crucial for the outcome of TB meningitis.

School: School of Medicine

MS1-2 BAYLESS, SARAH

Pilot study of PTSD in Lubbock County Detention Center employees using the PCL-5

Gittner, LisaAnn Schelli, PhD. Dennis, Jeffrey Alan, PhD. Bayless, Sarah Makala. Flores, Paloma Celeste. Jones, Jaclyn Marie. Ludwig, Cameron David. Poch, Ryan Matthew. von Roeder, Nathan Lewis

Detention center officers and associated employees are tasked daily with working in the confines of a detention facility to manage a diverse population of incarcerated individuals, including violent offenders, inmates with mental illness and substance use disorders, inmates with intellectual and developmental disabilities, and special populations such as veterans and gang members. The Lubbock County Detention Center (LCDC) houses a co-ed jail population with a capacity of 1,500 inmates, serving Lubbock County and some surrounding areas. As a direct supervision facility, LCDC staff may supervise up to 70 inmates on their own during a shift. Although the freedoms of direct supervision have been shown to have beneficial effects for inmates, the close proximity to correctional staff may lead to increased tensions and stress for employees. Research on Posttraumatic Stress Disorder (PTSD) has focused less on chronic stress environments, and as such, LCDC provides an ideal setting to understand how traumatic exposures impact the mental health of LCDC employees. This study will administer the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5), a 20-item scale, to assess PTSD in this population. Participants rate how much they have been bothered in the past month by their most stressful experience on a 5-point Likert scale ranging from 0-4 (0= not at all to 4= extremely). Findings aim to contribute to national understanding of chronic stress work environments and their relation to PTSD, as well as to make recommendations to LCDC administration about whether additional resources are needed to address PTSD in their employees.

School: School of Medicine

MS1-2 BETTIOL, PATRICK

Novel use of a Porcine ECM Scaffold to treat Post-Operative Seroma in a Total Knee Arthroplasty Patient

Brendan MacKay, MD; Patrick Bettiol, MBA; Chris Gerzina, MD; Cameron Cox, BBA

BACKGROUND: Acellular Dermal Matrix (ADM) has been used since their inception in 1992 to treat burn injuries, abdominal wall reconstruction and breast reconstruction. The purpose of ADM is to provide a non-immunogenic scaffold to promote tissue granulation and re-vascularization of native tissue. However, ADMs are not ideal to native tissue regeneration because ADMs create a dense, fibrous, acellular core that does not permit native tissue and cells to integrate into the scaffold. Urinary bladder matrix (UBM), a porcine extracellular matrix (ECM) scaffold maintains similar tensile and sheering properties to ADMs, but also permits epithelial cell penetration. Epithelial cell penetration serves to protect underlying tissue and stimulates nerve cell growth and fibroblast migration while minimizing wound contraction. **CASE REPORT:** A 52-year-old female with a history of multiple irrigation and drainage procedures of a left total knee arthroplasty over a one-year period presents with a recurrent seroma on the left knee that ruptured one week prior. The patient underwent surgical excision of the seroma and placement of 1500 mg of UBM in both the medial and lateral gutter of the left knee. At the time of the operation, the wound bed was 15 cm (L) x 5 cm (W). However, at the six-week follow-up appointment, the patient presented to the clinic with continued exudative drainage and underwent irrigation and drainage of the seroma. During the procedure, the wound bed size reduced from 15 cm x 5 cm at the initial operation to 9 cm x 4 cm. **CONCLUSION:** In this case, UBM demonstrated success in decreasing the wound bed size and may prove useful in patients who struggle with post-operative wound closure by first intention through several mechanisms. Given that the use of UBM in orthopaedic lower extremity arthroplasty procedures is still uncommon, further research is needed to examine the efficacy of UBM in this setting.

School: School of Medicine

MS1-2 BLAKELY, SUMMRE

Evaluation of Current Screening Effectiveness in Non-Accidental Trauma Cases

Celeste Hollands, MD - Associate Professor of Surgery at Texas Tech University Health Sciences Center in Lubbock, Texas, Summre Blakely, MPH, MS2 with TTUHSC School of Medicine

Introduction: Non-accidental trauma (NAT) is a leading cause of injury and death for children in the United States. Common screening procedures are implemented by all physicians; however, some true NAT cases are still undetected. A child who returns to their residence without intervention after a medical appointment can have an increased risk of mortality from 11 to 50%. Lubbock County is ranked number 14 out of 254 for number of child abuse victims in the past ten years, even though it has a relatively smaller population than several surrounding counties. The goal of this study is to determine the level of over or under screening that is being performed at Covenant Children's Hospital. We hypothesized that pediatric patients at Covenant Children's Hospital are being over-screened for NAT.

Methodology: The trauma registry identified (n=97) patients admitted for diagnosis of NAT from 4/1/17 to 3/31/19 and a chart review was conducted. Variables of interest including screening criteria used for admission, final diagnosis, true NAT, socioeconomic factors (age, sex, insurance, ethnicity/race), and final disposition were compiled and estimated using descriptive statistics such as mean, frequency, median, and distribution patterns.

Results: A total of 97 charts fit the criteria for review. Of these, all 97 patients were screened for NAT and 42 (43.3%) were confirmed NAT while the other 55 had NAT ruled out. Statistical analysis is in progress.

Conclusion: The results of this study will guide an evidence-based suggestion aimed at improving the rate of reported cases so that they more accurately represent the true number of cases. NAT is an important indicator of morbidity and mortality in the pediatric population that can easily be over or under-indicated in the hospital setting. Appropriate screening measures are critical to minimize unnecessary emotional trauma to families and prevent premature death in pediatric patients.

School: School of Medicine

MS1-2 BROWN, ELLEN

A Review of the Lubbock County Drug Court Program

Ellen Brown

Drug court programs are becoming increasingly prevalent across the country due to reports of lower rates of drug use and recidivism, saving communities money in the long-term. Drug-related crimes and substance use treatment are large issues in Lubbock County, leading to the establishment of a drug court in 2005. This project seeks to update and compare the outcome and demographic statistics of the program from the last report done in 2009.

Demographic and outcome statistics on 864 participants from 2009-2017 were obtained from drug court administrators. Data analysis was performed using SPSS-16.

The graduation rate decreased from 65.6% to 56.5%, while the recidivism rate among graduates stayed roughly the same, dropping to 16.8% from 19.6%, and the recidivism rate among program terminates dropped significantly from 66.7% to 39.9%. The number of participants increased by 720% and the percent of women participants dropped from 42.6% to 32.2%. Hispanic/Latino participants decreased from 36.9% to 13.0%.

The program has expanded significantly, graduating 408 more people than in the previous evaluation. The addition of two more courts has enabled the enrollment of higher risk participants. Together, these two factors could have led to the drop in graduation rates. The stable recidivism rate among graduates indicates that the quality of the program has stayed the same, despite the increase in size. The decrease in terminate recidivism could indicate the benefit of spending time in the program. The decreased Hispanic/Latino and female involvement reflects low levels of minority and female enrollment seen in drug court programs across the county. Possible causes include participant declined participation and criminal history causing ineligibility for participation.

The Lubbock Drug Court has helped many offenders break out of the cycle of substance use leading to prison time. Possible areas of improvement for the program are increasing female and minority participation.

School: School of Medicine

MS1-2 CAREY, MICHAEL

Bilateral Cephalohematoma with Sagittal Synostosis and Scaphocephaly

Avery Kopacz BS, Laszlo Nagy MD, Joshua Demke MD, and Michael Carey MS

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Bilateral Cephalohematoma with Sagittal Synostosis and Scaphocephaly:

Inappropriate fusion of the cranial sutures leads to craniosynostosis and the subsequent skull rigidity can cause many developmental and structural problems. Cephalohematoma is a subperiosteal collection of blood commonly associated with birth trauma or instrument-assisted delivery and is one of the most frequently reported fetal injuries in Caesarian Section procedures. There have been very few cases reported of patients with both scaphocephaly due to sagittal craniosynostosis and cephalohematoma and no reports of scaphocephaly with bilateral cephalohematoma as of the date of this report. The current literature suggests that the two conditions are potentially associated, either through mechanical pathways involving trauma or through a complex interplay of growth factors. We present a case of bilateral cephalohematoma with scaphocephaly secondary to progressive sagittal craniosynostosis.

School: School of Medicine

MS1-2 CASTANEDA, KAREN

Sex-specific protection from inhibitory circuit disruption by retinoic acid signaling in a novel mouse model of Alzheimer's disease

Karen Castaneda, Brent Krisby, Anthony J. Pascullo, Robert Barnes, Jeremy D. Bailoo, PhD, Igor Ponomarev, PhD, J Josh Lawrence, PhD.

INTRODUCTION: Vitamin A (VA) signaling disruption is observed in Alzheimer's disease (AD). Deficiency of retinoic acid (RA), a VA metabolite, may contribute to hippocampal dentate gyrus (DG) hyperactivity seen in the amnesic mild cognitive impairment stage of AD and alter excitation/inhibition (E/I) balance. Intact inhibitory somatostatin (SOM) and parvalbumin (PV) circuits normally maintain E/I balance, but the impact of RA on DG SOM and PV circuitry has not been investigated. **OBJECTIVE:** The goal of this study was to evaluate the therapeutic effect of RA on DG SOM and PV circuitry during AD pathogenesis. **METHODS:** Triple transgenic J20+/- (AD) mouse models were generated, enabling examination of SOM and PV circuitry via tdTomato (tdT) expression. Mouse models were treated with RA (RT) or corn oil (VT) intraperitoneally and compared to age-matched J20-/- (WT) controls. Behavioral testing was done in the Y-maze and open field maze. Brains were then hemisected for histological and transcriptomic analyses. **RESULTS:** Behavioral testing revealed VT AD mice traveled a greater distance than WT AD mice (U=5.000, p=0.009). RT AD and WT mice did not vary in overall distance travelled (U=16.000, p=0.727), suggesting phenotype normalization. Histological analysis revealed SOM:tdT expression in the DG inner molecular layer (IML) of AD, but not WT mice. SOM:tdT expression was absent in the DG IML of 5/6 male RT AD mice, consistent with a rescue of phenotype. However, SOM:tdT expression in the DG IML of 3/3 female RT AD mice persisted, indicating sex differences in RA signaling. Transcriptomic pairwise comparison of VT WT and AD to RT WT and AD showed partial normalization of differentially expressed genes, particularly within the Synaptogenesis Signaling pathway. **CONCLUSION:** RA appears to have protective effects against AD pathogenesis among males. The sex differences observed warrant further investigation involving a larger sample size of mice per group matched by age and sex.

School: Graduate School of Biomedical Sciences

MS1-2 CHANDRAHAS, SHEILA

Treatment of Three Different BRAF-V600E Positive Brain Tumors with Vemurafenib and Dabrafenib/Trametinib: A Case Series

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Background: The BRAF-V600E gene is a protein kinase involved in regulation of the mitogen activated protein kinase pathway (MAPK/MEK) and downstream extracellular receptor kinase (ERK). The BRAF-V600E mutation has a significant role in the progression of pediatric brain tumors. 85% of pediatric CNS tumors express the BRAF mutation. Thus, BRAF targeted therapy in pediatric CNS malignancies has potential to become the standard of care for tumors expressing this mutation.

Objective: Current pediatric CNS brain tumor treatment focuses on chemotherapy and radiation, causing significant toxic side effects for patients. The significance of this case series lies in relaying our experience using targeted therapy in BRAF-V600E positive CNS pediatric brain tumors.

Methods: We followed the disease course, progression, and treatment of three pediatric patients with three different CNS tumors. Each of these individuals was treated with surgical resection, chemotherapy, and/or radiation as per standard protocol. When that modality failed to reduce tumor progression, we found that each of their different tumors was BRAF-V600E positive and they were all started on targeted therapy.

Discussion: Vemurafenib, Dabrafenib, and Trametinib are BRAF-V600E/MEK inhibitors that were initially used to treat melanomas. However, more research has shown that various pediatric CNS tumors are BRAF-V600E positive. Therapy with these BRAF inhibitors has been shown to slow tumor progression, but toxicity can be severe. This case series shows one patient with successful tumor regression, one patient with prolonged disease stabilization, and one patient with initial response but subsequent progression and ultimate death. It has been shown that using BRAF inhibitors in lower grade CNS tumors are more effective than higher grade CNS tumors.

Conclusion: The success of Vemurafenib and Dabrafenib/Trametinib in causing pediatric CNS tumor regression is promising, but further studies are needed.

School: School of Medicine

MS1-2 CHOW, DANIELLE

A Case of Infant Botulism

Danielle Chow and Dr. Fatma Levent

Background: Infant botulism is a lethal, neuroparalytic disease caused by *Clostridium botulinum* toxins. This spore forming, anaerobic microorganism is mainly found in soil, honey products, and canned food. Individuals, ages 3 weeks – 6 months, can become infected via inhalation, ingestion, or wound contact. Symptoms of descending paralysis, bilateral ptosis, and weak cry can present between 4 hours to 8 days after infection. A single dose of Botulism Globulin Intravenous (BabyBIG) is available for treatment. If infant botulism is suspected, it is highly recommended to begin treatment immediately rather than wait for laboratory confirmation.

Case Presentation: A 4-month-old female from Seminole, Texas was brought into the emergency department at University Medical Center Pediatric Hospital in Lubbock, Texas with a 2-3-week history of constipation, poor sucking, and regression of physical developmental milestones. Upon presentation, the patient had hypotonicity, bilateral ptosis, drooling, and weak cry. However, she had no fever, congestion, rash, or vomiting. Aside from a high platelet count, laboratory values from the complete blood count (CBC) were within normal limits, and a brain magnetic resonance imaging (MRI) showed no abnormalities. A stool sample was sent for botulinum toxin analysis, and administration of BabyBIG was given the next day after admission. Five days later, the patient had increased activity, muscle tone, and feeding ability. After 6 days, the patient was discharged. Stool sample analysis was positive for *C. botulinum* toxin type A, confirming infantile botulism. Source was not identified.

Conclusion: Although rare, infant botulism has a high mortality if not treated promptly. This disease is the fastest growing type of botulism in the United States. Moreover, Texas has the second highest incidence following California. The aim of this report is to bring awareness to this disease by emphasizing its presentation, risk factors, and early treatment.

School: School of Medicine

MS1-2 CHOW, NATHAN

Forearm Hypertrophy in Rodeo Athletes

Nathan Chow BS, Christian Douthit MD, Cameron Cox BA, Rick Foster MS, Brendan Mackay MD

Purpose: Wolff's Law states that bones remodel to increase size and density in response to greater stress. This has been documented in the dominant arm of athletes in sports requiring significant utilization of a single limb such as tennis. The literature addressing this effect in rodeo athletes, however, is minimal.

The patients evaluated presented with chronic arm pain, and radiographs were taken during initial evaluation. We hypothesized that the grip arm in these rodeo athletes would demonstrate bony hypertrophy and osseous changes compared to the non-grip arm as they had been demonstrated in previous studies reporting on athletes of other sports.

Methods: AP and lateral x-rays of 17 bareback rodeo athletes were reviewed. Ulnar hypertrophy was observed in the grip arm, and the diameter of bilateral ulnas was measured at its longitudinal midpoint. Ratio of Ulnar Diameters (grip arm/free arm), Percentage Diameter Increase, and Percentage Projected Cross-Sectional Area Increase were all calculated.

Results: The mean ratio of grip to free arm ulnar diameter was 1.42 (n = 17, range: 1.05-1.92). The mean diameter percent increase measured 42.3% (n = 17, range: 4.7-92.0%), and projected cross-sectional area increase was recorded at 106.8% (n = 17, range: 9.6-268.5%). Clinical photographs also showed soft tissue changes consistent with what is expected in an arm bearing increased load.

Conclusions: Rodeo rough stock riders presented with grip arm pain, no radiographic evidence of injury, and signs of peripheral nerve compression on exam. These athletes showed a greater degree of bony hypertrophy than athletes of other disciplines, as well as concurrent soft tissue hypertrophy. Significant anatomic changes in response to high stress are occurring in the grip arm that should be taken into account during clinical evaluation. This study provides an additional clinical consideration for rodeo athletes presenting with unilateral pain and no radiographic evidence of injury.

School: School of Medicine

MS1-2 CHU, VICTORIA

Management of Thyroid Dysfunction During Pregnancy - A Case Report Highlighting Endocrine and OB/GYN Collaboration

Victoria Chu, Jasmin Rahesh, Dr. Cornelia De Riese, Dr. Alan Peiris

In healthy pregnant women the human chorionic gonadotropin hormone (hCG) has been shown to suppress thyroid stimulating hormone (TSH). This suppression of TSH resolves by second trimester. For cases in which hyperthyroidism and TSH suppression fail to resolve, physicians are challenged to balance the treatment of thyroid imbalance and health of the developing fetus. We present a case report of hyperthyroidism in a patient that lasted past first trimester that has successfully resolved without medical intervention. Physical exam found her to be lethargic but otherwise healthy. Diagnostic test included thyroid US scan, thyroid hormone lab studies. Not all labs report based on trimester specific ranges; this can result in difficulty with interpretation of results. Standardization of trimester specific thyroid hormone ranges on reports should be implemented. The case also highlights how effective patient management requires close joint clinical management between endocrinology and OB/GYN teams.

School: School of Medicine

MS1-2 COLEMAN, BOONE

Active learning resources applied to first four weeks of embryological development in first year medical school curriculum

R. Boone Coleman, Dr. Brandt Schneider, Dr. Gurvinder Kaur

At Texas Tech University Health Sciences Center School of Medicine, the curriculum begins with a rigorous Clinically Oriented Anatomy course. A portion of this course includes embryology, which is taught using standard lecture model along with a faculty made Embryology High Yield Fact sheet. Even though, first year medical student's perception of the high yield fact sheet was favorable, it is a list of facts, and on its own fails to stimulate critical thinking. To achieve higher retention of key embryology concepts, our objective is to transform the passive experience of reading a document, to an active and engaging experience. To achieve this objective, topics covering the first four weeks of embryological development which includes content such as fertilization, early development, cellular differentiations, gastrulation, neurulation, cardiac looping, and cardiac defects were selected. To stimulate active learning, resources including Flashcards, Formative self-assessment questions (N=30) with answer analysis, Pre-unit exam content review, and a Pre-National Board of Medical Examiners (NBME) exam content review were created and provided to the students. To evaluate the effectiveness of these resources, the current class performance on in-house and NBME exam with regards to embryology was compared to last year's class performance. Although, the current class performance on in-house exams was not significantly different, their performance on NBME was improved compared to last year's class. In addition, survey data was collected from 114 students using a 5-point Likert scale over the perceived helpfulness of the active learning materials. Approximately 95% of survey respondents stated that the resources were helpful for learning. Additionally, students scored 40.6% better on post-test questions compared to the pre-test. Overall, this data strongly suggests that using active and engaging resources will help students in effectively learning and retaining embryology.

School: Graduate School of Biomedical Sciences

MS1-2 COVELL, JARED

The evolution of Snakebite treatment: A retrospective analysis of CroFab use in conjunction with one hospital's snake bite assessment treatment algorithm.

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Over 7,000 people are bitten by venomous snakes in the United States every year. These snakebites can pose serious health problems including complications that range from necrosis of tissue and loss of appendages to severe shock and death. In the United States, most of these bites are inflicted by a subfamily of pit viper (Crotalinae) that includes well known species such as the rattlesnake, cottonmouth, and copperhead. Treatment has progressed from the haphazard “suck out the venom” cowboy method, to aggressive surgery, and finally to more modern snakebite antivenoms. At first the antivenom was derived from horse serum, which often caused patients to suffer serious side effects such as serum sickness. The current development of antivenom from sheep serum, also known as CroFab, has all but eliminated the need for drastic surgical procedures while markedly reducing serum sickness complications. However, there is very little standardization on the signs and degree of envenomation in addition to high variability among health-care providers on the administration of antivenom. This lack of standardized care leads to inefficient snakebite treatment, has the potential to increase total costs, and decrease overall patient outcomes. Preliminary studies at Texas Tech University Health Science Center, developed a snakebite treatment protocol that associates local and systemic symptoms, coagulation studies, and severity of envenomation to approximate CroFab dosing. This protocol has yet to be evaluated on a large-scale patient population. The aims of this study are to retrospectively analyze 220 snakebite patients that presented to UMC, Lubbock, TX from January 2002 through May 2019. Specifically, we aim to compare patient outcomes prior to implementation of the snakebite protocol (n = 177) to those after (n = 43). Primary study variables include amount of CroFab used (vials), hospital and ICU days, coagulopathy, surgical intervention, total cost of treatment, and mortality.

School: School of Medicine

MS1-2 CREDO, ROALD

Efficacy of learning modules with video clinical vignettes on diabetes for first year medical students

Roald Credo, Jannette Dufour Ph.D.

Diabetes is one of the most prevalent cases in primary care today, with the total number of both diagnosed and undiagnosed cases increasing every year. Because of the high incidence of pre-diabetes/diabetes amongst patients and the clinical application of this disease, several areas of this illness are covered throughout the first and second year of medical school curriculum. Medical students in the basic science courses are challenged with digesting a plethora of information. Learning modules have been an efficient route of delivery for this information to stimulate active learning. I have created an online learning module, incorporated with video clinical vignettes, that is a supplementary, self-paced study guide to the diabetes lectures covered in the Physiology block of the medical school curriculum. This project consists of endocrine pancreas composition, insulin and glucagon synthesis and regulation, and glucose metabolism. I also emphasized the pathophysiological causes of diabetes mellitus and the appropriate diagnostic criteria and treatments as suggested by the American Diabetes Association. By creating this module, I hope to increase the recall of relevant information for the students' in-house exam and National Board of Medical Examiner (NBME) test. I used Microsoft PowerPoint 2016 and Adobe Premiere Pro to produce a learning module alongside clinical presentations in a visual form. This module also includes vignette-style questions to track the students' understanding of the material during the utilization of the project. First year medical students will take a pre- and post-test that evaluates their grasp of the material covered in the module to test the effectiveness of this project. A needs analysis will be conducted with an emphasis on the project's utilization as a learning tool for the Gastrointestinal and Endocrine portion of the first year's Physiology course.

School: Graduate School of Biomedical Sciences

MS1-2 DE LA CRUZ, NOAH

The Association of Life's Simple 7 and Diabetic Retinopathy in the U.S Population

Noah De La Cruz, MPHc*; Obadeh Shabaneh, MPHc*; Duke Appiah PhD MPH

Globally, about 2.2 billion people have a vision impairment or blindness and half of them could have been prevented. In the U.S, the leading cause of vision impairment or blindness is primarily due to age-related diseases including diabetic retinopathy (DR). With a growing elderly population, it has become imperative now more than ever to focus on prevention of such ocular diseases. The aim of the study was to evaluate the relation the American Heart Association's prescription for health called the Life's Simple 7 (LS7) metrics and the occurrence of DR. Data were from 6118 adults aged ≥ 40 years who participated in the 2005-2008 National Health and Nutrition Examination Survey. LS7 metrics consisted of information on smoking, physical activity, body mass index, diet, blood pressure, total cholesterol and blood glucose. Scores were summed for a maximum of 14 (most ideal cardiovascular health). Logistic regression was used to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI). The average age of participants was 57 years with 53% of them being women. The prevalence of DR was 5%. In models adjusted for age, sex, race, education and income, a one-unit increase in LS7 scores was associated with a 31% reduced odds of DR (OR: 0.69, 95% CI: 0.64-0.74, $p < 0.001$). This association persisted when DR was limited to only diagnosis by retinal imaging. In this study, we observed that the more ideal an individual's cardiovascular health was as described by the LS7, the lower their odds of developing diabetic retinopathy. These findings suggest that the use of interventions to prevent cardiovascular disease hold promise in preventing ocular diseases such as diabetic retinopathy.

School: Graduate School of Biomedical Sciences

MS1-2 DOAN, JEREMY

Inhibitory Effects of Essential Oils on Common Rhinosinusitis Pathogens: A Systematic Review

Callie L. Fort, MS, MBA; Jeremy Doan, BS, MBA; Joshua C. Demke, MD; Phat Tran, PhD; James C. Wang, MD, PhD

INTRODUCTION: The purpose of this study is to provide a comprehensive review of in vitro studies that examine the inhibitory effects of essential oils (EOs) on sinonasal pathogens.

MATERIALS AND METHODS: PubMed, Ovid, Cochrane, and Embase computerized searches were performed through December 2019. Two independent reviewers conducted data extraction following a predetermined protocol.

RESULTS: Nine articles were included in the final analysis. These studies evaluated the inhibitory and bactericidal effects of 46 different EOs/EO combinations on 13 sinonasal pathogens. Cytotoxic effects on 8 fungal pathogens were also evaluated. Studies evaluated antimicrobial effects of EOs in the gaseous form (3), in broth dilution (2), Kirby Bauer disc diffusion method (1), agar diffusion (4), and microdilution (4) methods. One study evaluated the synergistic effect of EOs when combined with ciprofloxacin or amphotericin B, for bacterial and fungal pathogens, respectively. Among the EOs considered to be effective inhibitors of sinonasal pathogens were: Melaleuca oil mixtures (*S. aureus* and *M. catarrhalis*), *Thymus siphyleus* (*S. aureus*, *S. pyogenes* and *M. catarrhalis*). More generally, cinnamon, thyme, and lemongrass oils were found to have the strongest antimicrobial action. *Artemis capillaris* was found to be a potent inhibitor of *S. aureus*.

CONCLUSION: Despite differences in methodology, 8 out of 9 studies showed EOs to exhibit antimicrobial effects on sinonasal pathogens in vitro. Future studies should explore potential synergistic, antagonistic, and additive interactions of EOs with antibiotics/antifungals utilized in the treatment of rhinosinusitis.

School: School of Medicine

MS1-2 DRINNON, KYLE

Sternal Tumor Resection and Reconstruction Using Iliac Crest Autograft

Kyle Drinnon BS, Samir Sherali BA, Cameron Cox BBA, Brendan J. Mackay MD

Background: Primary malignant tumors of the sternum are rare among bone tumors. Even with radical resection, the survival rate for sternal tumors remains low. Resection often results in significant bone defects in the chest wall, and reconstruction must provide adequate protection for pulmonary and respiratory structures. Flexible materials have historically been used for sternal reconstructions following failed sternotomies in cardiac surgery. While these have had some success, they fail to provide adequate support for patients undergoing reconstruction secondary to tumor resection, who are otherwise healthy and active. Though rigid materials offer greater protection, they frequently cause chronic pain and respiratory complications. More recently, bone grafts have been used to reconstruct sternal defects, and the limited published reports are promising.

Methods: We present the case of a patient diagnosed with an extramedullary solitary bone plasmacytoma who underwent sternal resection and reconstruction with autogenous bone graft taken from the iliac crest. There are currently no reports of sternal reconstruction using iliac crest autograft in the literature.

Results: At 9 month follow up, bone marrow biopsy showed no evidence of multiple myeloma. X-ray, CT, and PFT scans confirmed graft stability, and the patient has returned to normal activities.

Conclusions: Sternal resection and reconstruction is an effective method for treating extramedullary solitary plasmacytoma when radiation is ineffective. In cases of significant segmental defects, iliac crest bone graft may be a viable option for repairing sternal defects following tumor resection.

School: School of Medicine

MS1-2 EBOH, STANLEY

The Efficacy and Hydrodynamics of Ventriculoperitoneal shunt valves

Stanley Eboh, Laura Perez arnold, Brandon Wei

Despite efforts to perfect shunt design, over-drainage and under-drainage remains a significant problem in the clinical use of intracranial hydrocephalic shunts. If too much or too little CSF is evacuated from the cranium, the ICP fall below or rise above the normal range. Abnormal ICP results in significant side effects such as severe headache. Besides changing the posturing of the body itself, changing the structure and orientation of the shunt within the body can also affect the rate of CSF drainage. The length of the distal catheter, and the effects of bending or coiling the distal catheters have yet to be explored as possible variables affecting the rate of drainage. These variables are of particular interest because in pediatric cases surgeons will put in more distal catheter than is necessary to span the distance from the ventricle to the peritoneal cavity. This is so that as the child grows, and the distance between the ventricle and the peritoneal cavity increases, there will still be enough distal catheter to reach its destination. However, there is no standard of practice governing how much excess distal catheter should be used in these cases. If longer distal catheters or the natural coiling of the extra tubing in the peritoneal cavity affect the rate of CSF drainage, then these factors could contribute to over-drainage, under-drainage, or even shunt failure in these patients. This begs the question of whether there are specific and predictable distal catheter lengths and positions that will optimize shunt function for each patient, and whether there is one standard length of distal catheter that all surgeons should be using in pediatric cases. In this study we hope to advance the literature discussing the clinical use of shunts by examining for the first time how the position, length, and coiling of the distal catheter affect the rate of drainage through the shunt system.

School: School of Medicine

MS1-2 ELMORE, BLAIR

Hashimoto's Disease and Vitamin D Deficiency

Blair Elmore, Rainna Coelho, Corresponding Author: Alan N. Peiris MD, PhD

Vitamin D deficiency is highly prevalent. Its endocrine effects are well known, the paracrine and autocrine effects have received less attention. Vitamin D actions are mediated through a nuclear high affinity vitamin D receptor. An emerging role for Vitamin D as an immune modulator in many autoimmune diseases such as Multiple sclerosis is evident. Vitamin D reduces the activity of Th1 cells which are known to promote inflammatory cytokines. Certain polymorphisms of the Vitamin D receptor may increase the genetic susceptibility to an autoimmune diathesis.

Hashimoto's disease is an autoimmune thyroiditis and a common cause of hypothyroidism. Family and twin studies indicate a strong familial tendency to HT. Environmental triggers such as Vitamin D deficiency may promote autoimmune disease through deregulated pathways such as BACH2/PDCD5-FOXP3 and result in Hashimoto's thyroiditis. Individuals with vitamin D deficiency have a much higher chance of having Hashimoto's Disease. Vitamin D status is an independent predictor of the presence of thyroid antibodies, which are a hallmark of the disease. Vitamin D levels are inversely associated with anti-thyroid antibody titers. Vitamin D deficiency tends to be more common in Hashimoto's thyroiditis patients with overt hypothyroidism or subclinical hypothyroidism compared to euthyroid individuals. Moreover, treating Vitamin D deficiency can reduce anti-thyroid antibodies. Further studies are needed prior to concluding that treating Hashimoto's Thyroiditis patients with either euthyroid or subclinical hypothyroid status with Vitamin D will halt progression to overt hypothyroidism. We agree that screening patients with Hashimoto's Thyroiditis for Vitamin D deficiency and assisting patients deficient in Vitamin D achieve a replete status is a good strategy pending additional studies.

School: School of Medicine

MS1-2 ENDSLEY, AVERY

Antibiotic Treatment with Enzymatic Biofilm Dispersal in Diabetic Mouse Wound Models

Avery Endsley, MS2, Whitney Redman, Kendra Rumbaugh

Chronic infections in both diabetic and non-diabetic hosts are associated with the formation of a biofilm, a community of microorganisms surrounded by a protective matrix of extracellular polymeric substance (EPS). Biofilm formation imparts antibiotic tolerance and reduces metabolic activity to the bacteria dwelling inside them and thus contributes to the chronicity of wounds. Nearly half of chronic diabetic wounds will become develop a biofilm-associated infection. We have recently shown that glycoside hydrolases (GHs) can degrade biofilms by breaking down polysaccharides in the EPS and releasing bacteria from the biofilm. In mouse wound infections GH treatment potentiated the efficacy of antibiotics to kill bacteria. However, the efficacy of GHs is dependent on the type of polysaccharides present in the EPS, which can differ depending on the bacterial species producing them and the environment in which the species are grown. In this study, we aimed to determine whether the biofilms made by *Pseudomonas aeruginosa* (PA) in diabetic wounds would be as susceptible to GH treatment as those made in non-diabetic wounds. We hypothesized that PA growing in the diabetic wound environment may produce EPS that was either more or less susceptible to the action of GHs than PA growing in a non-diabetic wound environment. To test this hypothesis we examined the ability of GH to disperse PA from biofilms in the wounds of diabetic and non-diabetic mice. We found that GHs were able to disperse bacteria in both types of mice and caused septicemia in the absence of antibiotics. However, when administered with antibiotics, septicemia did not occur. Interestingly, we saw increased dispersal in diabetic mice, which did not correlate with the overall number of bacteria present in the wound. This could indicate that the biofilms in diabetic mice are more susceptible to GHs, or that impairments in the immune system of diabetic mice are allowing for the survival of more dispersed bacteria.

School: School of Medicine

MS1-2 FAIN, KRISTEN

Hypothyroidism following gastric sleeve surgery resolved by ingesting crushed thyroxine tablets

Kristen Fain, Alexandra P. Rojas, Alan N. Peiris, M.D, PhD

Bariatric procedures for weight loss have increased in the past few decades. Levothyroxine malabsorption has been reported following gastric bypass; however, few studies have addressed this issue after gastric sleeve procedures. Levothyroxine dosage is usually weight based and administered at approximately 1.6mcg/kg body weight. Absorption occurs mainly in the jejunum and upper ileum, which can be altered by gastric pH, other drugs, food, and other factors. We present a 35-year old female patient with longstanding hypothyroidism treated with thyroxine. Patient developed significant hypothyroidism following gastric sleeve procedure despite stated compliance with levothyroxine on a daily basis.

School: School of Medicine

MS1-2 FANG, CHIH YU

The effects of ginger root extract on gut microbiota-derived metabolites in animals with neuropathic pain

Chih Yu Fang, Samir Sherali, Masoud Zabet, Xiaoxia Gong, Parvin Mirzaei, Rui Wang, Volker Neugebauer, Chwan-Li Shen

Recent studies indicate gut microbiota as a key modulator of peripheral and central sensitization pathways of chronic pain through gut microbiota-derived mediators (GMDM). These pathways include the activation of microglia and infiltration of immune cells. Thus, dietary intervention with changes in GMDM may represent a new therapeutic strategy for chronic pain. Ginger (*Zingiber officinale* Roscoe), an analgesic and anti-inflammatory agent, poses great potential. This study evaluates the effects of ginger root extract (GRE) on GMDM in neuropathic pain models.

A cohort of 16 male rats was divided into 4 groups. One group received a sham surgery and the others received a spinal nerve ligation (SNL). Two SNL groups received treatments, one with gingerols-enriched ginger root extract (GEG) and one with shogaols-enriched ginger root extract (SEG), starting on the day of SNL surgery and lasting 30 days. 50mg fecal samples were homogenized using bead beater in PBS buffer. Metabolites were extracted by combining 100 μ L of homogenized sample with dichloromethane/methanol/water (1:2:1 v/v) and centrifuging. The aqueous phase was analyzed using LC-MS/MS and compound discoverer software.

This study focused on a few key metabolic pathways affected among the 4 groups: branched chain amino acid biosynthesis (BCAAB), anaerobic aromatic compound degradation (AACD), and aromatic amino acid biosynthesis (AAAB). No statistically significant differences were observed in these 3 pathways between the sham and the SNL control groups ($p > 0.05$). Significant differences were observed between the ginger-supplemented groups (GEG and SEG) and the SNL control for fecal metabolites in the BCAAB pathways (2-Oxoglutarate, 4-Methyl-2-oxopentanoate, L-Glutamate, L-Valine) and the AAAB pathway (L-Tryptophan, L-Tyrosine, L-Phenylalanine). Further analysis of fecal functional data is ongoing.

These significant differences due to ginger supplementation may be beneficial signs for neuropathic pain relief.

School: School of Medicine

MS1-2 FORT, CALLIE

Epidermoid Cyst: A Case Report

Callie L. Fort MS, Cynthia M. Schwartz MD, Winslo K. Idicula MD

Epidermoid cysts are lesions very rarely seen in the oral cavity. Epidermoid cysts, teratomas, and dermoid cysts are neoplasms comprised of tissue derived from germ layers foreign to their location. This case reports a 13 year old female patient that presented with a palpable fluctuating mass in the submental region. A post-operative pathology report showed an epidermal inclusion cyst, a synonym for epidermoid cyst. In addition to the epidermoid cyst, the patient also presented with focal chronic non-specific inflammation in the right sublingual gland. A literature review yielded only one other case with co-presentation of an inflamed sublingual gland and submental epidermoid cyst. A transoral surgical approach was taken; the cyst and sublingual gland were excised. The epidermoid cyst was 24 g and measured 4.2 x 3 x 3 cm. The sublingual gland was 2 g and measured 3 x 2 x 0.6 cm. No post-operative complications were seen.

School: School of Medicine

MS1-2 FREEDLE, CAROLINE

A rare case of stage IV colorectal cancer presenting after NSTI

Caroline Freedle, Jasmin Rahesh, Michelle Harris, Virginia Tran, Sharmila Dissanaik

Necrotizing soft tissue infections (NSTIs) are highly aggressive and possibly lethal infections if untreated. Polymicrobial infections of the groin and lower limb have been documented secondarily to invasive colorectal cancer (CRC). We present a rare case of colorectal cancer diagnosed greater than 5 years following development of NSTI. A 39-year-old male presented with 2-week upper thigh pain and systemic symptoms of fever, leukocytosis, and cellulitis. The patient was diagnosed with NSTI and was taken to the operating room for debridement. The wound was debrided a second time during his hospital stay with a final wound dimension of 41 cm x 46 cm. Wound cultures were positive for *Escherichia coli* and beta-hemolytic *Streptococcus*. Once infection was controlled, he underwent a split thickness skin graft to the right flank, abdomen and lower thigh. There were no indications of colon cancer at the time and he was discharged after a 3-week hospital stay with anticipation to follow-up with the surgery team. Five years later, the patient presented to the emergency department with diffuse colicky abdominal pain. A colonoscopy was performed and biopsies indicated invasive cecal and descending colon adenocarcinoma. He underwent subtotal colectomy with primary ileorectal anastomosis. Intraoperatively, a cecal mass was found eroding into the right lower quadrant of the abdominal wall. He was treated post-operatively with several rounds of chemotherapy. Two years later (seven years after his NSTI diagnosis) he developed malignant small bowel obstruction. Due to the severity of his disease, he received a venting open gastrostomy tube and was admitted to hospice care. While there are documented cases of NSTI concomitant with a pre-existing CRC, this case presentation suggests that NSTI in the groin, flank or thigh in an otherwise low-risk patient should raise suspicion for CRC in future cases.

School: School of Medicine

MS1-2 FULTON, ALEC

Observing the Effects of Student Created Learning Videos and Question Banks on First Year Medical Students Over the Respiratory and Acid Balance Physiology Section

Alec Fulton

Video explanations created by former students (learning modules) and question banks with detailed explanations of both right and wrong answers in other Texas Tech University School of Medicine (SOM) courses, such as the anatomy block of the curriculum, have previously been well received by students. These type modules and questions have not been created for the respiratory and acid balance portion of the SOM course, Major Organ Systems (MOS). For this project, student created learning modules and question banks were created and used to observe whether they would improve the overall learning experience for medical students in this portion of the curriculum, as it did in others.

Feedback on content focus from students previously enrolled in the course was utilized in the creation of the modules and question banks. Required textbooks, old lectures, and other recommended resources were used as the source content for the modules and questions. Nine respiratory and acid balance questions were administered to students prior to the unit to get a baseline of the students' knowledge. Following the unit exam, a post-test consisting of the same nine questions was administered. In addition, a survey evaluating the quality and helpfulness of the modules and question banks, as well as overall learning experience during the unit, was taken.

Following data collection and analysis, students' post-test scores and overall learning experience of those who used one, both, or neither of the resources will be compared to observe the resources effects on material comprehension and learning experience. Feedback on the quality and helpfulness of the resources will be used to assess areas of improvement and the students' personal satisfaction of the resources. The results will help in determining if supplemental student created learning modules and question banks elicits similar positive feedback as previous student created resources for SOM courses.

School: Graduate School of Biomedical Sciences

MS1-2 GALVAN, BERNARDO

Idiopathic Spontaneous Bladder Rupture: A Case Report and Review of Literature

Bernardo Galvan, Kate Holder, Dr. Allen Medway

Spontaneous, idiopathic bladder rupture is a rare condition. We describe a case of a 73-year-old female with spontaneous bladder rupture presenting with a two-month history of abdominal pain. An initial misdiagnosis of an acute UTI and later finding of an abnormal pelvic mass lead to an exploratory laparotomy. The procedure concluded with the repair of an extraperitoneal bladder perforation. Multiple causes of spontaneous bladder rupture are cited in the literature, all with varying presentations. The inconsistency in presentation and ambiguous results from standard imaging techniques make spontaneous bladder rupture difficult to diagnose.

School: School of Medicine

MS1-2 GARCIA, ANA

Transgender Healthcare Undergoes Transition

Ana Garcia, MS 1, Mary Miller, MS 4, Dr. Fiona Prabhu, Dr. Kelly Bennett

Background: The TTUHSC Free Clinic provides free healthcare to the uninsured population in Lubbock and surrounding area. This project will detail the procedures and guidelines used at The Free Clinic for transgender hormone therapy. This in-depth and qualitative look into the procedures will provide insight into the hormone therapy our transgender patients receive and allow us to continue improving their care.

Procedure: The details of our procedures for transgender therapy will be explained including the plan for initiating and follow up therapy visits. Patients are walked through an informed consent explaining the expected effects of hormone therapy. Blood tests are obtained, used for baselines, and to guide both permanent and transient changes. Patients undergoing masculinizing therapy are given a demonstration and instruction for hormone injections. They are supervised during their first self-injection and given referrals for voice counseling, a safe physicians list, and a list of transgender affirming resources in the area.

Results: Nine patients were treated for hormone therapy at The Free Clinic from November 2018-November 2019. Seven underwent masculinizing hormone therapy and two underwent feminizing therapy. The two transwomen had initiated therapy at other clinics and were seen for their 3 month follow up visits with CBC, CMP, TSH, and lipid panel as well as 100 mg spironolactone refills. Two of our transmen patients initiated masculinizing therapy and five others were seen for follow up visits, which include testosterone levels, lipid, CBC, and CMP labs and 3 month refills of testosterone.

Conclusion: At risk populations include transgender patients since they are more prone to comorbidities than their cisgender counterparts. Consistent access to quality care, education, and resources for hormone therapy are vital for healthy lifestyles. A qualitative look into the care offered at the Free Clinic can be used to reach goals in patient care.

School: School of Medicine

MS1-2 GARCIA, OMAR

Pain management in pediatric patients with acute appendicitis

Omar Garcia

Intro: Laparoscopic appendectomy for simple acute appendicitis is an outpatient procedure in many adults. Pediatric surgeons have been slower to adopt this approach due to concerns about adequate postoperative pain control in a population where postoperative narcotics are generally not used except for severe breakthrough pain. The purpose of this study is to evaluate the current practice of pediatric surgeons at Covenant Children's Hospital (CCH) regarding the use of intraoperative local anesthetic and postoperative pain management for pediatric patients with simple acute appendicitis undergoing laparoscopic appendectomy. We hypothesize that the addition of a longer acting local anesthetic to the more commonly used short acting local anesthetic will decrease the need for postoperative parenteral pain medications and narcotics in this population facilitating same day discharge. The findings from this study can be used to develop and study an enhanced recovery after surgery pathway for this patient population.

Methodology: A retrospective chart review of all patients under 18 years of age undergoing laparoscopic appendectomy from 4/1/17 to 3/31/19 will be performed.

Results: 349 patients identified as having an appendectomy during the time of the study. Data extraction and statistical analysis is being completed.

Conclusion: The hypothesis will be confirmed or rejected once data analysis is complete.

School: School of Medicine

MS1-2 GASCHEN, PAUL

Recurrent thyrotoxicosis following near-total thyroidectomy

Paul Gaschen BA, Joehassin Cordero MD, Alan Peiris Md

Total thyroidectomy for hyperthyroidism is usually curative. We report the unusual recurrence of thyrotoxicosis following a near-total thyroidectomy. The patient, a 27-year-old woman, elected to have a total thyroidectomy and began levothyroxine after the procedure. Approximately 2 years later, recurrent thyrotoxicosis was evident off levothyroxine. Vascularized thyroid tissue was noted on ultrasound, and a radioactive iodine scan indicated increased uptake in the right thyroid region. She began antithyroid medication and was subsequently treated with radioactive iodine once a euthyroid state was achieved. We discuss the implications of this rare scenario—recurrence of thyrotoxicosis after near-total thyroidectomy.

School: School of Medicine

MS1-2 GEORGE, ASHER

What the Stuck?! Management of Foreign Bodies of the Lower GU Tract: A Review and Case Series

Asher K. George, MPH (primary), Jaime Camacho, MD

Foreign bodies in the genitourinary tract can pose serious medical problems. These objects, including everyday household items, can come in various shapes and sizes. Inserted foreign bodies can lead to both acute and chronic problems of the lower genitourinary tract. These can include infection, pain, hematuria, stricture formation, fistula formation, and urolithiasis. A study of the literature shows various case reports and reviews that highlight some of the reasons for insertion of a foreign bodies into the genitourinary tract, which includes autoeroticism, psychiatric illness, perceived contraception, intoxication, or abuse. We aim to elucidate the presentation and incidence of these cases in Lubbock County and the surrounding area. Many of these cases presented involve patients who have inserted foreign bodies into their lower genitourinary system which include pen caps, razor blades, utensils, and dominoes. For these cases, the TTUHSC Department of Urology conducted various non-invasive and invasive methods to extract the foreign bodies from the penis, scrotum, various segments of the urethra, and the bladder.

School: School of Medicine

MS1-2 GORE, MEGH

Using Formative Exams in Clinically Oriented Anatomy: Identifying At-Risk Students and Reducing Stress

Megh Gore, Bridget Vories, Gurvinder Kaur, Brandt Schneider

During the first year of medical school, students find themselves in a fast-paced and educationally demanding environment. Throughout pre-clinical years, the utilization of formative exams has provided students with an excellent study tool. However, the understanding of how laboratory practice exams may predict academic standing and impact overall student wellbeing in Clinically Oriented Anatomy is not well established. To evaluate whether these formative exams can predict at-risk students and reduce stress, an online practice lab exam was provided to students before each of the three summative unit exams during the course. The formative lab exam utilized images of cadavers and anatomical models as well as provided question scoring and rationales to offer students immediate feedback. To measure the ability of these formative exams to predict exam performance, the averages from the second and third laboratory practice exams, the second and third summative lab exams, and scores from the NBME final exam were analyzed using Pearson Correlation Coefficient (r values) and p-values. Analysis of the data showed positive correlations between the formative lab exams and summative lab exams (r values of 0.66 and 0.70 for units two and three respectively, with p-values <0.0001). In addition, summative exams positively correlated to the NBME scores, with an $r = 0.738$ for unit two and $r = 0.783$ for unit three and both with p-values <0.0001. Data on the stress levels of students who utilized the formative exams is pending, however, according to a 5-point Likert scale issued to the students, the average perception of the lab practice exam was a 4.28 (1=extremely unfavorable, 5=extremely favorable). This direct parallel between the formative and summative Anatomy exams shows the ability to use practice exams not only as a student supported educational tool but also to predict student success and identify at-risk students for early academic intervention.

School: Graduate School of Biomedical Sciences

MS1-2 GRAHAM, DERRICK

Mathematical pilot study evaluating implantable collamer lens vault in vivo and in vitro.

Graham, Derrick; Moshirfar, Majid M.D.

Background: The implantable collamer lens (ICL) is a surgically inserted lens that can correct refractive error in patients whose corneas are too thin for conventional corrective procedures such as LASIK or PRK. It is implanted in the posterior chamber of the eye between the iris anteriorly and the crystalline lens posteriorly, with a central anterior vault created by its compression between the iris sulci into which its ends are tucked. Because of its close proximity to the iris and crystalline lens, incorrect sizing by the surgeon and the consequent over- or under-vaulting that results can produce angle closure glaucoma or accelerated cataract formation. The purpose of this study is to analyze the ICL's mechanic properties and elaborate a new set of sizing recommendations that build upon the existing but limited and error-prone set currently used by eye surgeons performing this procedure.

Methods: This study was performed in vitro and utilized a micrometer to compress ICLs to particular diameters across its useful range at 0.1 mm increments. The degree of vault produced was then measured by computer software analysis of photos taken at each compression. A correlation between diameter and degree of vault was statistically tested against post-surgical values for ICL diameter and vault in actual patients at a UT surgical clinic, Hoopes Vision.

Results: Preliminary results show that there are more factors contributing to an ICL's degree of vault once implanted in a human eye than the diameter alone that it is compressed to.

Discussion: Further testing must incorporate multiple factors into the study. The next step is to design a setup that can test iris angle, as it appears to be the next most likely contributor to degree of vault.

School: School of Medicine

MS1-2 HANSON, FRANCES

Assessing High-risk Pregnant Women's Perception of their Personal Health Before and During Pregnancy

Cornelia de Riese, M.D., Frances Kellerman Hanson – TTUHSC SOM Class of 2022, Duke Appiah, PhD, MPH; Participating Researcher: Natalia Schlabritz-Lutsevich, M.D., PhD

Our aim is to assess the perception that high-risk pregnant women have regarding the severity of their pre-existing co-morbidities. In particular, we are interested in understanding how the pre-existing health conditions of high-risk pregnant women influence their decision to become pregnant. The common co-morbidities that complicate the obstetrical care and outcomes for high-risk pregnant women include hypertension, heart disease, diabetes, morbid obesity, and renal disease. This study involves surveying high-risk pregnant women about their level of awareness of their pre-existing conditions, and the degree that their previous conditions impacted their decision to become pregnant. We also aim to understand if these high-risk pregnant women feel that their health-care providers could have better prepared them for the complications of pregnancy given their prior health conditions. Ultimately, we hope to better prepare women of reproductive age with pre-existing conditions for the challenges that arise with pregnancy in order to improve their informed decision making around pregnancy and their health during and after pregnancy.

School: School of Medicine

MS1-2 HARVEY, BAILEY

Case Report: An Unusual Presentation of Unilateral Maxillary Sinusitis that Cultured Parvimonas micra and Streptococcus parasanguinis

Bailey Harvey B.S., Cynthia Schwartz M.D., Joshua Demke M.D

Maxillary sinusitis is a relatively common condition with 4.1 million physician visits per year dedicated to the treatment of chronic sinusitis and 7.7 million physician visits per year dedicated to the treatment of acute sinusitis.¹ There are many causes of maxillary sinusitis the vast majority being viral infection with a small subset being bacterial and fungal in origin. Of the subset of sinusitis that is bacterial in origin, the most common pathogens are *S. pneumoniae* (most common bacteria), *H. influenzae*, *M. catarrhalis*, *S. aureus*, and *S. pyogenes*.² The objective of this case report is to focus on the unusual presentation of a 72-year-old white female with acute unilateral maxillary sinusitis that cultured *Parvimonas micra* and *Streptococcus parasanguinis*. The patient presented with past medical history of chronic obstructive pulmonary disease (COPD), hypertension, and paroxysmal nocturnal disease (PND) to the ENT clinic at our institution with complaint of right maxillary pressure persistent for months, headache, and rhinorrhea. Physical exam revealed a limited view of the right maxillary sinus with anterior rhinoscopy, missing maxillary teeth, and a bulging uncinate process of the middle meatus with no nasal obstruction, bleeding, polyps, or rhinorrhea. A computed tomography scan revealed unilateral opacification of right maxillary sinus identified as a soft tissue attenuation mass. The soft tissue mass expanded the right maxillary sinus and eroded the right maxillary sinus walls. Three weeks after patient was seen in the ENT clinic endoscopic right-sided maxillary antrostomy with tissue removal was performed and patient was sent home. Since surgery and discharge from the hospital, the patient is doing well with no sinus pressure or pain. At this time, patient has resolved with no evidence of recurrent infection. Our aim is to present this case to update literature regarding maxillary sinusitis, and to increase awareness amongst the otolaryngologist and dental

School: School of Medicine

MS1-2 HOLDER, KATHERINE

Ureterosigmoidostomy Effectiveness, Alternatives, and Oncologic Implications: a Case Study and Literature Review

Kate Holder, Bernardo Galvan, Dr. Allen Medway

Abstract: The ureterosigmoidostomy, a procedure now deemed antiquated by many, was once the preferred practice of urine diversion in patients looking to maintain urinary continence. Higher bladder and colon cancer rates in ureterosigmoidostomy patients eventually made treatment by ileal conduits and neoplastic bladders the preferred treatment. In this case study, a 53-year-old male presented in clinic with a CT scan indicative of sigmoid colon neoplasm. The patient, born with bladder exstrophy, underwent a ureterosigmoidostomy shortly after birth. This study will assess the effectiveness of the patient's ureterosigmoidostomy and evaluate common alternatives for urine diversion.

School: School of Medicine

MS1-2 IVOS, MIA

Factors Predictive of Negative Outcomes Following Parotidectomy

Mia Ivos, Callie Fort, Hannah Daniel, Dr. Rahul Varman, Dr. Tam Nguyen

BACKGROUND: The incumbent procedure to remove any tumor of the parotid gland is a parotidectomy, which is one of the most common locations for a salivary gland tumor. However, there is a high risk of facial nerve resection that is associated with primary parotidectomy. To compensate for the functional and cosmetic defects of this initial surgery, revision parotidectomy is performed. In most cases, revision parotidectomy may prove to be more harmful.

Various attempts have been made to reduce the risk of facial nerve paralysis. However, in clinical practice, the various histology types of tumors may not require the same parotidectomy techniques to be used, based on the size and the malignancy of the tumor.

In this study, data collected from patients with parotid gland tumors diagnosed and managed at University Medical Center (Lubbock, Texas) between 2010 and 2019 were evaluated with the goal to establish factors predicting negative outcome of facial nerve paralysis.

PURPOSE: •The purpose of this study is to identify factors predictive of facial nerve paralysis following parotidectomy conducted at a single university medical center over a time period of nine years.

•The primary objective of this study is to identify if there are correlations between chosen tumor characteristics and facial nerve paralysis by reviewing medical records of patients diagnosed with parotid neoplasm who received a parotidectomy.

STUDY DESIGN: Retrospective chart review, hypothesis-driven

METHODS: This retrospective review of patients with a diagnosis of neoplasm of the parotid gland was collected from Cerner PowerChart between the dates of 01/01/2010 through 07/01/2019. The following were collected and recorded in a data sheet for this study (diameter of parotid mass, benign/malignant, histology type, stage of malignancy, reported facial nerve paralysis). This retrospective study did not necessitate any intervention. All study data will have been in existence prior to this study.

School: School of Medicine

MS1-2 JAIN, NEIL

Determining Neck Lymph Node Level Patterns in Different Subtypes of Head and Neck Cancer

Brianna Hope, MS3; Hannah Daniel, MBA; Neil Jain, MS1; Rahu Varman, MD; Tam Nguyen, MD; Joehassin Cordero, MD

Neck dissections have been a consistent treatment option in the management of head and neck cancers, yet they pose very high risks to patients. Performing a neck dissection can cause damage to vital structures in the neck, resulting in significant bleeding, infection, and damage to nerves that could lead to numbness and weakness of the face and neck as well as problems with the vocal cords. Additionally, when more lymph nodes are unnecessarily removed lymphatic drainage is significantly impaired. There is currently an underwhelming amount of data regarding the specific lymph node levels that are most commonly involved with different subtypes of head and neck cancers and the pattern of spread based on their stage and grade. The majority of current recommendations involve either operating on multiple lymph node levels or a very large area of the neck, such as the entire lateral neck or the entire central neck. If specific patterns of spread exist between a specific type of cancer at different stages and the lymph node levels involved, neck dissections could be performed more efficiently and pose fewer risks to the patient. This study aims to identify to which lymph node levels that different subtypes of head and neck cancer preferentially spread. A retrospective cohort study will be performed on head and neck cancer patients at a local facility to identify which neck lymph node levels contained positive lymph nodes after neck dissections. Factors that will be evaluated include grade and stage of the cancer, site of cancer, location of positive lymph nodes, lymph node density in those locations, and whether or not chemotherapy and radiation have been initiated prior to surgery. Based on the results of this study, recommendations for neck dissections could be made based on the subtype of cancer being treated.

School: School of Medicine

MS1-2 JOHN, ALBIN

Are Mitochondrial MicroRNAs Key Regulators of Disease Process in Aging and Neurodegenerative Diseases?

Albin John MD student, Aaron Kubosumi, MD Student, P. Hemachandra Reddy, PhD.

Department of Internal Medicine, Texas Tech University Health Sciences Center, Lubbock Texas

The purpose of our study is to summarize recent findings in mitochondrial microRNAs that demonstrate their role in aging and age-related neurodegenerative diseases, including Alzheimer's, Parkinson's and Huntington's disease. MicroRNAs are small (18-25 nucleotides in length), noncoding RNA molecules that act as post-transcriptional regulators of gene expression. They are important regulators of several biological processes, such as cell growth, cell proliferation, embryonic development, tissue differentiation and apoptosis. Currently, over 2000 mammalian microRNAs have been reported to regulate biological processes. In 2011, Barrey et al. discovered a subset of miRNAs found to be localized in human mitochondria. According to published literature, over 400 mitochondrial microRNAs have been shown to modulate the translational activity of the mitochondrial genome. While miRNAs have been studied for years, researchers are still scratching the surface when it comes to the function of mitochondrial microRNAs and their role in aging and disease pathologies. In the current study, we briefly discuss known microRNAs and their roles in aging and neurodegenerative diseases. We will also discuss mitochondrial microRNAs and their involvement in regulating the mitochondrial genome in aging and neurodegenerative diseases.

School: School of Medicine

MS1-2 JONES, DAEMAR

Implementing Interactive Learning Based Modules to Enhance Pattern Recognition in Histology

Daemar Jones, Dr. Dan Webster

Learning basic histology for medical students has been a major foundation in the understanding of basic medical education. It is important for students to have this foundation in order to properly integrate the material with other disciplines of medical sciences (pathology, pharmacology, physiology, etc.). Interactive learning modules have been shown to be a great tool in establishing this in histology; however, a complete module system has not been implemented at the Texas Tech University Health Sciences Center. Using Adobe Captivate, an interactive online module was created over blood histology describing structural and functional characteristics of the major blood cells and their lineages. This resource was made available to the medical students immediately after learning the material in preparation for the Biology of Cells and Tissues histology exam in the first-year curriculum. The modules allowed the students to view various blood histological images, as well as answer practice questions to test their comprehension. One month after the modules were given to the students, a survey was sent to those that used and those that did not use the modules. Overall, the results show a positive impact for those that utilized the modules. During this trial, it was shown that the blood histology interactive modules was a helpful study tool for students in preparation for their histology exam. More feedback will be necessary to improve these interactive modules, and to also expand this project to cover all histological tissues in the future.

School: Graduate School of Biomedical Sciences

MS1-2 KAMILAR, ELIZABETH

Nanodisc Characterization

Elizabeth Kamilar, Wan Zheng, PhD., Hongjun Liang, PhD

Membrane proteins (MPs) are coded by ~30% of our genome and the targets of ~70% of pharmaceuticals in the market. Understanding the structure and function of MPs is crucial, yet challenging, due to the difficulty in stably isolating and supporting MPs in well-defined membrane platforms. Lipid nanodiscs represent one of the most promising MP-supporting platforms. A traditional lipid nanodisc is composed of a small discoidal lipid-bilayer patch encased within two belt-like membrane scaffold proteins derived from human apolipoprotein A-I. In order to prepare the MP-supporting nanodiscs, MPs have to be released from their native membranes, but this solubilization process risks denaturation. Polymer encased nanodiscs, replace the scaffold proteins with styrene-maleic acid copolymers (SMAs), which bypass the detergent solubilization process by directly cutting into native membranes to form nanodiscs, but have the issue of buffer incompatibility.¹ For this reason, the Liang lab developed zwitterionic styrene-maleic amide (zSMA) copolymers that overcome the buffer incompatibility of SMAs, having improved stability in a wider pH range.²

This study aims to elucidate the formation behaviors of polymer-encased nanodiscs. Unlike commercial SMAs, which were originally developed as industry binders, dispersants, or coatings, and are known for their poorly-defined structures (such as molecular weight, polydispersity, S/MA stoichiometric ratio etc.), the zSMAs are prepared by controlled/living polymerization with well-defined structures. Which, opens up unprecedented opportunities to understand the self-assembly mechanism and control the formation of polymer-encased nanodiscs. An ideal synthesis protocol would yield a homogeneous and monodisperse population of nanodiscs, both with and without reconstituted MPs. We will present our preliminary data on optimizing the protocol for synthesis of both SMA and zSMA-encased nanodiscs (termed SMALP and zSMALP, respectively).

School: School of Medicine

MS1-2 KASHYAP, CIMRON

A rare case of spontaneous mitral valve perforation

Cimron Kashyap, MBA, Marina Iskandar, MD, Pooja Sethi, MD

Background: Mitral valve perforation is a rare and potentially fatal heart condition that causes mitral regurgitation. The most common cause for mitral valve perforation is infective endocarditis, but connective tissue disease, trauma to the chest, cardiac surgery, and eccentric aortic regurgitation are other potential causes.

Case: A 61-year-old male presented with shortness of breath on exertion, orthopnea, and leg swelling. The patient was found to be in atrial fibrillation with rapid ventricular response on admission with continued symptoms despite rate control. Other cardiac history includes chronic systolic heart failure and hypertension. Patient denied any trauma to the chest wall, no history of connective tissue disease or prior cardiac surgery. TTE revealed mitral regurgitation and mitral valve perforation, which was confirmed by TEE. A color doppler examination revealed two mitral regurgitation jets with one jet going through the anterior leaflet, suggesting perforation.

Decision-Making: Perforation was confirmed due to results from imaging. The patient underwent mitral valve replacement, and the surgery was successful. This case was unique as most valve perforations are caused by infective endocarditis, but this patient did not present with fever or infection. The patient had no trauma to the chest wall, history of connective tissue disease, or prior cardiac surgery. Urine analysis and blood cultures both were negative, and subsequent pathology failed to reveal infective endocarditis as the cause.

Conclusion: Mitral valve perforation is well described as a cause of mitral regurgitation. The regurgitation can also lead to severe systolic heart failure such as the case described above. The sequelae of chronic mitral regurgitation is left atrial dilatation and can lead to atrial fibrillation. The treatment for mitral valve perforation is surgical repair and treating the underlying cause of the perforation, which is commonly infective endocarditis. This case highlights that early identification and treatment of spontaneous mitral valve perforation is crucial in preventing the progression of the disease to systolic heart failure, which can lead to significant morbidity and mortality.

School: School of Medicine

MS1-2 KHARBAT, ABDURRAHMAN

Motor Cortex Control of Posture

Abdurrahman Fayeze Kharbat; Mimi Zumwalt, MD

Scientists have long characterized and documented the roles of subcortical central nervous system (CNS) regions in stereotyped activities, such as posturing and locomotion. However, there was a lack of understanding of the role of cortical CNS regions, specifically the motor cortex (MC) and primary motor cortex (M1), in these stereotyped activities. The well-established complexity of neurophysical control exerted via cortical efferent innervation on motor and physiological processes reasonably supports an investigation into the role of the MC and M1 in stereotyped activities. Quantitatively analytical studies were reviewed, contingent on recency of publication (< 5 years) and perceived novelty and importance of findings (well-supported, previously undocumented findings). This review elucidated many clinically significant findings: 1) There is significant activation of the MC and M1 during stereotyped activities such as locomotion, as well as efferent information flow that indicates cortico-muscular connectivity. 2) The activation of specific muscle groups corresponds to specific activation in the M1. Outputs of the M1 carried by cortical efferents are excitatory or inhibitory, and both outputs were mapped and represented in M1 output maps. 3) Bilateral M1 cortices engage in interhemispheric communication through the corpus callosum during a unilateral movement task. Ipsilaterally, output facilitates bilateral contraction of trunk axial muscles. Contralaterally, interhemispheric interaction is inhibitory and functions to modulate trunk contraction. 4) Cortical plasticity drives greater MC activation symmetry in ambidextrous pianists, indicating that practice can induce MC cortical plasticity that enhances fine motor control. These findings support the conclusion that the MC and M1 are involved in stereotyped movements, contrary to the traditional view. Moreover, this control is interhemispheric, responds to feedback mechanisms, and can be plastically modulated.

School: School of Medicine

MS1-2 KISHAN, RAINA

Investigating the Association between Metabolic Syndrome and Adenomyosis

Frances Kellerman Hanson, MS2, Raina Kishan, MS2, Katie MacLeay, MS4, Cornelia de Riese, M.D., PhD, MBA, OB/GYN, Rohali Keesari, Ph.D.

We performed a retrospective electronic chart review of pelvic ultrasounds and electronic clinical charts to extract surrogate markers suggestive of metabolic syndrome such as weight, BMI, HbA1c, and serum lipid profile. Preliminary data analysis of 200 patient charts, 100 patients in each of the control (CON) and adenomyosis (AM) groups, was performed. This analysis showed that there was a statistically significant difference in weight between the two groups, with the AM group having a BMI 3.62kg/m² higher than those in the CON group. Prior pregnancy also presented as a statistically significant difference, with the AM group (85.9%) being more likely to have been previously pregnant compared to the CON group (60%). Our data did not show statistically significant differences between the two groups among the other markers of metabolic syndrome. Limitations to this study include sample size, retrospective nature of the study, and the impact of medications used to treat hypertension, hyperlipidemia, and/or diabetes on the development of adenomyosis. Additional analysis is currently being performed to exclude patients who are taking medication for comorbidities relating to metabolic syndrome in order to better understand the association between metabolic syndrome and adenomyosis.

School: School of Medicine

MS1-2 KLAR, JANINE

Do Positive Psychological Traits Predict Treatment Response in Patients with Major Depressive and/or Generalized Anxiety Disorders?

Nimra Pasha, Samuel Yang, Janine Klar, Ashish Sarangi, MD, Regina Baronia, MD, Chuck Giles, PhD, Yasin Ibrahim, MD

Objectives: This study aims to examine four positive psychology traits (resilience, loneliness, religiousness, and engaged living) as predictors of treatment response in patients with depression and/or anxiety.

Methods: This is a prospective study aims to include 200 patients with new diagnosis of depressive and/or anxiety disorders. Positive psychology traits (resilience, loneliness, religiousness, and engaged living) will be determined by Connor-Davidson Resilience Scale (CD-RISC 10 item scale), De Jong Gierveld 6 item scale, Duke University Religious index scale, and Engaged Living Scale, respectively. These measures will be administered during orientation prior to first evaluation and week 12 to monitor any score changes. The severity of depression and anxiety will be measured during the first visit evaluation, weeks 8 and 12 to monitor for response and at 12 and 24 months to monitor for relapse. Severity symptoms will be measured by Patient Health Questionnaire 9 item (PHQ-9) for depressive symptoms and Generalized Anxiety Disorder 7 item (GAD-7) for anxiety. Improvement and relapse rates between patients with high scores on the positive psychology scales will be compared to those who had lower scores. The post treatment score changes in resilience, loneliness, engaged living, and spirituality/religiousity scales will be monitored as well.

Results/Discussion: Researchers hypothesize that higher pretreatment scores of resilience, engaged living, and spirituality and lower pretreatment scores of loneliness are associated with better treatment response and lower relapse rates in patients diagnosed with depressive and/or anxiety disorders. They also hypothesize that antidepressants can increase resilience, engaged living, and spirituality/religiousity while decreasing loneliness. Results of this project can inform if resilience, loneliness, engaged living, or spirituality/religiousity could be utilized to help predict response to antidepressants and/or anxiolytics.

School: School of Medicine

MS1-2 KOPACZ, AVERY

Effectiveness of Imaging Markers on Computed Tomography (CT) in Predicting Early Epidural Hematoma Growth

Avery Kopacz, BS, Hunter Miers, BS, TuongVy Dang MD, and Laszlo Nagy MD

Epidural hematoma, most often caused by rupture of the middle meningeal artery secondary to head trauma with fracture of the temporal bone, is a fatal condition that can lead to elevated intracranial pressure, herniation, and death within hours following the inciting traumatic incident, unless surgical evacuation is accomplished. However, subacute and chronic forms of epidural hematoma have been documented, including progressive epidural hematoma (PEDH). Since PEDH patients are likely to exhibit elevated intracranial pressure and to require craniectomy for hematoma removal to prevent the potentially fatal sequelae seen in acute cases, a reliable predictor of hematoma growth would be useful to guide early and appropriate intervention. Several markers have been found to be associated with hematoma expansion in intracerebral hemorrhage (ICH) patients, including the CT blend, swirl, and spot sign. This study aimed to assess these markers, along with some not yet supported by the current literature. Presence of intradural air close to or in the region of an epidural hematoma and/or close to a significant fracture, as well as involvement of the skull base were evaluated for possible associations to epidural hematoma growth. Scans from pediatric patients with epidural hematomas from 2012-2019 were examined and used to determine whether these additional factors are of predictive value. Upon review, an association was found between patients whose CT scans showed evidence of the Blend, Spot, and Swirl Signs, as well as those with air in the region of the lesion and/or fracture and involvement of the skull base. The addition of these markers could be helpful in predicting the growth potential of pediatric epidural hematomas, leading to more effective case management and prevention of adverse outcomes. Using CT signs to determine whether surgical intervention should be undergone earlier can be beneficial to the patient and potentially avoid extensive cerebral damage.

School: School of Medicine

MS1-2 KROLL, ALEXANDER

Antineoplastic Agents Targeting Sphingolipid Pathways

Alexander Kroll, Hwang Eui Cho, Min H. Kang

Emerging studies in the enigmatic area of bioactive lipids have made many exciting new discoveries in recent years. Once thought to be play a strictly structural role in cellular function, it has since been determined that sphingolipids and their metabolites perform a vast variety of cellular functions beyond what was previously believed. Of utmost importance is their role in cellular signaling, for it is now well understood that select sphingolipids serve as bioactive molecules that play critical roles in both cancer cell death and survival, as well as other cellular responses such as chronic inflammation, protection from intestinal pathogens, and intrinsic protection from intestinal contents, each of which are also associated with oncogenesis. Importantly, it has been demonstrated time and time again that many different tumors display dysregulation of sphingolipid metabolism, and the exact profile of said dysregulation has been proven to be useful in determining not only the presence of a tumor, but also the susceptibility to various chemotherapeutic drugs, the metastasizing characteristics of the malignancies, and the efficacy of chemotherapy. Since these discoveries surfaced it has become apparent that the understanding of sphingolipid metabolism and profile will likely become of great importance in the clinic for both chemotherapy and diagnostics of cancer respectively. The goal of this paper is to provide a comprehensive review of the current state of chemotherapeutic agents that target sphingolipid metabolism that are undergoing clinical trials. Additionally, we will formulate questions involving the use of sphingolipid metabolism as chemotherapeutic targets in need of further research.

School: School of Medicine

MS1-2 KUSKO, REBECCA

A Novel Mechanism of Assembly in the Functional CRES Amyloid

R. E. Kusko, Aveline Hewetson, Caitlyn Myers, Matthew Dominguez, Michael P. Latham, Benjamin J. Wiley, R. Bryan Sutton, Gail A. Cornwall

Amyloids, cross- β -sheet rich structures, are known in medicine for their propensity to cause disease. However, growing evidence shows amyloids play physiological roles in processes as diverse as sperm maturation and long term memory, comprising a class of non pathogenic, functional amyloids. Further complicating things, the amyloid structures implicated in disease are indistinguishable on EM from functional amyloid forms. By elucidating at the atomic level the pathway by which a functional amyloid can both assemble and disassemble, we hope to define mechanisms that can be targeted for treatment. We used X-ray crystallography and solution and solid state NMR to follow the assembly of the functional amyloidogenic precursor CRES (cystatin-related epididymal spermatogenic) from its monomeric to amyloid state. A 1.9 Å resolution crystal showed a novel interaction between a flexible loop in CRES molecule A, forming a pseudo β -sheet interaction with β -strand 5 of CRES molecule B. We hypothesize this interaction guides a novel process of amyloid assembly in addition to the traditional domain swapping that is generally associated with cystatin amyloids. To test this, we produced CRES with a mutated loop (LM) and followed its amyloid assembly by DLS (dynamic light scattering) and TEM. WT immediately assembled to an oligomer (6 nm diameter) that remained stable over 12 weeks. In contrast, LM rapidly transitioned to higher order amyloid assemblies of 100 nm to 2000 nm. Further, TEM revealed branched amyloid matrices in WT, but not LM. On gross examination, LM samples gained precipitate, while WT remained clear. These data suggest that the rigidification of the flexible loop into a β -strand may be a mechanism to regulate CRES amyloid assembly, including the building of elaborate, highly branched amyloid matrices similar to those seen in vivo.

School: School of Medicine

MS1-2 LOVELACE, JESSICA

The Joint Association of Septicemia and Cerebrovascular Disease with In-Hospital Mortality Among Patients with Left Ventricular Assist Devices in The United States

Jessica Lovelace; Noah De La Cruz; Damilola O. Owoade MPH; Nandini Nair, MD PhD; Duke Appiah PhD MPH

INTRODUCTION: Left ventricular assist devices (LVADs) are implanted mechanical devices that assist with cardiovascular circulation for patients with end-stage heart failure. There are many complications from this procedure such as cerebrovascular diseases (CEVD) and septicemia. However, large-scale contemporary data from the United States evaluating the interaction of these complications on survival are limited. The aim of this study was to investigate the joint association of CEVD and septicemia with in-hospital mortality in patients with LVAD.

METHODS: We used data from the National Inpatient Sample from 2004 to 2015 to identify patients 18 years of age or older who underwent implantation of a LVAD by means of International Classification of Disease, 9th Revision, codes. Multivariable hierarchical generalized linear models were used to estimate risk ratios (RR) and 95% confidence intervals (CI) for in-hospital mortality by CEVD-septicemia status.

RESULTS: There were 4659 hospitalizations with the average age being 56 years, and 23% being women. Approximately 15% of patients had septicemia; 8% had CEVD and 2.5% had both conditions. In models adjusted for demographic, lifestyle/behavior factors and comorbid conditions, the risk of in-hospital mortality was almost threefold higher among patients with septicemia alone (RR=2.84, CI:2.24-3.60); two-and-half fold higher among patients with CEVD alone (RR=2.53, CI:1.85-3.48); and almost fourfold among patients with both septicemia and CEVD (RR=3.76, CI: 2.38-5.94, Pinteraction = <0.001)

CONCLUSION: In this study, we observed a substantially high risk of in-hospital mortality among LVAD patients who had both septicemia and CEVD. We recommend careful evaluation of LVAD patients with septicemia since it exacerbates the impact of other complications like CEVD on mortality.

School: School of Medicine

MS1-2 LOY, SYDNEY

An Overall Evaluation and Cost-Analysis of Dermatology Nights for Uninsured Patients at The Free Clinic

Sydney Loy, MS, Christine P. Lin, BA, David Boothe, MD, Fiona Prabhu, MD, Kelly Bennett MD, Ashley Sturgeon, MD, Michelle Tarbox, MD

The Free Clinic at Lubbock Impact, a student-run health clinic associated with TTUHSC, provides free healthcare to uninsured patients in the city of Lubbock and the surrounding West Texas area. Once a month, a highly focused and specialized “Dermatology Night” is held to ensure that those with various skin conditions or malignancies can be treated efficiently and thoroughly. These nights emphasize the importance of skin care management and demonstrate the significance of providing healthcare measures to those unable to afford or have access to them.

The purpose of this study is to conduct a retrospective chart review from February 2018 through February 2020 at The Free Clinic. The objectives are as follows:

1. Identifying the frequency of dermatologic-specific diagnoses, procedures, and treatments provided to patients on Dermatology Nights
2. Performing a procedural cost analysis regarding the dermatologic-specific procedural services rendered on Dermatology Nights

We are currently in the process of data analysis for this study. Our early review of data shows 135 patients seen, >30 skin cancers diagnosed, and >65 procedures performed (e.g. biopsies, excisions, cryotherapy, ED&C) in the 2-year time period.

Dermatology Nights at The Free Clinic offer specialized services that uninsured patients may not otherwise be able to receive, which are key in detecting and treating skin conditions that alter the quality of their lives. These nights emphasize the importance of screening in order to prevent the occurrence of future malignancies. The cost-analysis provides budget insight for future patient compliance and allows the clinic to apply for future funding opportunities.

School: School of Medicine

MS1-2 LUDWIG, CAMERON

Lone Star Peripheral Arterial Disease Registry for PAD-CLI Diagnosis, Treatment and Outcomes

PI - Mohammad Mac Ansari, MD, Additional Investigators: Rasikh Ajmal M.D., Joshua Randall Brock MS, Marina Iskandir M.D., Cameron David Ludwig MS2, Tyler Bray Helton MS3, Baseer Quraishi MS2, Christopher Thompson MS2

Introduction: Peripheral artery disease (PAD) is a prevalent and underdiagnosed disease. The etiology of this disease consists of atherosclerosis in the vasculature of the extremities and can cause many symptoms ranging from mild claudication to ischemic necrosis and subsequent limb amputation. The study of PAD is an important area of research in cardiology as there is relatively little information on the outcomes of PAD treatment. There are only two known registries, but no registries in the West Texas region. In West Texas the disease is common due to high incidence of risk factors like DM, HTN, HLD, CAD, and smoking hx. Therefore, the focus of this project is to compile the Lonestar PAD registry, a quality initiative.

Methods: For the purpose of the quality control initiative, data collection will be done retrospectively in multiple fields regarding de-identified patients receiving PAD treatment. The fields analyzed will be the patient’s comorbidities, demographics, presence of symptoms, ulcers, gangrene, Rutherford classification, ultrasound use, access site location, vessel lesion location, balloon and stent type, length and diameter of the stent or balloon used, type of atherectomy device used, type of crosser that was used, what was used for access site closure, pt presentation, and pt outcomes. Outcome measures will include a 12, 24 and 36 month follow up concerning management of disease and incidence of amputation, myocardial infarction, stroke, and death. Inclusion criteria are PAD and CLI patients ages 18 to 89 with cath lab procedures done from January 1st, 2013 to December 31st, 2017. Exclusion criteria is any patient that does not meet the inclusion criteria.

Results: Initially as an example of quality control checkup of registry, we analyzed smokers and found the following:

1. Smoking status had the greatest contribution to total lesion length of all co-morbidities.
2. Total lesion length is positively correlated with Rutherford score, particularly among smokers

3. Once Data is collected, Many such analyses can be performed

Conclusion: The information obtained through patient record review will contribute to quality improvement, insight into treatment modalities, better metrics, and more thorough guidelines for addressing PAD patients in West Texas. Additionally, future plans are to allow other researchers to access the data collected by the investigators; however, prior to the implementation of this process, a revised Protocol will be submitted to the IRB which formally addresses the procedures necessary to operate the study as registry research.

School: School of Medicine

MS1-2 MCCABE, PARKER

Incorporating Active Learning Materials Into the Gastrointestinal and Reproductive Embryology Curriculum for First-Year Medical Students

Parker McCabe, Dr. Brandt Schneider, Dr. Gurvinder Kaur

First year medical students at the Texas Tech University Health Sciences Center (TTUHSC) start their year with a 10-week block of Clinically Oriented Anatomy (COA). During this course, the students learn about human anatomy along with embryology. Historically, embryology has been a difficult topic for students to grasp. To decrease student work load, a high yield embryology fact sheet, covering key topics, was provided online. We hypothesize that converting passive embryology learning (reading high yield embryology fact sheet) to active learning (by incorporating active learning materials such as flash cards, review sessions, and practice problems and solutions) will improve student understanding of the material. To achieve this goal, we focused on Unit 3 of the COA embryology material and evaluated whether active learning improved current class performance on in-house and National Board of Medical Examiners (NBME) final exam scores with regard to embryology by comparing their score to last year's class. Pre and post-quiz data were also collected to evaluate the usefulness of an embryology review session before the NBME final exam. Overall, student's perception of the active learning was favorable. Indicative of better understanding of the material, student performance on post-quiz was improved. Although, the current class performance on in-house exams was not significantly different, their performance on NBME was improved compared to last year's class. Collectively, our data suggests that providing embryology material in form of active learning improved student's grasp of the material thereby augmenting their performance on NBME. Based on how popular these materials were amongst the students, adapting a similar model might be helpful for other medical schools across the country in preparing their students for embryology on both in-house and board exams.

School: Graduate School of Biomedical Sciences

MS1-2 MERIDA-MORALES, NORIKO

A Student-Generated, Peer-Led Teaching Activity for Integrative Medicine in a Family Medicine Accelerated Track

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Purpose: The TTUHSC FMAT1 course focuses on the top 24 diagnoses in primary care. During each summer session, students and faculty work together on a project that develops, implements and assesses an innovation in medical student teaching. Methods: FMAT students studied evidence related to the use of complementary and alternative medicine (CAM) and/or integrative medicine (IM) therapies in primary care. Focusing on the topic of each week, students were responsible for researching and educating their peers about evidence-based CAM/IM therapies. Each student gave a brief presentation for 2 IM therapies, including one nutritional supplement, noting indications, drug interactions, MOA, sex- differences, safety issues, etc. Learning objectives for this activity include applying basic sciences and clinical content to integrative therapies; demonstrating clinical competencies that apply to course content, and demonstrate critical thinking and synthesis of information. Both faculty and students participated in pre- and post-course assessments of knowledge and attitudes about integrative medicine therapies. Results: On a series of questions that matched health conditions with CAM therapies, scores on the pre-test were 40% correct overall (35.3% for students); on the post-test, scores were 41.7% correct overall (39% for students). On student-submitted questions, students score 70.8% correct, while faculty scored 67.4% correct. All groups reported higher levels of comfort and confidence with CAM/IM therapies from pre-test to post-test. Conclusions: This project offered the opportunity to 1) embed a self-directed learning activity into an ongoing course; 2) address CAM/IM therapies, which are often not taught well in medical school; 3) challenge students to integrate CAM with the week's content & diagnoses; 4) use physician & scientist faculty expertise to guide discussions; 5) engage students directly in teaching & evaluation; and 6) pilot a model that can be expanded.

School: School of Medicine

MS1-2 MIEARS, WILLIAM

Gender and Ethnic Differences in Seeking Healthcare Plus Time of Recovery from Procedures for Shoulder and Knee Conditions

Amanda Weaver, Katerina Kellar, William H. Mears, Rhett Butler, Ali Ashraf MD, Adam Woolridge MD, Anudeep Dasaraju, John Chappa, Matthew Ferguson MD, George Brindley MD, Phillip Watkins, and Mimi Zumwalt MD.

Background: Previous studies have demonstrated that females have more severe pain in more locations on the body than males, but tend to wait longer to seek help which leads to worse postoperative outcomes. Also, physicians/surgeons may have an unconscious bias in recommending surgery more for men than women.

Methods: We analyzed 798 charts with chief complaints of shoulder or knee pain from 2007-2015. We categorized patients based on acute or chronic injury, then looked at time from referral to first orthopedic appointment, delay to the time of surgery, and time of recovery.

Results: Women were observed to have chronic injuries more often than men (61.2% vs. 54.1%) a difference that was statistically significant ($\chi^2=4.08$, $df=1$, $p=0.043$). Men required longer recovery time in surgical cases ($p=0.0024$).

Conclusions: Our study shows gender disparity in healthcare between men and women. Data from broader geographic locations is essential to educate physicians about this important topic to eliminate bias.

School: School of Medicine

MS1-2 MITTAL, NITISH

Utilization of Curve Sheath Technique to Facilitate Difficult Internal Carotid Artery Occlusions

Nitish Mittal; Dr. Mohammad Ansari, MD

Carotid Artery Angioplasty with Stenting, a minimal invasive procedure, has now become a widely used procedure for carotid artery occlusive disease, especially in patients with high-risk carotid endarterectomy. Traditionally, symptomatic patients with $\geq 60\%$ Internal Carotid Artery (ICA) stenosis underwent carotid endarterectomy as standard care. Within this report, we present a particularly difficult case of Type 3 Aortic Arch – Right ICA stenosis.

A 87-year old patient initially presented to the Cardiology clinic for elective carotid intervention. Patient had a history of right frontal stroke, CKD, HTN, chronic systolic HF. A clinical diagnosis of ICA stenosis was made, and carotid angiogram showed 70% occlusion of Right ICA. Moreover, patient was at high risk for endarterectomy due to co-morbidities and age. Hence, the patient was scheduled for internal carotid artery stenting in the Cath Lab. Interestingly, the patient had a Type 3 aortic arch, ≥ 2 diameter of Common Carotid artery (CCA), making it difficult to get the catheter to the stenosis due to the sharp angle. For this purpose, Curve Sheath Technique was implemented, and Cook 90 cm Shuttle Sheath was positioned in the right CCA. Eventually, Medtronic self-expanding stent was placed at the site of lesion in ICA. Angiography revealed excellent results. Post-operatively, patient developed bradycardia without hypotension transiently requiring chronotropic support with dopamine infusion. The reflexive bradycardia is a well described post-procedural phenomenon following ICA stenting.

This case illustrates the use of innovative technology, Curve Sheath Technique, to facilitate the challenging case of Type 3 Aortic Arch Right ICA stenosis. Utilizing the Curve Sheath Technique prevented the patient from undergoing Carotid endarterectomy, hence mitigating risks for this specific patient. This is a glaring example of how innovation and new technologies are integral in the development of medical treatment.

School: School of Medicine

MS1-2 MOHAMMED, TIJANI

Creation of Male and Female Perineum Dissection Videos to Enhance Student Understanding of Perineal Injuries

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Clinically Oriented Anatomy (COA) is a core and introductory subject for first year medical students (MS1). At Texas Tech University Health Sciences Center (TTUHSC), MS1's begin their medical training by learning about human anatomy through lectures and laboratory dissections in the COA block. Pre-lab videos, providing step-by-step dissection guide, are critical to introduce students to cadaver dissections. However, TTUHSC's COA curriculum lacks prelab videos that introduce students to the male and female perineum structures. Through personal interaction and end of the block reviews, students reported that there is need for these prelab videos to enhance their understanding of perineum anatomy. Based on this information, we hypothesize that male and female prelab videos will result in better understanding of this topic thereby augmenting student performance on in-house and board exams. To achieve this goal, we created two modules – 1) prelab videos exposing students to perineal dissections and 2) a PowerPoint presentation which integrated information from lecture and the course textbook to enhance students' understanding of perineal injuries. These modules are self-paced with the option to start and stop in the event of interruptions and were made available to MS1's. The effectiveness of these modules was determined by comparing this year's class performance to last year's class in-house and board exams. Although, exam performance was not significantly improved, students rated these modules favorably. Based on Likert survey, 100% of respondents stated that the presentation was effective at enhancing their understanding of the perineum. Student feedback on the prelab videos, and PowerPoint presentation lead us to believe that our project is a good first step toward resolving a deficiency in TTUHSC COA curriculum. Students also provided comments that will enable us to refurbish our teaching materials to better educate future MS1's.

School: Graduate School of Biomedical Sciences

MS1-2 NEIGHBORS, LEXI

Mechanical Small Bowel Obstruction Secondary to Gallstone Ileus

Kristen Fain MS2, M. Warren DO, Babak Abbassi MD, Yana Puckett MD, Catherine Ronaghan MD, FAC

Introduction: Gallstone ileus is a rare and infrequent cause of small bowel obstruction seen disproportionately in the elderly population. Often, this condition is observed in individuals with a history of cholelithiasis or cholecystitis. Gallstone ileus does not typically present with any defining or unique characteristics; thus diagnostic imaging is key to discovering the cholecystoduodenal fistula. Surgical treatment to relieve the mechanical small bowel obstruction remains the most effective treatment.

Objective: To present an unusual mechanism for small bowel obstruction, that of gallstone ileus, and provide a thorough literature review of mechanisms of small bowel obstruction.

Methods: We present a case of a 74-year old female suspected of small bowel obstruction who underwent exploratory laparotomy in November of 2018. Data was collected from an emergency room visit, surgical procedure encounter, and follow ups dating from November 18th, 2018 to December 5th, 2018.

Results: Patient presented to the emergency center with a 1-day history of abdominal pain, nausea, and vomiting on November 18th, 2018. The patient described the pain as intermittent, confined to the umbilicus area, and prevalent with meals. Radiographs revealed the presence of a cholecystoduodenal fistula. Ultrasound revealed thickened gallbladder walls with pericholecystic fluid and inflammation. Next day exploratory laparotomy, enterolithotomy, and enterorrhaphy was performed for a small bowel obstruction secondary to a gallstone ileus. No post operative complications were noted and the patient was safely discharged on November 22nd, 2018.

Conclusion: Gallstone Ileus is a rare and infrequent condition typically presenting in elderly females with a history of cholecystitis. This case emphasizes the importance of focusing on the differential diagnosis of small bowel obstruction and the use of imaging to narrow the diagnosis.

School: School of Medicine

MS1-2 NEVELS, ANNA

Analysis of Pathological Changes in Colitis and Colon Cancer in the Setting of Hemochromatosis

Anna Nevels; Mitchell Wachtel, M.D., Vadivel Ganapathy, Ph.D.

Hemochromatosis is a genetic iron overload disease leading to late onset manifestation of organ damage due to the slow accumulation of iron and oxidative stress. Liver cirrhosis and hepatocellular carcinoma are the most notable presentations of the disease, but the involvement of other organs is less known.

Previous studies from our lab explored the possible relationship between hemochromatosis and the colon by inducing hemochromatosis in mice with two different experimental models of colon cancer: a genetically driven cancer and a colitis-associated cancer. The genetically driven cancer was produced in mice with a heterozygous mutation in Apc (adenomatous polyposis coli) and the colitis-associated cancer was produced by administering a colon-specific carcinogen azoxymethane and cyclic administration of dextran sulfate sodium, an irritant. The polyps were sectioned and stained with an H&E stain.

In this study, the polyps were analyzed for the progression of colon cancer using the computer program FIJI (FIJI Is Just ImageJ), an open source program developed by the NIH geared toward scientific image analysis. The characteristics of nuclei are important in determining malignancy of tissue due to the uniquely identifying characteristics of cancerous cells compared to healthy cells. FIJI was used to collect data on the size, shape, and color of each nuclei via the measurements of circularity, area, brightness, and nucleolar area; the nuclei of the small and large intestine epithelial cells of each experimental model were compared.

WT nuclear circularity averaged only 1% larger than HFE circularity ($P = 0.42$). All other features were more atypical in the HFE cancer nuclei ($P < 0.00001$ for each comparison). WT nuclei, on average, had 29% larger area, 44% larger brightness c.v., and 66% larger nucleolar area, than those of HFE nuclei. From this, the HFE nuclei appeared less aggressive than the WT nuclei.

School: School of Medicine

MS1-2 NWANERI, RACHEL

The Influence of Race and Ethnicity in Therapeutic Dosing Among Patients Newly Treated for Painful Diabetic Peripheral Neuropathy

Rachel Nwaneri, 1 Lin Ma, MS, 2 Alyce S. Adams, PhD 2

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The purpose of this study was to investigate the association between race and ethnicity and the likelihood of receiving a therapeutically effective dose of non-opioid pain medications among insured adults newly diagnosed with diabetic peripheral neuropathic pain. Prior studies have identified racial and ethnic disparities in pain treatment using opioids, particularly in emergency room departments. We hypothesized that race and ethnicity would be associated with DPN pain treatment. Our study sample included 1,252 adults enrolled in the Diabetes Telephone Study, a negative randomized controlled trial that investigated treatment outcomes via automated monitoring of patient treatment experiences. A post-hoc analysis was conducted to evaluate the relationships between receiving a therapeutically effective dose during the 12 months following treatment start and patient characteristics (race/ethnicity, gender, neighborhood deprivation, medication drug class, pain severity, chronic pain, most recent A1C, BMI, language spoken, Medicare, Medicaid). Descriptive statistics were assessed using Student's t test and contingency tables (chi-squared tests). We also conducted a logistic regression analysis to assess the independent association of race and ethnicity and the outcome. Anticonvulsants and antidepressants were prescribed most frequently. About half of all patients within the study received a therapeutically effective dose of medication. Of the variables examined, only pain interference [3rd quartile: 1.76, (1.21,2.55)], 4th quartile: 1.95, (1.25, 3.03)] and type of medication prescribed [3.62, (2.71,4.84)] were statistically significantly associated with receipt of a therapeutically effective dose. Race/ethnicity were not associated with receiving a therapeutically effective dose. This may suggest that disparities are primarily related to opioid prescribing in acute settings of care. However, more analysis is needed to confirm these findings.

School: School of Medicine

MS1-2 OCHOA, OZMAN

Assessing the Effects of Implementing Student-Created Teaching Videos and Question Analysis within the First-Year Medical School Renal Physiology Unit

Ozman Javier Ochoa, John Pelley

Introduction: First-year medical students (MS1s) enrolled in the Multiple Organ Systems (MOS) block often struggle with the material. However, in previous blocks, such as Clinically Oriented Anatomy (COA), students have benefited from video learning modules created by Teaching Assistants (TAs) who have previously taken the same class. Despite the favorability for these modules, the benefits of student-created video modules in blocks outside of COA have not been assessed. Therefore, this project will explore if the implementation of student-created content, specifically, review videos and question banks with rationals during the Renal portion of MOS, will augment the learning experience for the MS1s.

Methods: A Needs-Based assessment aided in ascertaining which topics were believed to be the most difficult. This information helped guide the creation of video modules covering most of the lecture material. In addition, question banks with rationals were created with 1st, 2nd, and 3rd questions. Both of these resources would then be distributed at the start of the Renal portion of the block.

A Pre and Post unit quiz with identical questions were used to assess the improvement in the students' understanding of the material. Furthermore, a satisfaction survey was sent out following the unit, allowing students to rate their perception of the usefulness and quality of the video modules/questions, as well as give their comments and critiques.

Results/Conclusion: Comparing the results from the pre and post quizzes between students who used the modules, questions, both, or none, alongside the satisfaction survey, will help demonstrate if student-created content elicited similar positive perceptions as those utilized in the COA block of the first year curriculum. Assuming that the hypothesis was correct, the results will describe the benefits of implementing student-created content compared to the current medical school curriculum.

School: Graduate School of Biomedical Sciences

MS1-2 ONYEJGBU, DUBEM

Identification of the bupropion binding site in GLIC using site-directed mutagenesis

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The aminoketone bupropion is clinically used as an antidepressant and smoking cessation drug. The mechanism of action involves binding to dopamine and norepinephrine transporters to inhibit reuptake in the brain. More recently, it was shown that bupropion also inhibits pentameric ligand-gated ion channels (pLGICs) also called Cys-loop receptors in eukaryotes, in particular nicotinic acetylcholine receptors (nAChR) and serotonin receptors (5-HT₃AR). A prokaryotic homologue that has been extensively used to investigate structure, function, and pharmacology of pLGICs is the *Gloeobacter violaceus* ligand-gated ion channel (GLIC). GLIC is a proton-gated cation-selective channel that exists that structurally contains an extracellular and transmembrane domain. We used docking studies and site-directed mutagenesis to analyze potential binding site residues for bupropion. We engineered amino acids within the α -helical transmembrane domain with the goal to interfere with bupropion's ability to bind and inhibit channel function. Two-electrode voltage-clamp recordings in *Xenopus* oocytes were used to examine the effect of mutations on the proton concentration that yields half-maximal GLIC activation and then the bupropion inhibition of these engineered GLIC constructs was tested. We further used Cys scanning of key residues in the identified binding site to substantiate our results. Further studies are needed to probe whether bupropion uses a similar binding site in eukaryotic pLGICs. A more detailed understanding of bupropion's molecular mechanism of action will enable us to better understand its clinical effects. This may include both desired as well as undesired clinical effects.

School: School of Medicine

MS1-2 O'SUOJI, CHIBUZO

Pediatric Kikuchi-Fujimoto's Disease with a Relapse of Systemic Lupus Erythematosus: A Case Study

Chibuzo O'Suoj, MD, MS, John Rafael, MS1

Introduction: Kikuchi-Fujimoto Disease (KFD), also known as histiocytic necrotizing lymphadenitis, is a self-remitting, immune-mediated rare disorder having unique histopathological characteristics commonly seen young adults <40 years old, particularly in Asian populations. There is a strong association between KFD and Systemic Lupus Erythematosus (SLE), but reports of KFD and subsequent SLE occurring within a short time frame (<2 years) for pediatric populations are rare.

Case report: We herein report a 13-year old Hispanic girl with no significant medical history who presented to the emergency department (ED) with persistent fever of unknown origin (FUO), headaches, and dizziness that evolved into extensive weight loss and scalp lesions. An extensive, repeated hematology, oncology, infectious disease, and rheumatology work up done over a period of 1.5 months led to a lymph node biopsy revealing histiocytic necrotizing lymphadenitis suggesting KFD. After a short course of steroids and normalizing symptoms, the patient presented to the ED 17 months later with symptoms of a recurrent KFD. She was seen a week later in clinic with worsening symptoms, including diffuse vasculitic non-blanching rashes over her face and extremities, and extreme fatigue accompanied by arthralgias and myalgias with no arthritis. Labs revealed positive ANA and anti-Smith antibodies along pancytopenia, leading to a diagnosis of SLE and treatment methylprednisolone and hydroxychloroquine.

Conclusion: We report a rare case of pediatric KFD and subsequent SLE within a year and a half, a very rare combination and timeline.

School: School of Medicine

MS1-2 PASHA, NIMRA

An Unusual Cause of Sore Throat and Dysphagia in a Teenage

Rachel Nwaneri, BS, Nimra Pasha, BS, Winslo Idicula, MD, Roy Jacob, MD

Branchial cleft cysts are congenital abnormalities that arise from improper obliteration of the branchial cleft and/or pouch. The branchial apparatus begins to develop during the fourth week of gestation. A 13-year old female presented to the ER with neck pain and left anterior neck swelling. The patient states that it began with a sore throat and dysphagia. Physical examination reveals significant tenderness and soft tissue swelling in the left thyroid region. Incision and drainage, fine needle aspiration, and intravenous clindamycin was administered for suspected infection. CT neck with intravenous contrast was ordered, revealing a 2.9 cm x 2.7 cm x 2.5 cm rim enhancing lesion involving the superior pole of the left thyroid lobe. Ultrasound-guided fine needle aspiration shows the presence of *Streptococcus intermedius*, *Haemophilus haemolyticus*, and *Veillonella parvula*. The characteristic location of a rim enhancing lesion involving the left lobe of the thyroid gland suggests a diagnosis of a fourth branchial cleft cyst. An otolaryngologist initially recommended performing microlaryngoscopy and bronchoscopy (MLB), cauterization of tract transorally, or excision transcervically with a hemithyroidectomy. However, the patient showed signs of visible improvement. Most recent CT scan revealed no accumulation of lesion or masses following fine needle aspiration. This case revealed that fourth branchial cleft cysts should be considered in the differential diagnosis for patients in this age group even though the usual presentation is within the first decade of life. Antibiotics and fine needle aspiration are more favorable treatment options over incision and drainage. These options should be considered more frequently due to their higher success rate.

School: School of Medicine

MS1-2 PATEL, BIANCA

Emergency department use for mental health symptoms: Findings from 2009-2015 NHAMCS data

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Background: Hospital emergency departments (ED) in the U.S. serve a wide range of health needs, including to individuals who have poor access to primary care. Research has found mental health ED visits have increased in both pediatric and adult populations, but more research is needed to understand the demographics of these populations. This study explores triage scores, wait times, length of visit, and time from first MD contact to discharge in ED visits where mental health was identified as a reason for visit.

Data & Methods: Data for this study include all individuals age 18+ in the 2009-2015 National Hospital and Ambulatory Care Survey, a nationally representative sample of emergency department visits collected annually. Each case provides up to three reasons for visit entered during the triage process, and individuals are given a score for their urgency to be seen ranging from 1 (Immediate) to 5 (non-urgent).

Results: About 5% of all ED visits involved a mental health concern, with about 2% being a visit where mental health was the only presenting issue. This translates to about 5.9 million ED visits annually related to mental health symptoms, of which 2.4 million ED visits were for mental health symptoms alone. Average triage score for adults for whom a mental health concern was the sole reason for visit was 2.8, significantly lower than the average of 3.3 in the non-mental health sample (lower score=more urgent). Patients with or without mental health symptoms wait similar amounts of time to see a doctor in the ED, but those with mental health issues remain in the ED an average of 80 minutes longer.

Conclusion: The sizable population using the ED for mental health is a meaningful public health issue that calls for improvement of community mental health care and more ED resources for mental health patients.

School: School of Medicine

MS1-2 PATEL, DHRUV

Medical Business: Cost-Benefit Analysis of Implementing a Drug Scanning System

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Introduction: The Texas Tech University Health Sciences Center manages a pharmacy in West Texas for the Texas Department of Criminal Justice (TDCJ). After an internal audit was conducted, it was shown that there was no efficient way of checking the number of reclaimed drugs that were being returned for a refund/credit and the actual credit being issued by the seller, University of Texas Medical Branch at Galveston (UTMB). Thus, there was large discrepancies in the monthly amount of credit received for these reclaimed drugs. Furthermore, the TDCJ facility was inspected on site and was shown to have inefficient methods of drug receiving, reclaiming, and destroying.

Objective: The purpose of this study is to conduct a cost-benefit analysis to evaluate the proposed implantation of a drug scanning system at this TDCJ facility to reduce the discrepancy in credit and better monitor the reclaimed drugs.

Methods: This project was done by gathering the monthly invoices for the past twelve months and separating the total prescription costs and the reclaim credit per month. The percentage of the total prescription costs which was reclaim credit was calculated for every month and analyzed to find any trends in the data.

Results: The data analysis showed the percent reclaim credit varied from 7% to 51% in the twelve months that were analyzed. After completing the cost-benefit analysis, it was determined that it would be beneficial to implement a drug scanning system since the cost is much less than the average reclaim credit for one month. With the implementation of a scanning system, including software and hardware (estimated cost \$4000), this would decrease monthly discrepancy in reclaim credit and allow for better monitoring of the reclaimed drugs at this TDCJ facility.

*The specific name of the pharmacy was not included due to confidential state re

School: School of Medicine

MS1-2 PATEL, SHREE

Electrothermal Neck Burns: Unusual Injuries Caused by Necklaces and Phone Chargers

Shree Patel, Grant Sorensen, MS, PhD, John Griswold, MD, FACS

Introduction: Electrocutions from both high and low voltage exposures can cause serious injuries and account for an estimated 2% to 5% of burns admitted to the hospital. Low voltage injuries are those less than 1000 volts while most house-hold electronics are 120 volts. Many electrical injuries are a result of contact between electrical sources and metallic jewelry. Serious burn injuries occur when the metallic jewelry becomes fused to the exposed electrical source causing it to super-heat. We present two unusual cases of low-voltage electrothermal injuries resulting in significant burn injuries when metallic necklace jewelry contacted phone charger plugs.

Case 1: A healthy 14-year-old male was transferred to UMC sustaining full thickness circumferential thermal burns to his neck. While the patient was sleeping, the electrical conduction from an extension cord to his phone charger became overheated and attracted his metal necklace. This chain made contact between the charger and extension cord. As a result of this contact, the patient awoke from the initial electrocution to find his necklace overheated, red hot, and causing his shirt to catch on fire, resulting in a thermal burn injury.

Case 2: A 22-year-old male, presented to UMC with deep circumferential burns to the neck. The patient was attempting to charge his cell phone when his metal necklace contacted an exposed wire on the charging cord. The metal necklace heated up around his neck which caused full thickness thermal burns. While the metal chain was heating, the patient attempted to rip the necklace off with his right hand, resulting in additional burns on his right palm. The burns were surgically treated the following day with excision and grafting.

Conclusions: Both cases demonstrate the potential of thermal burn formation via electrical resistance in metal jewelry. This study aims to bring public awareness to the potential hazards that can result from simple phone chargers and metal jewelry.

School: School of Medicine

MS1-2 PAYBERAH, EBRAHIM

Implantation of Porcine Urinary Bladder Matrix to Forehead Laceration

Ebrahim Payberah BS, Jasmin Rahesh MS, Sterling Rosqvist, Beatrice Caballero BS, Catherine Ronaghan MD FAC

Introduction: Porcine urinary bladder matrix (PUBM) is a new xenograft used for surgical reinforcement and management of soft tissue wounds. It is an acellular extracellular matrix derived from the basement membrane and lamina propria in the inner lining of porcine urinary bladder. It facilitates constructive remodeling and wound healing via its components such as intact cellular signaling proteins.

Methods: We present a case of a 20-year-old male who underwent xenograft implantation utilizing PUBM for a dog bite to the forehead with significant soft tissue loss. Data and information were collected via chart review of EMR at UMC from the initial ER visit, ENT consultation, initial acute care, surgical management, and clinic follow up for one year.

Results: Patient presented October 30, 2018 with multiple dog bite wounds including a 4.5 cm wide 0.7 cm deep and 7 cm long with tunneling stellate avulsion laceration to the left forehead with a large area of tissue loss extending to the galea. ENT kept wound moist with Bacitracin ointment and adaptic with telfa non-adherent gauze, hypafix tape and changed dressings twice a day. On October 31, 2018 nonviable tissue was debrided, and PUBM was implanted. A total of 200 mg of MicroMatrix was implanted covering the tunneled areas. The entire 7 X 10 cm sheet was implanted and secured to skin with vicryl suture. Adaptic was secured to skin with prolene suture and Hydrogel was applied to maintain hydration. Wound completely healed with one application of PUBM, despite the challenging location, over 12 weeks.

Conclusion: PUBM can be used to facilitate the healing of otherwise large lacerations and wounds in difficult locations that can that be difficult to manage and close in many cases obviating the need for skin grafts or flap reconstruction. This case highlights the successful use of PUBM implantation on a large avulsion laceration on a particularly challenging location of the forehead with 100% healing and wound closure achieved.

School: School of Medicine

MS1-2 PEREZ-ARNOLD, LAURA

Intracranial Hematoma Volume and Outcome in Traumatic Brain Injury

Usiakimi Igbaseimokumo M.D. (Principal Investigator), Laura Perez-Arnold B.A., Brandon Wei B.S., Roy Jacob M.D., Muhittin Belirgen M.D., Laszlo Nagy M.D.

Traumatic brain injury is a heterogeneous disorder with variable outcome. Furthermore, intracranial hematomas are a common cause of death and disability. Establishing a correlation of hematoma volume to outcome will allow for triage and rapid medical decision-making. Thus, we carried out a study to determine the feasibility of measuring hematoma volumes and relating it to outcome. Hematoma and brain volumes were measured from the CT scans of sixteen patients under five years of age who had intracranial hematomas evacuated between January 2014 and December 2018. Hematoma volumes were related to scores on the Glasgow Outcome Scale, which relates degree of brain injury to expected degree of recovery. The mean hematoma volume was 32.3 cc (6 -139), which is consistent with current literature. 75% had a good outcome and there was one fatality (6%). There was a significant correlation between hematoma volumes and outcome ($p= 0.001$). This information will be very useful for medical decision making and for counseling families of children who suffer traumatic intracranial hematomas. However, we will need larger numbers to confirm the robustness of the current findings.

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School: School of Medicine

MS1-2 PERRY, CODY

Exercise and Nutritional Guidelines for Weight Loss and Weight Maintenance in the Obese Female

Cody Perry, Mohammed Pourghaed

Overweight (BMI 25.9-29.9 kg/m²) and obesity (BMI ≥ 30 kg/m²) are a growing epidemic in the United States with two-thirds of the population falling into either category [5]. Obesity has been linked to numerous health-related issues including type II diabetes, hypertension, heart disease, strokes, and certain types of cancer [4]. Research has found that the best treatment for obesity is weight loss [7]. The preferred approach for losing and maintaining weight loss is through the combination of dieting and exercising together [7]. Beginning a weight loss treatment can be difficult as physical, mental, and emotional factors can deter an individual's progress. However, a correct understanding of the body's metabolism and the selection of an appropriate diet and exercise program may assist patients with weight loss. This study aims to analyze the assortments of diets and exercises available to public knowledge and assess their effectiveness during an intervention period. The current literature indicates that diets such as Atkins, Keto, Paleo, Mediterranean, and Intermittent Fasting can help patients to lose weight [14, 27, 28, 38, 44]. Yet each of these diets comes with inherent limitations, although the Mediterranean diet appears to have relatively few limitations/contraindications in comparison to the other diets previously mentioned. Of the many exercise modalities, high-intensity interval training (HIIT) and resistance training illustrated the most significant ability to establish weight loss. HIIT produces the largest difference in body fat rate (BF%) and body fat mass (FM) while resistance training shows the highest adherence to exercise rate and builds the most muscle mass, linked to an increase in basal metabolic rate (BMR) [76, 77]. The future of weight loss may include greater integration and optimization of diet and exercise based upon the body's circadian rhythm. However, there is a need for additional studies to explore this theory [78].

School: School of Medicine

MS1-2 PETERSON, CHRISTOPHER

Immune Response Elicited by S. japonicum Vaccine in C57 Mice

Rebecca Kernan, Christopher Peterson, Adebayo Molhehin, Weidong Zhang, and Afzal A. Siddiqui

NOTE: This is a joint submission for Rebecca Kernan and Christopher Peterson. Both were sponsored by the summer medical research program and are presenting the poster under the “Medical students years 1-2 | Graduate Medical Sciences | Master of Public Health” category.

Schistosoma is a parasitic helminth that causes the disease known as Schistosomiasis, a neglected tropical disease endemic to Africa, Asia, the Eastern Mediterranean, the Caribbean, and South America. It is estimated that 200 million people are infected with Schistosoma worldwide, with an additional 779 million people at risk. The three most common species of this trematode – S. mansoni, S. japonicum, and S. haematobium – can cause serious symptoms such as hepatosplenomegaly, jaundice, portal hypertension, esophageal varices, and hematemesis. What’s more, these parasites cause a combined annual mortality of 280,000 deaths. The persistence of Schistosoma, despite eradication efforts, is due in part to its life cycle, which involves both humans and aquatic snails. Additionally, the anti-helminthic praziquantel, while an effective treatment, isn’t readily available in endemic areas and its widespread use could result in resistance¹.

Given this, an effective Schistosoma vaccine is desperately needed. Here we examine such a vaccine for S. japonicum, the major cause of Asiatic schistosomiasis. The vaccine targets the Sj-p80 protein, a large subunit of the S. japonicum calcium-activated protease calpain, which plays a major role in membrane biogenesis and renewal. The Sj-p80 vaccine functions to inhibit egg hatching and decrease egg retention, expulsion, and transmission—providing both prophylactic and therapeutic benefits. However, the way in which a vaccine is produced can effect its immunogenicity. Here we examine the effects of five protein buffer used in vaccine production on immunoglobulin and cytokine production—two important components of Schistosoma immune response¹.

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School: School of Medicine

MS1-2 PETERSON, JOSHUA

Analysis of Patients and Conditions Seen at a West Texas Free Ophthalmology Clinic

Rachel Wagstaff, Derrick B. Graham, Joshua A. Peterson, Kelly Mitchell, Kenn Freedman, Fiona Prabhu

The Texas Tech University Health Sciences Center Free Clinic provides eye examinations and treatment for uninsured patients in Lubbock, Texas. Founded over ten years ago as a primary care clinic, it was expanded in 2014 to incorporate an ophthalmology service for the clinic’s large diabetic and hypertensive population. The purpose of this study is to analyze patient demographics and diagnoses at the clinic to improve understanding of our patient population and guide the ophthalmology clinic’s future expansion efforts. A retrospective chart review of ophthalmology patients seen between March 2018 and January 2020 was performed. Charts were reviewed for diagnoses and demographics (age, gender, ethnicity, income). The results provide a breakdown of our patient population by age, gender, ethnicity, and income and identify the most commonly encountered conditions at our clinic. To best serve our patient population, we need to understand the conditions they suffer from and their living conditions (based upon demographics). This analysis highlights where we can best allocate future resources to provide targeted eye care and treatments for this vulnerable patient population.

School: School of Medicine

MS1-2 PROVOST, KENNA

Studying the Effectiveness of “Bite-Size” Review Modules on Gastrointestinal Physiology Concepts in Medical School

Kenna Provost; Dr. Jannette Dufour, Ph.D.

Medical educators are always searching for ways to streamline pre-clinical curriculum to help students succeed and feel prepared for the next stage of their training. In order to combat the overwhelming amount of information presented to students, short online review modules covering important material with practice questions to test their understanding could be helpful in preparing students for exams and allow them to study content at their own pace. The aim of this project was to determine the effectiveness of Gastrointestinal Physiology modules for teaching important concepts to medical students. Interactive review modules covering Gastrointestinal Physiology were created using PowerPoint. Each module covered one topic that related to the lecture material, required textbook as well as clinically significant information that may be tested on licensing exams such as STEP 1. The modules contained animations, drawings, and charts to make the information more interactive and help students retain important information. Practice questions written for each module were presented in a similar animated style through PowerPoint and had detailed explanations for correct and incorrect answers. Additionally, a Needs Assessment survey was sent to students who had already completed the course, asking what kind of study materials would be most effective for learning. The results of this survey showed that 75% of student respondents would have liked to have review modules that included practice questions. The results of this survey were used to create the review modules. After completion of the Gastrointestinal Physiology unit, a survey will be sent out to first year students to assess if they felt they were effective study materials. The results of this project will be used to help medical schools and educators design and implement effective study materials to help better prepare students for their exams and future careers in medicine.

School: Graduate School of Biomedical Sciences

MS1-2 RAFAEL, JOHN

Diagnostic Accuracy of Ultrasound for Upper Extremity Fractures in Children: A Systematic Review and Meta-analysis

John Rafael; Po-Yang Tsou, MD MPH; Yu-Kun Ma, MD; Yu-Hsun Wang, MD MPH; Jason T Gillon, MD

Objective: Ultrasound has an excellent diagnostic accuracy for fractures that is reportedly comparable to plain radiographs. We aim to summarize the diagnostic accuracy of ultrasound for upper extremity fractures in children.

Methods: Databases were searched from inception through November 2019 using pre-defined index terms, including “ultrasound,” “fractures of upper extremities” and “children”. The study is reported using Preferred Reporting Items for a Systematic Review and Meta-analysis of Diagnostic Test Accuracy Studies (PRISMA-DTA). Meta-analysis of the diagnostic accuracy of ultrasound for fractures was conducted using the random-effects bivariate model. Subgroup analysis of fracture site (elbow vs non-elbow fractures) was also performed. Meta-regression was performed to determine if the site of fracture affected the diagnostic accuracy.

Results: Thirty-two studies were identified in the meta-analysis. Ultrasound for fractures of the upper extremities has a sensitivity: 0.95 (95% CI: 0.93-0.97), specificity: 0.95 (95% CI: 0.91-0.98), positive likelihood ratio: 21.1 (95% CI: 10.8-41.5) and negative likelihood ratio: 0.05 (95% CI: 0.03-0.07), with an area under ROC (AUROC) curve of 0.98 (95% CI: 0.97-0.99). Subgroup analysis for elbow fracture showed ultrasound has a sensitivity: 0.95 (95% CI: 0.86-0.98), specificity: 0.87 (95% CI: 0.76-0.94), positive likelihood ratio: 7.3 (95% CI: 3.7-14.4) and negative likelihood ratio: 0.06 (95% CI: 0.02-0.16), with an AUROC of 0.96 (95% CI: 0.94-0.97). Meta-regression suggested the fracture sites would affect diagnostic accuracy of ultrasound (elbow vs non-elbow, $p < 0.01$).

Conclusions: Current evidence suggests ultrasound has excellent diagnostic accuracy for non-elbow upper extremity fractures in children, serving as an alternative diagnostic modality to plain radiographs.

Keywords: upper extremity fractures, ultrasound, diagnostic accuracy, meta-analysis

School: School of Medicine

MS1-2 RAHESH, JASMIN

Hypervitaminosis D without Toxicity

Jasmin Rahesh MS MBA, Victoria Chu MS MBA, Alan Peiris MD PhD

Vitamin D deficiency is highly prevalent and there are increasing reports of vitamin D toxicity, mostly related to misuse of over the counter (OTC) supplements. Vitamin D toxicity usually accompanies hypervitaminosis D and may be fatal. Vitamin D status is assessed by measuring 25(OH)D levels (normal range 30 to 100 ng/ml). Current guidelines indicate 25(OH)D values over 150 ng/ml increase risk of Vitamin D toxicity. We report a case with marked hypervitaminosis D (25(OH)D 196 ng/mL) without clinical or biochemical toxicity. Her serum calcium, phosphorus and 1,25(OH)₂D were all normal. She was taking OTC supplements including calcium and Vitamin D, the estimated daily dose per bottle was not more than 2000 IU Vitamin D daily. We acknowledge that taking 2000 IU of vitamin D should not result in hypervitaminosis D. The Institute of Medicine has acknowledged Vitamin D doses of 4000 IU daily are safe. Vitamin D levels slowly declined after cessation of OTC supplements. The decline and normalization of her 25(OH)D and urine calcium after cessation of her OTC supplements indicate that these supplements were likely the etiology of her hypervitaminosis D. Over the counter supplements are not FDA regulated and as such may contain varying amounts of active ingredients. OTC medications would benefit from FDA regulation which may prevent incidental toxicity as seen in our patient. We also conclude that there is a wide margin of safety with vitamin D. Future research should measure free 25(OH)D and 1,25(OH)₂D levels in assessing potential vitamin D toxicity.

School: School of Medicine

MS1-2 RAMIREZ, MICHAEL

SLC38A5, a unique amino acid transporter, is upregulated in pancreatic cancer: A potential tumor promoter and an actionable target for cancer therapy?

Michael A. Ramirez, Kei Higuchi, Yangzom D. Bhutia, and Vadivel Ganapathy

SLC38A5 is a transporter for selective amino acids; it mediates the Na⁺-coupled influx of its substrates with efflux of H⁺. SLC38A5 is unique because it provides glutamine and other amino acids to cells and causes intracellular alkalinization. As glutamine has multiple biological functions and intracellular alkalinization promotes DNA synthesis, SLC38A5 is uniquely suited to serve as a tumor promoter. With this rationale, we first examined public databases for SLC38A5 expression in cancers. We found evidence of marked upregulation in pancreatic cancer, directly related to the stage and grade. Patients with higher expression show worse overall survival. Prompted by this data, we examined SLC38A5 expression in 10 pancreatic cancer cell lines and 10 patient-derived xenografts and compared it to expression in a normal pancreatic cell line. SLC38A5 expression was markedly higher in both samples. We then monitored the functional activity of SLC38A5 in two pancreatic cancer cell lines (AsPC-1 and BxPC3). As multiple transporters recognize glutamine, we used the unique property of SLC38A5 to tolerate Li⁺ in place of Na⁺ to measure its transport function. Li⁺-coupled glutamine uptake was evident in both cell lines; the transport was also influenced by a transmembrane H⁺ gradient, corroborating involvement of H⁺ efflux coupled to Li⁺/glutamine influx. We then examined Wnt signaling in SLC38A5 upregulation since this pathway is activated in pancreatic cancer. Treatment of BxPC3 cells with a Wnt agonist increased the expression and function of SLC38A5 whereas treatment with a Wnt antagonist had the opposite effect. These studies show that SLC38A5 is upregulated in pancreatic cancer, likely via Wnt signaling. Based on the ability of SLC38A5 to provide glutamine along with other amino acids and induce intracellular alkalinization, we predict that SLC38A5 functions as a tumor promoter in pancreatic cancer and could have potential as a novel pharmacologic target for cancer therapy.

School: School of Medicine

MS1-2 ROJAS, ALEXSANDRA

Resolution of hypercalcemia in primary hyperparathyroidism with Vitamin D replacement

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Vitamin D deficiency is common in patients with primary hyperparathyroidism (PHPT). The optimal management of this deficiency in primary hyperparathyroidism is unclear. Vitamin D deficiency can impact the diagnosis of primary hyperparathyroidism by reducing urine calcium and increasing intact PTH. Traditionally, parathyroidectomy has been the definitive treatment in PHPT while vitamin D replacement has been administered tepidly to avoid exacerbation of hypercalcemia. We present a case of primary hyperparathyroidism with a positive parathyroid scan and history of nephrolithiasis. She had a normal albumin and renal function but was vitamin D deficient. After treatment with vitamin D for thirteen-months, her total calcium normalized. The patient's PTH values declined in parallel with the elevation in vitamin D. Although her total calcium normalized, her ionized calcium remained elevated throughout treatment. We believe vitamin D deficiency should be carefully monitored in primary hyperparathyroidism. The current guidelines, which focus on the total serum calcium, should include ionized calcium measurements as it is a more sensitive marker and may remain elevated in the presence of a normal serum calcium.

School: School of Medicine

MS1-2 ROSQVIST, STERLING

Multifocal Chondrosarcoma of the Hand: Case Report and Review of the Literature

Hunter Jones, BS; Jacob Murphree, MD; Joash Suryavanshi, BA; Bradley Osemwengie, BA; Sterling Rosqvist, BS; Cameron Cox, BBA; Brendan Mackay, MD

Primary malignant bone tumors rarely occur in the hand, with chondrosarcomas being the most common malignancy in this location. Chondrosarcomas are typically singular, and the very few multifocal cases that have been reported arose from multiple enchondromas in patients with Ollier's disease, Maffucci syndrome, or hereditary exostosis. We present a case of multifocal hand chondrosarcoma in a patient who had none of the aforementioned conditions and presented with no evidence of prior enchondroma. To our knowledge, there are no other cases of multifocal hand chondrosarcoma without prior enchondroma in the literature. Our patient was treated with surgical resection including partial hand amputation and 5th ray resection, removing all malignant tissue with wide margins. Subsequent tenolysis, carpometacarpal fusion, and rotational osteotomy were performed to improve function of the affected hand. The patient progressed as expected given these procedures, and there was no evidence of recurrence and/or metastasis at 26 months post-resection.

School: School of Medicine

MS1-2 ROSSETTIE, STEPHEN

Alternative Treatment Modalities for the Active Female with Musculoskeletal Pain

Dr. Mimi Zumwalt, Stephen Rossettie, Adin Mizer

The purpose of this study is to evaluate the alternative relaxation modalities for the active female with musculoskeletal pain. Alternative relaxation modalities in the study are defined as any treatment that is not considered surgical or pharmacological, or that has gained popularity despite scientific controversy. Topics include heat/cold treatment, exercise therapy, neuroscience education, supplements (CBD, antioxidants, glucosamine, etc.), chiropractic spinal manipulation, acupuncture, dynamic compression, kinesio taping, transcutaneous electrical nerve stimulation (TENS), cupping, and homeopathy. Data was collected from journals and studies published on Pubmed and Cochrane Library. Treatments were grouped into tiers based on current available evidence. Evidence best supported heat/cold therapy, exercise therapy, neuroscience education, and specific supplements as treatment options for musculoskeletal pain. Other treatment modalities either possessed a lack of evidence, or only had low quality evidence to support claims of beneficial outcomes.

School: School of Medicine

MS1-2 SAWANT, NEHA

Mitochondrial division inhibitor 1 (Mdivi1) improves ER-mitochondria contacts in Huntington's disease

Neha Sawant^{1*}, Subodh Kumar¹, Murali Vijayan¹, Bhagavathi Ramasubramanian¹, Pradeepkiran Jangampalli Adil and P. Hemachandra Reddy^{1,2,3,4,5}

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Huntington's disease (HD) is long known to be associated with defective bioenergetics, axonal transport and abnormal mitochondrial dynamics and biogenesis. Mitochondria also associate with other cell organelles such as the endoplasmic reticulum (ER) at specialized contact sites (MAM) where the ER releases calcium ions into mitochondria thus maintaining mitochondrial dynamics and bioenergetics. These sites are known to be disrupted in many neurodegenerative disorders. The purpose of our study was to assess the MAM in healthy and disease states and also to assess whether mitochondrial division inhibitor 1 (Mdivi1) rescues the defective MAM in HD neurons.

To achieve this, we used both wild type HD STHdhQ7 and homozygous mutant HD STHdhQ111 neurons. The cells were obtained from wild-type (Q7) and HD homozygous (Q111) knock-in mice. Proteins such as IP3R3, Grp75, VDAC1 and Mfn2 were reported to be involved in the ER-mitochondrial interactions in neurodegenerative diseases. Therefore, we studied these proteins in the mutant HD (Q111/111) and wildtype HD (Q7/7) neurons. We used immunoblotting, co-immunoprecipitation, co-localization and confocal microscopy methods. The cells were also transfected with pDsRed2-Mito and GFP-Sec61- β constructs for the fluorescent labelling of mitochondria and ER. Based on improvement in cell viability and morphology two concentrations of Mdivi1 were chosen for further analysis.

Our preliminary studies indicate, reduced mitochondrial biogenesis and fusion proteins and increased mitochondrial division proteins in HD neurons. The ER mitochondria contact sites were diminished in the STHdhQ111 cells and upon treatment with Mdivi1 these were significantly increased. Taken together these findings suggest that Mdivi1 restores the MAM and enhances the expression of proteins associated in HD neurons, thereby suggesting a new pathway by which Mdivi1 plays a protective role in HD cells.

School: School of Medicine

MS1-2 SCHRADER, KAYLEE

Ability to Identify External Ear Deformities Based on Year and Specialty of Medical Training

Kaylee B. Schrader, BS; Joshua C. Demke, MD; Rahul M. Varman, MD; Callie L. Fort, MS; Mhd Hasan Almekdash, PhD; Hannah A. Daniel, MDA

Objective: To analyze a potential association between resident level of training/specialty type and the correct identification of external ear deformities.

Methods: A Qualtrics survey was distributed via email to all pertinent residency programs in the United States. The survey captured specialty type (Otolaryngology, Pediatrics, and Plastic Surgery) and level of training (divided by PGY 1-2 and PGY 3+). The assessment asked residents to identify ten clinically relevant external ear deformities: Anotia, Polyotia, Lop Ear, Stahl Ear, Question Mark Ear, Cryptotia, Shell Ear, Mozart Ear, Microtia Grade 3, and Darwin Tubercle. Chi-squared tests were utilized to examine the association between level of training/specialty type to performance on individual survey items. To examine group performance on overall mean scores of the external ear deformity survey, a t-test and factorial ANOVA were used.

Results: Responses from 105 residents were analyzed. Senior residents (PGY 3+) performed significantly better correctly identifying Microtia Grade 3, Question Mark Ear and Cryptotia as compared to junior residents (PGY 1-2). Senior residents also performed significantly better in the overall identification of external ear deformities ($p=0.002$). Otolaryngology and Plastic Surgery residents performed significantly better in the identification of external ear deformities ($p<0.001$) as compared to Pediatric residents. There were no significant interaction effects between level of training and specialty type on ear deformity identification.

Conclusions: Patient outcomes are improved with timely detection and correction of external ear deformities. Our study identified gaps in the correct identification of such deformities, particularly among Pediatric residents and junior residents in all specialty types. Residents of all training levels and specialty types may benefit from a quantified digital curriculum, exposing them to deformities encountered in the clinical setting.

School: School of Medicine

MS1-2 SELLERS, JAKE

Active learning techniques and their effects on medical student education of head and neck embryology

Jake Sellers, Dr. Brandt Schneider, Dr. Gurvinder Kaur

Medical school embryology is a difficult subject for students to grasp and visualize. At Texas Tech University Health Sciences Center (TTUHSC), first year medical students are taught embryology during the rigorous Clinically Oriented Anatomy curriculum. Currently, TTUHSC utilizes a faculty-created Embryology Fact Sheet (passive learning) along with lectures to teach embryology. The objective of this project is to convert the Embryology Fact Sheet into active study resources for students and determine the associated effects on student performance as well as their responses to the resources. To achieve this goal, three resources were created with material covering pharyngeal apparatus, thyroid gland, tongue, larynx, epiglottis, lip, palate, thymus, ear, and eye embryology. The resources included a flashcard deck using the Anki flashcard program, a question and solution module, and a unit review. Further, a separate final review along with a 5-question pre-test and post-test was held before the student's National Board of Medical Examiners (NBME) exam. To evaluate the effectiveness of this active learning method, current class performance on the in-house and NBME exam with regards to embryology was compared to last year's class performance. Based on the student survey, over 95% of students stated that the active learning methodology was very helpful. Additionally, after the final review, students performed 35.6% better on the 5-question post-test when compared to the pre-test administered before the review. Although the total current school class performance on in-house exams was not significantly different, their performance on the NBME was improved compared to last year's class. Collectively, this project provides insight into different ways to promote active learning and increase student understanding in the field of embryology.

School: Graduate School of Biomedical Sciences

MS1-2 SHEPHERD, JESSICA

Bupropion inhibitory capacity regarding 5-HT_{3A} receptors

Jessica Shepherd¹, Dubem Onyejebu¹, Antonia Stuebler², Zackary Gallardo³, Chris Hornback³, Michaela Jansen³.

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Bupropion is an FDA approved medication marketed as an anti-depressant, smoking cessation, and weight loss drug. Presently, the known effects of bupropion include inhibition of norepinephrine and dopamine reuptake, as well as inhibition of cation-selective Cys-loop ion channels like nicotinic acetylcholine and serotonin type 3 A (5-HT_{3A}) receptors. The present study focuses on bupropion's inhibitory capacity with regard to the 5-HT_{3A} receptor. 5-HT_{3R} is a member of the pentameric ligand-gated ion channel superfamily, which also includes nicotinic acetylcholine, γ -aminobutyric acid type A (GABAA), and glycine receptors. These channels are made up of five homologous subunits around a central ion channel pore. Each subunit is divided into extracellular, transmembrane, and intracellular domain. Dysfunction within this superfamily has been linked to neurological disorders such as anxiety, depression, epilepsy, Alzheimer's, and Parkinson's Disease. Currently, the 5-HT₃receptor is targeted clinically by anti-emetics and irritable bowel syndrome treatments, but the receptor could potentially become a target for the treatment of anxiety, psychosis, bipolar disorder, and several other neurological disorders. We engineered amino acids in the α -helical M2 and M3 transmembrane segments near the M2M3 loop that is located at the interface of transmembrane and extracellular domains. We used docking studies and site-directed mutagenesis to analyze potential binding site residues for bupropion. Two-electrode voltage-clamp recordings were used to examine the effect of mutations on bupropion inhibition of these engineered 5-HT_{3A} channels expressed in *Xenopus* oocytes.

School: School of Medicine

MS1-2 SNITMAN, ANNIE

The Analysis of Cost Savings, Barriers to Implementation and Overall Benefit of Increasing Patient Assistance Program Staff at a Student-Run Free Clinic

Annie Snitman, BS, Nathan Chow, BS, Fiona Prabhu, MD, Kelly Bennett, MD

Background: The Free Clinic at TTUHSC offers free medical care to uninsured adults in Lubbock, TX. Patients who require medications that the clinic cannot afford to continuously provide are enrolled in Patient Assistance Programs (PAPs). PAPs are offered by pharmaceutical companies to provide patients with free medications. In January 2019, an additional PAP coordinator role was added at clinic. The purpose of this study was to assess the impact of increasing PAP coordinator positions on the extent of cost savings, new enrollment, and to compare savings to clinic budget.

Methods: Data collected for this study includes number of approved applications, medication name/strength, medication cost, number of units, and date received. In-house pharmacy invoices were analyzed to determine the annual cost of running the pharmacy and wholesale cost for specific medications. Cost savings from 2/2019-2/2020 were calculated as three distinct values: patient, clinic, and category illness savings. These values were then compared to savings/enrollment from 2/2017-2/2018.

Results: From 2/2019-2/2020, PAPs saved The Free Clinic \$169,000 and its patients \$211,000. Total clinic savings for respiratory, diabetic, and miscellaneous illnesses were ~\$47,000, \$118,000, and \$4,000, respectively; total additional enrollment was 69 patients. Savings from 2/2017-2/2018 was \$100,000; total additional enrollment was 24 patients.

Conclusion: This study showed that instituting an additional PAP coordinator was associated with increased PAP savings and enrollment when compared to 2/2017-2/2018. Without PAPs, the clinic would need to quadruple its \$40,000 annual budget to sustain the inventory of drugs provided through these programs. Additionally, the division of responsibilities improved efficiency of PAP coordinators as enrollment increased. These results demonstrate the significance of expanding PAP utilization when possible to improve the effectiveness and sustainability of a free clinic.

School: School of Medicine

MS1-2 SOLIS, JESSICA

An Interdisciplinary and Multi-Departmental Study of Patient No-Shows

Jessica Solis, MBA; Jeff Dennis, PhD

Background: Patient no-show rates can range anywhere from 7% to 33% across specialties and institutions. No-shows affect system efficiency by increasing wait times and decreasing patient satisfaction. Non-adherence to scheduled visits can lead to: unmanaged chronic conditions, worse health outcomes, and increased use of emergency care. Additionally, repeatedly missing appointments has been shown to lead to medication non-adherence, faster disease progression, and treatment failure. This study aims to understand clinic staff perspectives on no shows to better understand how those with practical experience of the problem perceive it.

Methods: A 14-question survey was distributed to all non-physician employees at Texas Tech Physicians. A total of 95 respondents completed the survey, about 61% of which reported having direct contact with patient scheduling.

Findings: Staff who schedule appointments reported that no shows were a significantly bigger problem than those not involved with scheduling, and were more likely to report that no shows substantially impact their job duties. Staff rated lost clinic revenue and negative impact on continuity of care as the biggest repercussions of no shows. Asked who was most responsible for no shows, 96% of staff ranked patients as most responsible, followed by clinical staff, clinic office staff, and then clinic administration. New patient appointments and ED/hospital follow-up were identified as the most likely appointment type to result in a no show.

Discussion: Clinics have substantial interest in understanding why patients miss appointments, and many efforts have been made to understand this behavior. Few studies have gathered perspectives from clinic staff, who deal with this problem on a daily basis. Staff saw no shows as a meaningful problem and felt that text message reminders were the most effective current method for reducing no shows. However, many staff suggested charging no show fee to further reduce no shows.

School: School of Medicine

MS1-2 SWINNEY, SETH

RETROSPECTIVE ANALYSIS OF OPEN AND LAPAROSCOPIC GASTROSTOMY TUBE PLACEMENT OUTCOMES IN NEONATAL INTENSIVE CARE UNIT

Seth Swinney, MSII; Celeste Hollands, MD

Background: Gastrostomy tubes (GT) serve as an alternative option to oral or nasogastric feedings in neonates in order to receive the nutrients needed for growth and survival. Laparoscopic procedures have become more popularly performed in NICU patients, but not all institutions approach GT placement this way. The open surgical technique for GT placement has been associated with negative outcomes as compared to the laparoscopic technique. This study aims to look at distinct variables shared between laparoscopic and open GT placement techniques. **Hypothesis:** We hypothesize that patients undergoing laparoscopic GT will have less complications, decreased number of postoperative ventilator days, decreased time to full feeds, and less pain medication requirements. **Methods:** This was a retrospective chart review in which patients were selected from the Covenant Children's Hospital NICU database based on the inclusion criteria of NICU patients undergoing laparoscopic or open GT placement between 4/1/17 and 3/31/19. Patients were split into two groups: those that underwent open GT placement and those that underwent laparoscopic GT placement. Within the groups, data regarding operative time, gastrostomy site complications, pain medication usage, time on ventilator post-op, time to full feeds, and type of GT will be extracted and compared. Data will be analyzed and summarized in descriptive statistics using the mean, median, standard deviation, and frequencies depending on the measurement level. For continuous data, differences among groups (open vs. laparoscopic) will be examined using a t-test or its non-parametric alternative if the data did not meet the normality assumptions. For categorical data, differences among groups will be examined using Chi-square testing. **Results and Conclusion:** Results and conclusions pending completion of statistical analysis. Estimated completion date: Early March, 2020.

School: School of Medicine

MS1-2 TELCHIK, COLLIN

Helping medical students understand the impact socioeconomic status has on a patient's dietary choices

Collin Telehik M.S., Jeff Dennis Ph.D

Background: The TTUHSC SOM culinary medicine elective aims to help medical students understand food preparation and to provide practical knowledge relating to dietary guidelines for a variety of chronic health conditions. The culinary medicine course is relatively new, but has great potential given that it represents an intersection between medicine, nutritional science, and public health.

Methods: After a review of existing U.S. medical school culinary medicine programs and an literature review on culinary medicine curricula, a new assignment was developed for the culinary medicine elective to incorporate a better understanding of how socioeconomic status (SES) impacts patient's food decisions. Students were given a budget of \$30 to shop for a day's worth of meals for a family of 4, and asked to assess their understanding of socioeconomic limitations before and after the activity.

Results: Students found that staying under budget required them to pick meals that were simple and do not require a lot of ingredients, cooking time, or equipment. Other students noted having to make decisions sacrificing taste, choosing meals that kids may or may not enjoy, and choosing some less healthy meals.

Discussion: Nutritious and healthy foods are not always accessible for low SES patients, and it is important for healthcare professionals to recognize this and be able to counsel them on how they can make improvements. Physicians need be properly educated in nutritional science and learn what foods are going to put patients at the lowest risk of disease and illness. Physicians also need to know the barriers that low SES patients face when it comes to making daily decisions about their diet as well as their family members. This assignment challenged students to understand the difficulty of making nutritional decisions based on both cost and nutritional value, which stands to help future physicians better understand how SES may impact their patient's diet.

School: School of Medicine

MS1-2 TIDWELL, DALTON

Kappa opioid receptor activation in the central amygdala enhances pain behaviors in CRF-cre rats under normal condition

D. Tidwell¹, M. Hein, P. Presto¹, E. Navratilava³, F. Porreca³, G. Ji^{1,2}, V. Neugebauer^{1,2},

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Patients with functional pain syndromes (FPS) often experience intermittent episodic pain related to “triggers” including stress. Stress-induced activation of KORs has been shown to promote negative affective states, including depression, anxiety and pain. KORs are found in multiple brain regions that are relevant to pain, including the central nucleus of the amygdala (CeA). The amygdala is a limbic brain area that plays a key role in emotional responses and affective state and disorders including learned fear, anxiety, depression, and pain. We hypothesize that in sensitized states, stress-induced kappa opioid receptor (KOR) signaling in the amygdala promotes functional pain responses.

This study tested the hypothesis that KOR activation is sufficient for pain-related behaviors in CRF-cre rats. Emotional-affective pain responses were determined by measuring the duration of audible and ultrasonic vocalizations evoked by a brief compression of the knee. Anxiety-like behavior was assessed in the elevated plus maze (EPM) and open field test (OFT). Pain and anxiety-like behaviors were tested before and after stereotaxic administration of U69,593 to right CeA by microdialysis (to activate KOR signaling in CeA and ITC cells). Administration of U69,593 to right CeA increased the audible and ultrasonic vocalizations, and decreased the center duration of OFT. Effect of optogenetic silencing of CRF+ CeA neurons in CRF-Cre rats injected with AAV-EF1a-DIO-eNqHR3.0EYFP were tested to assess the direct role of CRF+ neurons on pain and anxiety-like behaviors. Optogenetic silencing with yellow light pulses (590 nm) was delivered through a wireless system. Optical silencing of CRF+ CeA neurons decreased vocalizations and anxiety-like behavior in normal rats.

The data provide direct evidence for KOR activation is sufficient for pain and pain-related behaviors in CRF-cre rats under normal condition.

School: School of Medicine

MS1-2 TSOU, PO-YANG

Diagnostic Accuracy of Procalcitonin for Bacterial Pneumonia in Children – a Systemic Review and Meta-analysis

Po-Yang Tsou, MD MPH; Yu-Hsun Wang, MD MPH; Yu-Kun Ma, MD; Shekhar Raj, MD; John Rafael

Objective: Childhood pneumonia is a leading cause of death. Differentiating bacterial pneumonia from non-bacterial respiratory tract infections for timely initiation of antibiotics is life-saving. Procalcitonin to predict pediatric pneumonia is unclear. We aim to evaluate the diagnostic accuracy of procalcitonin for bacterial pneumonia in children.

Methods: Major bibliographic databases were searched from inception through September 2019 using pre-defined index terms, including “procalcitonin,” “pneumonia” and “children”. Meta-analyses of the diagnostic accuracy and odds ratio of procalcitonin for bacterial pneumonia were conducted along with subgroup analyses for different cutoffs of procalcitonin. QUADAS-2 was used to assess the methodologic quality of eligible studies.

Results: Twenty-five studies (n=2,864) show procalcitonin for pneumonia has an overall sensitivity: 0.64 (95% CI: 0.53-0.74), specificity: 0.72 (95% CI: 0.64-0.79), positive likelihood ratio (LR+): 2.3 (95% CI: 1.8-3.0) and negative likelihood ratio (LR-): 0.50 (95% CI: 0.38-0.66), with an area under ROC (AUROC) curve of 0.74 (95% CI: 0.70-0.78). Using a cutoff of 0.5 ng/ml, procalcitonin has a sensitivity: 0.68 (95% CI: 0.50-0.82), specificity: 0.60 (95% CI: 0.47-0.72), LR+: 1.7 (95% CI: 1.3-2.2), LR-: 0.53 (95% CI: 0.34-0.81), and AUROC curve of 0.68 (95% CI: 0.64-0.72). Using a cutoff of 2 ng/ml, procalcitonin has a sensitivity: 0.59 (95% CI: 0.40-0.76), specificity: 0.71 (95% CI: 0.58-0.81), LR+: 2.0 (95% CI: 1.3-3.2), LR-: 0.58 (95% CI: 0.36-0.95), and AUROC curve of 0.71 (95% CI: 0.67-0.75). Elevated procalcitonin was associated with increased odds of bacterial pneumonia (odds ratio: 1.78, 95% CI: 1.18-2.38, p<0.001). Quality assessment finds minimal concerns for bias or applicability.

Conclusions: Given procalcitonin’s moderate diagnostic accuracy for pneumonia, we recommend procalcitonin be used in conjunction with other findings for the management and disposition of patients.

School: School of Medicine

MS1-2 UKE, NKEMJIKA

The Ideal Donor Site Dressing: A comparison of the Chitosan Dressing Opticell to Traditional Dressings

Nkemjika Uke; John Griswold, MD; Simran Singh; Grant Sorensen, PhD; Ebrahim Payberah; Ilina Terziyski

Background: Management of a donor site after skin grafting requires the proper donor site dressing for optimum healing. Advancements in medicine have led to the abundance of different donor site dressing but there is yet be a dressing that satisfies the criteria as the ideal donor site dressing. The ideal donor site dressing speeds healing, prevents desiccation, allows gas exchange, possesses antimicrobial activity, is hemostatic, easy to care for, cost-effective and most importantly, minimally painful for the patient. This study aimed to evaluate the properties of Opticell compared to traditional dressings – Opsite, Tegaderm, Xeroform, Scarlet Red, allograft and xenograft.

Methods: Patients who underwent split-thickness skin grafts, and on whom Opticell was used, were reviewed from the UMC Burn Registry. Data collected included healing rate, readmission due to donor site complications, donor site infections, hemostatic control, length of stay, and cost of readmission. Data on traditional dressings - Xeroform, Scarlett Red, Opsite, Tegaderm, cadaveric skin, and pigskin – were obtained through the PubMed database.

Results: Healing rates of the dressings were as follows: Scarlet Red 10.25 days; Opticell 10.46 days; Opsite 11.48 days; Xeroform 11.52 days; Tegaderm 14 days²²; xenograft 15.2 days¹¹; allograft 19 days.¹¹ On a visual analog scale (VAS), Opsite, Xeroform, and Opticell had pain scores of 1.34, 2.2, and 2.5 respectively.^{9,18,23} Opsite had infection rates of 40% and 5% in two studies.^{4,5} The infection rates for Scarlet Red were 0% and 9.5% in two studies.^{15,19} Xeroform had a 0% infection rate in a sample of 30 patients.⁶

Conclusion: Scarlet Red and Opticell healed the fastest. There was no infection in patients with Xeroform dressing, and patients with Opsite dressing reported the least pain. These results suggest that Opticell speeds donor site healing but is not superior to all traditional dressings.

School: School of Medicine

MS1-2 UPADHYAY, AKSHA

A Community Assessment in Peru

Aksha Upadhyay, Kelsey Sprinkles, & Savannah Forsyth

As Master of Public Health students, we traveled to Peru in June of 2019 to complete our Applied Practice Experience project. We conducted a community-based needs assessment that included community based participatory research such as a windshield survey, focus groups, key informant interviews, surveys and water testing. The assessment was conducted in four communities in Peru, Pedregal Grande, Pedregal Chica, Campiña, and Narihualá. Initially, we discovered signs of decay in the housing due to a devastating flood in 2017. Additionally during our windshield survey, we gathered that they were lacking several resources including major markets, recreation areas, a waste disposal system and a sewage system. Next, we performed key informant interviews and focus groups which revealed grievances and many desires for community change. We also gave out 100 surveys to patients that were in line for the clinic that was also hosted by the TTUHSC during our trip. From the surveys we were able to better understand the general health of the population and their knowledge of water contamination in their communities. Furthermore, we used photovoice with a 6th grade class at a school to gauge their knowledge of health and safety in their community. The photos taken and presented demonstrated the children were aware of the lack of trash disposal systems, healthy foods, and contaminated water. Lastly, we collected 100 water samples during our trip and determined that 25% of the neighborhoods tested were contaminated with E. coli. Now, we will be returning to the communities with the Office of Global Health in June 2020 to achieve a latrine building project to teach and aid community members in building a composting latrine system to reduce human waste contamination of water and food sources. We will also promote more education on potable water and how to prevent contamination of drinking water sources.

School: Graduate School of Biomedical Sciences

MS1-2 VO, DIANA

Assessing the Impact of the TexLa Telehealth Resource Center (TTRC)

Diana Vo and Catherine Hudson

Telemedicine refers to the use of technology to deliver clinical diagnoses to patients who are in a separate setting from the physician (1). This technology helps enhance healthcare by providing virtual visits, patient monitoring from remote sites, and healthcare that can be given in a mobile manner. Recent evidence has shown that telemedicine has comparable positive outcomes when compared to the traditional methods of providing medical care (2). Telemedicine differs from telehealth due to its breadth of scope; the former focuses specifically on providing remote clinical services whereas the latter can also offer remote nonclinical services. Although relatively new concepts in healthcare, both telemedicine and telehealth have begun to spread throughout the United States as systems to provide medical care to a population that has historically been unable to access healthcare (3).

In our research, we aimed to look at the history and progression of the TexLa Telehealth Resource Center (TTRC), a program funded by Health Resources and Services Administration in 2012 to serve as a regional Telehealth Resource Center (TRC) covering Texas and Louisiana. The TTRC is administered by the Innovative Healthcare Technology (InHT) Division located within the Texas Tech Health Sciences Center's F. Marie Hall Institute for Rural and Community Health. The TTRC is a collaborative project between Texas Tech Health Sciences Center and Louisiana State University Health Care Services Division.

The TTRC data for years 2013-2019 were compiled in order to examine its progression and efficacy in providing telehealth technical assistance and resources to new and existing telehealth programs in Texas and Louisiana as well as provide services to all referrals for information of Telehealth applications. Based on our evaluation it was determined that TTRC has consistently met its objectives and has been a beneficial resource for both potential and current users of telemedicine.

School: School of Medicine

MS1-2 VORIES, BRIDGET

Practice Makes Perfect: Do Formative Assessments Predict Student Performance on Summative Exams and the Anatomy NBME

Bridget Vories, Megh Gore, Brandt Schneider, PhD, Gurvinder Kaur, PhD

During the first-year curriculum at Texas Tech University Health Sciences Center School of Medicine (TTUHSC SOM), students begin the year taking Clinically Oriented Anatomy (COA). In order to help prepare students for summative exams, the faculty at TTUHSC SOM release two formative exams per unit- one practice practical and one practice written exam. These formative exams have allowed us to predict students' performance on summative exams and evaluate their impact on student stress and the overall learning environment at TTUHSC SOM. This year, we worked to improve the practice practical exams (e.g. increasing the number of questions from 60 to 85 to match summative practical exams) in the hopes that they would better predict performance on summative exams. After analyzing data from units 1 and 2 in COA, we discovered that performance on practical formative exams was highly correlated with performance on summative practical exams (p values: 0.0001; r values: 0.65 for Unit 1, 0.66 for Unit 2). There was also a correlation between summative exam performance and the NBME (p value: 0.0001, r values: 0.704 for Unit 1, 0.738 for Unit 2). Upon updating the practice practical exams this year, we saw an increase in correlation between formative and summative practical exams in comparison to last year (r values: 0.48 (2018-19) and 0.62 (2019-20)). In addition, students' perception of formative assessments was evaluated using a 5-point Likert scale. With an average of 4.28 (1=extremely unfavorable, 5=extremely favorable), these results indicate a positive student response. Another 5-point Likert scale will be distributed to evaluate the effect of formative exams on students' stress levels. Understanding this relationship between formative exams and summative exam performance can help medical educators to identify at-risk students and evaluate student stress levels.

School: Graduate School of Biomedical Sciences

MS1-2 WAGSTAFF, RACHEL

Strengthening Biostatistics and Epidemiology Preparation with Problem-Based Learning in Medical Education

Rachel G. Wagstaff, Daniel R. Webster

Introduction - Medical students require a strong foundation in biostatistics and epidemiology to critically analyze literature and practice evidence-based medicine. Yet this area is regarded as difficult to teach, leaving many feeling inadequately prepared, as the curriculum has not varied much since the 1990s. To improve proficiency in this subject, we must discern if students would use a university-provided resource and students' preference for its structure.

Methods - 145 medical students self-reported measures (Sophomore: n=63, 43.45%; Junior: n=51, 35.17%; Senior: n=31, 21.38%) and were grouped by their completion status of the United States Medical Licensing Exam (USMLE) Step 1 exam. Juniors and seniors ranked perceived preparedness by the university for various exam sections. All predicted their usage of and recommended components for a biostatistics and epidemiology resource. To examine if perceived preparedness between subjects differed, a Friedman test was conducted.

Results - Evidence suggests that students' perceived preparedness by the university differed significantly by sections ($p < .0001$); students felt on average "least to a little prepared" by the university on the exam's biostatistics section, as compared with "somewhat to moderately prepared" on other sections. 100% of sophomores and 67.07% of juniors and seniors indicated they would/would've use(d) a biostatistics/epidemiology resource and most often recommended including practice questions with explanations (Sophomores: 92.06%; Juniors/Seniors: 98.18%).

Discussion - As hypothesized, medical students felt they were significantly less prepared for the biostatistics and epidemiology section than other sections on the USMLE Step 1 exam, and the majority would use a university-provided resource, providing a rationale for the creation of a problems-based supplemental resource. Future studies should investigate whether this addition translates to an increase in perceived preparedness and USMLE exam scores.

School: Graduate School of Biomedical Sciences

MS1-2 WAKIL, ANISA

Sources and genomic similarity of Pseudomonas aeruginosa in the hospital environment

Anisa Wakil¹, Derek Fleming¹, Rebecca Schneider¹, Cody Fell¹, Angel Cueva¹, Lauren Choate¹, Renae Yates², Marie Bugarel³, Guy Loneragan³, Kendra Rumbaugh¹

¹Department of Surgery and Burn Center of Research Excellence, TTUHSC; ²Infection Prevention & Control, UMC Health System; ³School of Veterinary Medicine, TTU

Pseudomonas aeruginosa (PA) is responsible for a variety of nosocomial infections in many hospitals throughout the world. In coordination with UMC infection control, we collected PA strains from the hospital environment and compared them to patient isolates. Specifically, we wanted to determine: 1. if there were few or many distinct PA strains in the hospital environment; 2. if the same strains remained in the hospital environment over long periods of time; 3. if environmental strains were the same as patient strains; 4. if patient strains were more antibiotic resistant than environmental strains. Previously it was determined that the most common environmental reservoirs for PA are sink drains. We isolated PA from approximately half of all sink drains tested in the BICU, SICU, MICU, and East Tower, and compared them to patient isolates from the same units. We used whole genome sequencing to compare 110 isolates (94 from the hospital environment and 16 from patients). Of these, 54 were confirmed to be PA upon analysis with genome speciation pipelines. Multi-locus sequence typing was used to characterize PA strains by comparing them to sequences from seven housekeeping genes. The predominant sequence types were ST 446 (3), ST 309 (7), ST 253 (5), ST 298 (5), ST 179 (6), ST 275 (3), and ST 3142/2556 (3), with 25 being found in environmental isolates across all units, and 7 in patient wounds. While there was sequence similarity within the environmental and patient isolate subpopulations, there was only one (1/16) case of an environmental and patient isolate being closely related. Most related environmental isolates were mapped to the same unit, but some appear to have traveled between units. We also determined the antimicrobial resistance profiles of the isolates using the microbroth dilution method. Surprisingly, there were similar levels of resistance in environmental and patient isolates, indicating that environmental strains are inherently multi-drug-resistant.

School: School of Medicine

MS1-2 WEAVER, PRESTON

Possible Implications of Changes in Peripheral Zone Based on Prostate Size in Prostate Cancer

Weaver PW, Smith LA, De Riese WT

It is well-discussed in the literature, an inverse correlation between size of the prostate and incidence of PCa. However, little is known to explain this clinical phenomenon. Recent studies postulate that the growth of the transitional zone (TZ) within the prostate is affecting the peripheral zone (PZ), where 80% of all PCa originates. This study performed histo-anatomical comparisons and measurements of gland density/distribution with possible implications for better understanding of development of this malignancy.

20 radical prostatectomy cases with different prostate sizes were analyzed using ImageJ, a Java-based open-source image processing software. Glandular pixel intensity processing within the software allowed accurate measurement of glandular density of the PZ within the equatorial region. Pixel calibration to millimeters allowed direct measurement of the prostate capsule thickness.

We saw a high positive correlation between the prostate volume and average capsule width ($r=0.84$, $p<0.001$) and a high negative correlation between prostate volume and average glandular density ($r=-0.74$, $p<0.001$). In a multiple regression analysis, out of all variables in our model, only average capsule density, and average capsule width were found to be significantly associated with prostate volume when tested individually. The multiple regression model statistically significantly predicted prostate volume ($F(2,17) = 21.63$, $p < 0.001$, adj. $R^2 = 0.69$). Only average capsule width added statistically significantly to the prediction ($p < 0.05$).

Apparently, growth of the TZ causes increased fibrosis of the PZ, making the capsule thicker, and causing atrophy and fibrosis of glandular cells. In very large prostate (>90 cc), the entire PZ appears to be transformed into fibrotic capsule, leaving only a few atrophic glands behind. It appears that BPH is protective against PCa and may explain the inverse correlation between BPH and PCa well-documented in literature.

School: School of Medicine

MS1-2 WEI, BRANDON

Prospective Study of EyeGuide Focus®, a 10-second Concussion Management Tool to Measure Neurocognitive Impairment Associated with Mild Traumatic Brain Injury

Brandon Wei, Benedicto Baronia, MD, Jeannie Lee, MD

Current research suggests that mild TBIs cannot always be accurately diagnosed via routine neurological examination. A lack of an objective method to assess concussions on the field raises concern for second-impact syndrome (SIS), which can lead to permanent brain damage or even fatality. The purpose of this study is to expose the prevalence of mild traumatic brain injuries among high school football players and to explore the possibility of implementing eye tracking performance as an objective way to assess cases of potential concussion. This multi-part study first surveyed high school athletes at Frenship High School in Lubbock, Texas. Student athletes filled out a baseline concussion survey, then assessed their eye tracking performance via the EyeGuide Focus, a 10-second test that involves visually tracking a continuous, figure 8 shape. During the sports season, when there is concern of mild TBI during the game, the athlete will be re-assessed with the Eye Guide Focus. This test will be compared to their baseline score to determine if there is a decline in eye tracking performance, which raises concern for a concussion injury. The survey examined 836 high school athletes, 97 (11.6%) of whom were diagnosed with a concussion during the sports season. Among the 306 responding high school football players, 47 (15.4%) were diagnosed with a concussion by a physician. Respondents who started playing sports at age 5 or younger were 2.549 times more likely to have had at least one non-diagnosed concussion when compared to those who began playing at age 6 or older ($\chi^2=12.374$, $p<0.001$). With the establishment of a baseline EyeGuide Focus score youth athletes, the goal of this study is to implement eye tracking performance as a mainstream form of quickly and accurately detecting concussions.

School: School of Medicine

MS1-2 WILSON, ELLEN

Rectus Sheath Hematoma, a rare surgical emergency

Kyle Drinnon, BS, Ellen Wilson, Sean Simpson, MD, Catherine Ronaghan, MD, Robyn Richmond, MD

RSH is a rare complication that can occur due to trauma, coagulopathy, obesity, muscle strains and pregnancy. Larger hematomas tend to occur below the arcuate line because there is an absence of the posterior rectus sheath which enables the hematomas to spread. RSH can be treated with conservative measures but for patients who continue to bleed, more aggressive measures should be taken to avoid life-threatening complications such as ACS.

School: School of Medicine

MS1-2 WU, WINNIE

Predictors of USMLE Step 1 Score

Winnie Wu, Sheila Chandrahas, Katy Garcia, Dr. Yasin Ibrahim, Dr. Marina Chavez

Introduction: Residency program directors have ranked the United States Medical License Examination (USMLE) Step 1 as the most important factor in determining a residency applicant's competitiveness. Thus, medical students strive to attain the highest possible score. In this review, we attempt to identify which factors can predict performance on USMLE Step 1.

Methods: We conducted a systematic literature search on PubMed, Web of Science, Scopus and ERIC. The key words used were "USMLE", "Step-1", "score", "success" and "predictors." The search included articles published within the last 15 years (2005-2019), with the most recent article published on May 22, 2019. Studies that did not focus on Step 1 outcome or medical students in the United States were excluded.

Results: Our initial literature search yielded 275 articles which were then narrowed down to 30 articles. Analysis from articles meeting the inclusion criteria demonstrated that predictors of USMLE Step 1 score can be divided into unmodifiable and modifiable factors. Unmodifiable factors include gender, MCAT score, preclinical grades and NBME/CBSE scores. Modifiable factors include taking USMLE Step 1 within two months of completing preclinical courses, using anxiety as a motivating force, number of multiple choice questions completed and number of unique Anki cards seen. Interestingly, neither utilizing commercial preparatory courses nor unique Firecracker flashcards seen were associated with a higher Step 1 score. Additionally, increased number of study days was associated with increased performance for average achieving students but not for students who received straight As in preclinical courses.

Conclusions: Our review suggests that while MCAT score, gender and preclinical grades are predictors of USMLE Step 1 performance, there are also several modifiable factors which are strongly associated with a higher score. Specifically, medical students should focus on increasing the number of multiple choice questions completed and unique Anki cards seen.

School: School of Medicine

MS1-2 YAMASHIRO, JUSTINE

New implantable tibial nerve stimulation devices: review of published clinical results in comparison to established neuromodulation devices

Justine Yamashiro

Purpose: The purpose of this review is to offer an update for medical providers practicing general urology and urogynecology in evolving and new promising technologies for neuromodulation in patients with OAB.

Patients and methods: A focused literature search for the years 2015 through 2019 was conducted on PubMed/Medline for the terms: “new techniques” AND “neuromodulation” AND “tibial nerve stimulation” AND “overactive bladder”. We limited our search to publications in English, for the last five years and with patient follow-up of at least 3 months.

Results: Clinical success, safety based on adverse events, and quality of life improvement criteria were evaluated and compared to sacral nerve stimulation (SNS) devices and older, non-implantable percutaneous tibial nerve stimulation (PTNS) treatment devices. Although a limited number of participants have been treated and only up to 6 months follow up data is currently available, it appears that the new implantable devices stimulating the tibial nerve have promising clinical response rates, are less invasive upon implantation than SNS, less expensive, and less of a burden on patients compared to the older non-implantable PTNS devices.

Conclusion: Practicing urologists should be aware of this new treatment option when counseling their patients regarding treatment for OAB.

School: School of Medicine

MS1-2 YANG, SAMUEL

Validity of Psychiatric Evaluation of Asylum Seekers through Telephone

Yasin Ibrahim*, Samuel Yang*, Chuck Giles, Regina Baronia, Marina Chavez

The main goal of psychiatric evaluation of asylum seekers is to comment on the asylum seeker’s credibility. Given the shortage of mental health providers trained in this particular type of evaluation, in person evaluation may not be feasible. Telephonic interview has been occasionally utilized to fill this void. The validity of such evaluations in assessing credibility has not yet been studied. In the case of telephonic interviews, the evaluators have no access to facial or body language cues. Objective Cues of deception can be appreciated from clients’ narrative, facial expressions, and body language. We will present a case of a client evaluated via telephone that was deemed credible and eventually released to pursue asylum in the US. Assessment of Credibility was based solely on cues obtained from client’s narratives and their style of interaction with the evaluator. We will highlight the findings from the client’s speech that supported credibility in the case and discuss the challenges of assessing asylum seeker’s credibility via telephonic interview. Telephonic evaluation of credibility can be considered a valid method despite major challenges, but psychiatric evaluators should be aware of the limitations of telephonic evaluations given the high possibility of secondary gains and deception.

School: School of Medicine

MS1-2 YIM, VIVIAN

Identifying Red Flags for Sex Trafficking: A Guide for Medical Students and Residents to Better Care for with Sex Trafficking Victims in the Medical Setting

Frances Kellerman Hanson, Shelby Buckner, Vivian Yim, and Nitish Mittal

Sex trafficking (ST) has become an increasingly more important issue in Texas, especially in Lubbock. Currently, Lubbock is the second most trafficked city in Texas. The medical community plays an important role in providing continuity and resources for ST victims who are among the many patients that are offered care at UMC and Covenant Hospitals. Often it takes awareness on the part of a physician, resident and medical student to identify a ST victim and to provide them with focused care and adequate resources. The goal of this project is (1) to bridge the knowledge gap found in medical students' and residents' understanding of the ST resources available in Lubbock and (2) to improve the comfort of medical students and residents in handling ST victims in a medical setting. The Year 1 methods focused on assessing the knowledge among medical students, residents, and physicians regarding the resources available to assist ST victims. Pre and post-survey data revealed that while general knowledge of sex-trafficking in Lubbock is known, more targeted education is needed to improve both the knowledge and comfort around utilizing the resources available for ST victims. The Year 2 methods focused on evaluating the knowledge of the appropriate steps to follow to best care for ST victims in a medical setting. The pre and post-survey results suggest that a short introductory presentation on managing ST victims in the medical field would increase the knowledge and comfort around following steps to appropriately care for ST victims. A final deliverable of this project is the creation of an ID badge insert designed for medical students and residents to have an easily accessible resource for managing the care of ST victims in a medical setting. The badge insert is double-sided and includes (a) Red Flags for Sex Trafficking and (b) Sex Trafficking Protocol for medical personnel to follow when they are interacting with victims.

School: School of Medicine

MEDICAL STUDENTS YEARS 3-4

MS3-4 AELETY, UDHAYA

Atypical Newborn Presentation of an Inborn Error of Metabolism

Udhaya Aelety, Abirami Rajasegaran

A 5-week-old male initially presented to an outside hospital with a 2-day history of emesis with each feed and was found to have abdominal distension and severe metabolic acidosis. He was treated with empiric antibiotics and transferred to our facility for further evaluation. Upon admission, the patient underwent numerous gastrointestinal studies, which were unremarkable. It was concluded that the patient's abdominal distension was likely secondary to obstipation. He demonstrated improvement with resolution of the metabolic acidosis; he was discharged home. The patient re-presented two days after initial discharge for significantly decreased oral intake and activity. At the time of re-admission, the patient appeared lethargic with significant abdominal distension and a 360-gram weight loss since the first admission. Workup showed normal anion-gap metabolic acidosis with normal lactate and ammonia levels. C-reactive protein and procalcitonin were elevated. UA was negative; urine organic acids and serum amino acids were obtained. A pediatric metabolic specialist was consulted who recommended a change in formula due to concern of possible fatty acid oxidation disorder. With the change in formula and hydration, the initial acidosis resolved. He was discharged with outpatient follow-up. Results of the urine organic acids received after the final discharge revealed the presence of elevated amounts of 4-hydroxyphenylacetic acid and 4-hydroxyphenyllactic acid. Abnormal amounts of both compounds are non-specific findings in both tyrosinemia and phenylketonuria but in our patient, such disorders could not be established. Upon obtaining outside records, it was determined that the second newborn screening was never completed. In our patient, a treatable IEM became a medical mystery leading to its lack of diagnosis due to improper follow up on newborn screening techniques. Furthermore, evaluation of IEMs must be considered in patients with severe illness in the neonatal period.

School: School of Medicine

MS3-4 AHNOOD, ELMIRA

A Rare Case of Isolated Vitamin A Deficiency in a Patient With Primary Biliary Cirrhosis

Ahnood, E. MS3, Tangella, N. MS3, Payne, D. DO

Fat-soluble vitamin deficiencies, in particular vitamin D deficiency, are commonly seen in patients with chronic liver disease such as primary biliary cirrhosis (PBC). Hereby, we present a rare case of a 64-year-old female with PBC and Celiac disease who presented to the ED with complaints of weight loss, diarrhea, overall fatigue, and worsening night blindness. Laboratory results demonstrated isolated vitamin A deficiency despite having normal levels of vitamin D and vitamin K. Patient was prescribed increasing levels of vitamin A supplements, which improved her night blindness although she continued having low vitamin A levels. We believe that vision and dark adaptation should be closely monitored in patients with chronic liver disease.

School: School of Medicine

MS3-4 AL DOGOM, SARA

Case Report: Traumatic Appendicitis - An Unclear Etiology

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Appendicitis is a commonly encountered diagnosis in acute abdomen presentation. Timely diagnosis is critical and requires a high index of suspicion. Despite its unclear etiology, a deep knowledge base of the possible causes that can lead to appendicitis is crucial in providing proper surgical management of patients presenting with symptoms sometimes unlikely suggestive of appendicitis. Typically, blockage of the appendiceal lumen by stool, parasites, or even growths causes appendicitis; however, other causes can also factor in causing an inflammation of the appendix such as GI tract infection, IBD, and, infrequently, abdominal trauma [2]. The pathophysiology of traumatic appendicitis is mainly described by the obstruction of the appendiceal lumen that likely results from shearing forces, compressive forces, crush injury or indirectly obstructive ileocecal hematoma or locally enlarged mesenteric lymph nodes that compress the nearby hollow structures such as the appendix [2]. Trauma can also induce impaction of stool in the appendix and hence leading to appendicitis [2]. Presentation of traumatic appendicitis usually mirrors that of the non-traumatic appendicitis, which includes fever, RLQ pain, signs of peritonitis, nausea, and anorexia [1,2]. However, in this case report, we present a case of acute abdomen which the patient's history and physical exam were not suggestive of acute appendicitis; hence requiring further imaging and an exploratory laparoscopy, eventually leading to a laparoscopic appendectomy. The patient, an otherwise healthy 16-year-old male, presented with abdominal pain after being involved in a motor vehicle collision and was believed to have developed traumatic appendicitis based on his history and physical exam as described in this report.

School: School of Medicine | Campus: Lubbock

MS3-4 ALHAJ, SARA

Rare Glomus Tumor in Sacral Decubitus Ulcer

Jonathan Umelo MS3, Sara Alhaj MS3, Muhammad Nazim MD FACS, Hassan Ahmed MD

INTRODUCTION: Glomus tumors are benign neoplasms comprising less than 2% of soft tissue tumors. They arise from glomus bodies (GB), which are arteriovenous shunts surrounded by a capsule of connective tissues. GB concentrates in areas subject to excessive cold like in the dermis of fingers or toes. 70% of GB tumors occur by age 30. GB tumor present as purple or pink vascular papule with paroxysmal excruciating pain out of proportion of size, and cold sensitivity.

The objective of this presentation is to describe a rare presentation of a GB tumor found in infected sacral decubitus ulcer.

CASE: An 85-year-old female nursing home resident with extensive medical history present to the hospital for a cardiac pacemaker change and was found to have a sacral ulcer on admission. Wound was a stage IV decubitus ulcer. The patient was sent for excisional debridement where the superficial wound was excised and extended down to the sacrum. Soft tissue and sacrum biopsies were sent for both culture and pathology to rule out osteomyelitis. Pathology report of the excised Sacral decubitus ulcer showed islands of tumor cells present within the extensive ulceration and necroinflammatory changes. Immunophenotypic and morphologic feature showed that the tumor was positive for CD34 and SMA which confirmed the presentation of a glomus tumor with free margins.

DISCUSSION: GB tumor is a tumor of the GB body that may involve soft tissues or bone. 90% of the tumors are solitary, but a minority exist as multiple variant. The fact that the majority of these tumor are found in extremities, makes the sacrum a very rare presentation. GB tumor presents in ages 20-40, making our 80-year-old patient atypical. Also the ulcer was probably masking the paroxysmal pain, delaying diagnosis.

CONCLUSION: We are reporting a rare case of GB tumor formation in the sacral region. To our knowledge, this is first case to be reported in the literature of this tumor type in the scrum of an octogenarian.

School: School of Medicine

MS3-4 ANDERSON, BRITTANY

Comparing Outcomes of Two Completion Methods Among General Surgery Faculty in the Laparoscopic Management of Acute Appendicitis

Vincent Athas MD, Adel Alhaj Saleh MD, Zayne Bilal MS, Brittany Grudzielanek MS, Kerrick Akinola MD, Sharmila Dissanaikie MD

Over the past several decades, laparoscopic appendectomy has become the standard of care for acute appendicitis. Endoloops and harmonics or staplers are the most popular methods of ligating the appendiceal base, however few studies have examined postoperative complications between these. Our objective was to look at differences in outcomes between them to see if one technique is superior to one another.

This is a retrospective cohort study by chart review of patients who underwent laparoscopic appendectomy at a University Center. Outcomes compared between the EL and ST techniques included but were not limited to, Length of hospital stay, duration of surgery. 30-day post-operative complications such as surgical site infection, abscess formation, ileus, and bowel obstruction using T-test or Fisher's Exact test were appropriate. Statistical analysis was performed using R.

A total number of 837 patients fit our inclusion criteria were examined. In EL: males (n=117), females (n=102). In ST: males (n=365), females (n=253). No statistical differences were found between the 2 groups in demographics. While no statistically significant difference was found in intraoperative time, the mean LOS showed a significant difference (mean EL = 0.76 days, vs 1.01 ST, $p = 0.006$). No statistical difference was noted in 30-day Morbidity and post-op complications.

Increased utilization of EL technique has been emphasized since 2017 at our center. EL is another tool in the armamentarium of surgeons and it provides adequate and safe ligation of the appendiceal stump and was additionally associated with a cheaper cost than stapler although not analyzed but prices differences if very well-known from the market. In addition to that our finding suggests a decreased LOS in EL technique. We also demonstrate that EL is at the very least no worse than stapler technique across several post-operative metrics of complication but much more cost effective without causing increases in operative time.

School: School of Medicine

MS3-4 ARISPE, RYAN

Vaginal Lactobacilli and Recurrent Fungal Vaginitis

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Introduction: Lactobacillus species play a vital role in the vagina, inhibiting the growth of pathogenic bacteria. Very few studies examined the relationship of Lactobacillus spp. with recurrent fungal vaginitis. Some Lactobacillus spp. produce a biofilm that protects against microbe proliferation. A common cause of vaginitis is infection by the fungal species, Candida, resulting in discharge, redness, and pain. For Candida to become pathogenic, the vaginal epithelium, microbiome, or the specific microbes need to be altered. The objectives of this study are to compare the fungal communities identified by clinical findings vs lab culture methods and to examine the relationship of Lactobacillus spp. and patients with recurrent fungal vaginitis.

Study design: Fungal communities from vaginal swabs were classified by lab culture method (Sabouraud dextrose agar and mycobiotic agar). In clinics, diagnosis of fungal infections of vaginal swabs is accomplished using wet mounts/potassium hydroxide preparation in symptomatic patients. A real-time PCR was carried out on vaginal swabs to detect specific Lactobacillus species and culture method was used to confirm specific fungal species.

Results: 17 swabs confirmed with fungal infections by clinical finding, but out of 17 swabs only 13 (approx. 77%) confirmed with specific Candida spp. by lab culture method. There was no significant difference in Lactobacillus spp. between clinical findings and lab culture method.

Discussion: Some Lactobacillus spp. can survive and protect against harmful pathogens in patients with recurrent fungal vaginitis. Lab culture method and other precise identification methods are required to confirm particular Lactobacillus spp. and fungal species.

School: School of Medicine

MS3-4 BANERJEE, AVANTIKA

Radial approach for lower extremity thrombectomy

Simran Singh, BS, MBA; Jeanie Lee, MD; Tim Dixon, BS, MSIV, Avantika Banerjee, BS, MSIV

PI: Mohammad Ansari, MD

Introduction: Acute limb ischemia may be life-threatening and even lead to limb loss. It is one of the most common causes of lower extremity amputation, affecting approximately 1.5 persons per 10,000 per year.¹ Immediate diagnosis and treatment are crucial. Generally, an endovascular approach should be taken for acute limb ischemia. The procedure involves surgical exposure of the common femoral or popliteal arteries then extraction or aspiration of the thrombus. Here, we present a patient with bilateral acute lower limb ischemia who underwent lower extremity angiogram and intervention via right radial arterial access due to limitations restricting access via the common femoral and popliteal arteries.: **Case Presentation:** An 85 year old African American man with a history of hypertension, benign prostate hypertrophy, and prostate cancer 10 years ago s/p radiation, presented to our institution with bilateral acute lower limb ischemia. Doppler evidence of limb ischemia, associated with low LVEF, intracavitary LV thrombus, ARI, and lactic acidosis indicated for a lower extremity angiogram and aspiration thrombectomy. **Interventional Procedure:** The right radial artery was accessed via ultrasound guided modified Seldinger technique and a 6-Fr slender radial sheath was placed. Post procedure the right popliteal artery remained occluded but had improved flow with significant residual thrombus burden. A duplex examination of the lower extremities was ordered for the next morning to assess if thrombi dissolved without intervention. Patient was continued on heparin drip, aspirin, clopidogrel, and statin therapy. **Discussion:** Early intervention for acute limb ischemia is critical to saving both life and limb. The radial approach shows viable solutions when technical or pathological complications prevent routine approaches from being made.

School: School of Medicine

MS3-4 BEAMAN, ERICA

A case report and literature review: Complex traumatic pelvic ring fractures and soft tissue injuries in a pregnant patient

Alexsandra P. Rojas BA, Robert Jameson MD, Jayne McCauley MD, Robyn Richmond MD, Catherine Ronaghan MD FAC, Erica Beaman BS

Introduction: Trauma is the primary cause of non-obstetric maternal death, with pregnant patients making up 1.5% of total trauma patients. Additionally, estimated fetal loss among pregnant trauma patients is 34%. A serious traumatic injury, pelvic fractures carry a mortality of up to 32% in a non-pregnant patient, with higher risk when associated with concomitant soft tissue injury or other complicating factors. Pelvic injury can present additional, specific problems for the pregnant patient.

Results: We present the case of a trauma patient estimated to be at six weeks gestation by last menstrual period. The injuries sustained were: a vertical fracture that extended to the anterior wall and roof of the right-sided acetabulum, a right inferior pubic rami fracture with the right symphysis pubis open to air, a left sided acetabular buckle fracture that extends to the anterior wall and roof of the acetabulum, a left inferior pubic rami greenstick fracture, and a soft tissue injury with soft tissue intervening between the separation. The right sacroiliac joint showed 4 mm of widening with an intact left sacroiliac joint. A pelvic binder was placed before presentation. The patient was taken to surgery after initial stabilization during which she underwent pelvic external fixation, proctoscopy, vaginal exam, on-table cystogram and fluoroscopy were performed. The following day, a pelvic ORIF was performed. She had an otherwise un-complicated course and was discharged to home on the 7th day after admission.

Upon discharge, she was weight bearing as tolerated on the left leg and touch down weight bearing on the right leg. Currently, she is recovering well and is walking without orthopedic complications. She was last observed to be at 23 weeks gestation without complication and was cleared for vaginal delivery.

Conclusions: This case report would serve as an example of how complex prenatal trauma injuries can be treated and maintain the viability of the pregnancy.

School: School of Medicine

MS3-4 BIHARI, SANYUKTA

Abscopal effect in solid tumor malignancy and the synergy of radiation therapy and immune therapy with long term durable control of cancer

Sanyukta Bihari, Naga Cheedella, Michael Burke, Kavitha Donthireddy

Small cell lung cancer or high-grade neuroendocrine carcinoma have poor prognoses and expected survival after failing two lines of therapy is less than 6 months at best. The median progression free survival (PFS) is 3.3 months with combined immune check point inhibitors and 5.2 months with combination chemotherapy and immune therapy. Durable response is unlikely based on historical data. We present a case where our patient maintained a durable response with PFS beyond 22 months when treated with radiation therapy and immune-stimulating agents. Our patient, a forty-one-year-old male with limited stage small cell cancer, was initially treated with cisplatin and etoposide along with radiation followed by prophylactic brain radiation. Three months later, patient had a new biopsy proving liver metastasis and was started on second line irinotecan. Patient developed progressive cancer on irinotecan with liver and retroperitoneal lymphadenopathy. Immunotherapy with Nivolumab was started and radiation to the liver was given with response shown not only in the liver lesion but also in all active sites of disease, showing calcification with durable PFS till date.

Cancer cells have the ability to evade immune surveillance by reducing expression of tumor antigens. Tumor antigen release by localized radiation promotes specific tumor-targeting by the adaptive immune system which can be further augmented by systemic immune-stimulating agents. Radiation therapy treatment acts as an “in situ vaccine” to prime the immune response by facilitating the release of tumor antigens, and this in turn can induce a phenomenon known as the abscopal effect whereby localized radiation results in immune-mediated tumor regression in disease sites outside of the radiation field. We present this case to emphasize that the abscopal effect of radiation and the synergy of radiation therapy with immune therapy can produce a long-term durable control in aggressive cancers like small cell carcinoma.

School: School of Medicine

MS3-4 BLUHM, PEYTON

Evaluation of Pediatric Hematology Referrals at a Tertiary University Hospital in West Texas

Irem Eldem, Peyton Bluhm, Angela Abraham, Chibuzo O'suoji

Background: It has been shown that one in forty pediatric visits in the US results in referral to specialty care with the top reason being advice on diagnosis and treatment. Poor access to subspecialty care results in delays of diagnosis and delivery of appropriate therapies to patients. According to the Community Needs Health Assessment at UMC (2016), "access to affordable healthcare" and "transportation" are two of the top significant community health needs for the Lubbock area. Identifying possible causes of referrals could prevent unnecessary time off work or school, travel, and costs.

Objective: To evaluate the necessity of pediatric hematology-oncology referrals to Southwest Cancer Center (SWCC). Primary outcomes include common reasons for referral and determination of health related costs due to unnecessary referrals.

Method: One hundred and one pediatric patients who were referred to SWCC at University Medical Center in Lubbock, TX between January 1, 2015 and September 30, 2018 for abnormal complete blood count (CBC) or coagulation tests, were included in the study. A retrospective chart review was done. "Necessity" of referrals was determined by evaluation of patient labs prior to referral, lab values at the initial specialist visit, and diagnosis that could be handled by primary care physician (PCP) without need for referral.

Results: The most common reasons for referral to Hematology clinic were abnormal Hb and WBC counts. The top three final diagnosis in decreasing frequency were: Iron deficiency anemia (IDA), leukopenia or leukocytosis, anemia other than IDA (hemolytic, aplastic, thalassemia trait). 95% of the patients were evaluated by hematologist after referral within 8 weeks. Patients had a median of 3 visits to the hematology clinic and 23% of patients only required one visit. About 33% of the referrals could be managed by PCP as the therapy already had been started before referral and/or the laboratory findings were not abnormal at the time of first visit. The cost of unnecessary visits to subspecialty clinic totalled \$82,888. There was no significant relation between the final diagnosis and necessity for referral. Patients who travelled longer than 100 miles tended to be necessary referrals ($p < 0.05$). The visits that cost more than \$5,000 were all necessary referrals.

Conclusion: Our study revealed that about 32% of the pediatric hematology referrals could be avoided, because either the labs were back to normal with therapy or resolved without intervention. Implementing guidelines for PCPs about the most common hematologic problems such as anemia, neutropenia, thrombocytopenia and coagulation defects can improve the healthcare in West Texas area.

School: School of Medicine

MS3-4 BRAMNIK, AVERY

Maternal Attitudes Regarding Postpartum Depression

Avery Bramnik, MSIII; Luke Bacon, MBA, MSIV; Joel Barrett, MSIV; Ana Leon-Arango, MSIV; Emily Nguyen, MSIII; James Tran, MSIII

Introduction: Peripartum depression (PPD) is a common perinatal complication that may harm both mothers and newborns. This project was designed to assess the efficacy of pre-discharge PPD education. We describe findings regarding attitudes and beliefs about PPD symptoms and the role of pediatricians in screening for PPD.

Methods: Surveys were administered in Amarillo, Texas at: (i) Northwest Texas Hospital to mothers in the postpartum unit, and (ii) the Women's and Children's outpatient clinic to mothers presenting for a 2-week well-child visit postpartum. Ten survey items assessed mothers' knowledge, attitudes, and empowerment regarding PPD.

Results: A total of 45 surveys were included in our analysis. 55% of respondents ($n=25$) agreed that excessive guilt and feeling overwhelmed were not normal signs of parenthood when experienced for greater than 2 weeks. 26.7% ($n=12$) were neutral and 17.8% ($n=8$) believed such symptoms were normal. 83.3% ($n=42$) agreed that symptoms of guilt or hopelessness for more than 2 weeks warranted evaluation by a physician. When asked whether they believed their child's doctor (the Pediatrician) should screen mothers for PPD, 74.9% ($n=31$) agreed, 15.6% ($n=7$) were neutral, and 15.6% ($n=7$) disagreed. 66.7% ($n=30$) agreed that the Pediatrician should educate them about PPD. 86.7% of respondents ($n=39$) endorsed the ability to reach out to a physician if they developed PPD symptoms. When asked about their agreeability to seeking help from the Pediatrician, 77.8% ($n=35$) were agreeable, 13.3% ($n=6$) were neutral, 8.9% ($n=4$) respondents were not agreeable.

Conclusion: These results suggest that most patients are confident in their ability to access care and believe that pediatricians

should play some role in screening for PPD. However, many mothers do not seem to possess an adequate understanding of the signs and symptoms of PPD. Limitations of this project include a small sample size and limited diversity of patient demographics.

School: School of Medicine

MS3-4 COOPER, CHLOE

THE ASSOCIATION BETWEEN INSURANCE TYPE AND PATIENT SATISFACTION SCORES

Chloe Cooper, BS, Kelly Little, MPH, Rohali Keesari, MPH, PharmD, Mhd Hasan Al-Mekdash, MA, MS, PhD, Cornelia de Riese, MD, PhD, MBA

Introduction: Patient satisfaction is becoming an increasingly important factor affecting reimbursement of healthcare providers. For example, Medicare uses the results of their HCAHPS survey as a part of their provider compensation policy. Studies have shown that there are many factors that affect a patient's perception of any given encounter, including wait times, previous medical knowledge and socio-economic status among others, but these studies never analyzed how each factor specifically affected survey scores. Given the limited exploration into the drivers of patient satisfaction, the present study aims to evaluate the role of insurance type in satisfaction scores.

Methods: Self-reported satisfaction surveys were collected from the Press Ganey System at an academic center and classified into five groups according to patient insurance type: Medicare, Medicaid, other government, commercial, and self pay. The differences in mean survey scores were then compared between groups. One-way ANOVA and Tukey HSD tests were used for statistical analysis.

Results: The mean patient satisfaction scores were highest for those with Medicare, followed by those utilizing other government insurance, commercial insurance, self-pay, and Medicaid, in that order. These differences were statistically significant ($P < .001$) for all insurance groups except between commercial insurance and self-pay ($P = .12$).

Conclusions: Our data show that patient satisfaction scores are affected by insurance type. This is in line with current literature indicating that patient satisfaction is multifaceted in nature. As patient experience has become an increasingly important driver of health care reimbursement, it is critical to consider the complexity of this subject. Further studies are warranted to explore the various factors comprising patient satisfaction, recognizing that survey scores are impacted by more than provider performance alone.

School: School of Medicine

MS3-4 D'CUNHA, RUTH

Extranodal Marginal Zone B-cell Lymphoma of the Conjunctivae and Orbits

Ruth D'Cunha, Nicholas D'Cunha MD

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Introduction: Orbital lymphoma originates in the conjunctiva, lacrimal gland, soft tissues of the eyelid, or extraocular muscles and makes up about 1-2% of non-Hodgkin's lymphoma. We present a rare case of extranodal marginal zone lymphoma of the conjunctivae and orbits that was effectively treated.

Case Presentation: A 63-year-old Hispanic female presented to her PCP with complaints of "knots" in both her eyes. The patient denied any impairment of vision. Upon examination, she was found to have mechanical left superior eyelid ptosis and salmon pink, fleshy, vascular lesion visible in the right conjunctiva.

A MRI of the orbit/face/neck showed bilateral enhancing masses within the preseptal fat, with right-sided postseptal and intracornal extension. The right-sided mass measured approximately 0.9x2.6x1.2 cm, and the left-sided mass measured approximately 3.3x2.4x1.2 cm. The extraocular muscles bilaterally appeared to be extrinsic from these masses and the optic nerves appeared to be spared bilaterally. A biopsy of the left orbital tumor showed stage II extranodal marginal zone lymphoma of the conjunctivae and orbits. Immunohistochemistry from the biopsy was positive for CD20, bcl-2, Ki-67 (~10%) and negative for CD3, CD5, CD10, cyclin D.

The bilateral conjunctival lesions were treated with definitive involved site radiotherapy utilizing an opposed laterals beam arrangement technique. Three weeks after radiation the patient was started on 6 cycles of chemotherapy with Rituxamab, Cyclophosphamide, Vincristine and prednisone.

Discussion: Radiation therapy is the treatment of choice as these tumors. Other treatment options include anti CD20 monoclonal antibodies and chemotherapy. A common etiological agent for these patients is chlamydia psittacosis and a few patients may respond to doxycycline. Chemotherapy is often reserved for relapse. However, because of the bilateral involvement of the orbits, in this case, it was decided to add chemotherapy to the treatment regime.

School: School of Medicine

MS3-4 DEAN, RYAN

Fatal Rectus Sheath Hematoma Secondary to Enoxaparin Administration

Ryan Dean, MSIII; Ganesh Maniam, MSIII; Dr. Thien Vo, MD

Introduction: Low molecular weight heparin (LMWH) demonstrates comparable efficacy to unfractionated heparin, but is a first-line option for thromboprophylaxis due to decreased risks of major bleeding & heparin-induced thrombocytopenia. However, this paper presents a fatal case of epigastric artery RSH secondary to enoxaparin injection.

Case Report: A 76-year-old female in the CCU for cardiac stabilization was found unresponsive & hypotensive on the commode. After returning to consciousness and reporting severe abdominal pain, a CT was ordered and found a large left RSH with active peritoneal hemorrhage anteriorly from the inferior epigastric vessels. Despite an IR guided embolization of the inferior epigastric artery and laparoscopic ligation of the left inferior epigastric artery, a second laparotomy found the colon & gallbladder to be frankly necrotic with continued active bleeding. Patient was kept deeply sedated with multiorgan failure secondary to hemorrhagic shock. The family chose to withdraw care and patient was pronounced dead following asystole.

Discussion. A rare, but notable, risk factor for rectus sheath hematomas is direct muscle injury or indirect damage due to forceful contraction – including defecation & any increased Valsalva effort. The patient had been found unconscious & hypotensive on the commode due to a vasovagal event secondary to constipation. It may be possible that treatment of her constipation with administration of enoxaparin may have prevented the development of the fatal RSH, but this is an area that requires future study.

Conclusion: This paper presented a case of an epigastric artery hematoma following enoxaparin administration, resulting in multi-organ failure secondary to hemorrhagic shock. While this proved fatal for the patient, the risk factors and clinical course outlined in this case report may assist other physicians in preventing future cases of severe intra-abdominal hematomas following enoxaparin administration.

School: School of Medicine

MS3-4 DELEON, SABRINA

Deportation of a detained asylum seeker with disabling panic attacks

Sabrina Deleon, Dr. Regina Baronia, Dr. Rosalinda Jimenez, Dr. Yasin Ibrahim

Introduction: Asylum applicants can benefit from psychiatric evaluation which can explain how culture and mental health symptoms relate to perceived deficits in credibility.

Case Presentation: Ms. B presents for psychiatric evaluation seeking asylum in the United States after multiple threats on her life in Honduras. At initial evaluation she was diagnosed with depression. On reevaluation, she was found to have panic attacks as a manifestation of post traumatic stress disorder triggered by previous trauma. Recommendations included a anxiolytic medications and the use of pre-written statements upon interview. Patient was unable to convince officer of credible fear and was deported to Honduras.

Discussion: Mental Health professionals must utilize PTSD scales especially with patients who are not forthcoming about past trauma history to avoid missing this diagnosis. It is important to educate immigration officials and lawyers about the necessity of accommodating clients' needs in order to appropriately present themselves in asylum interviews.

School: School of Medicine

MS3-4 DHIR, NIKITA

Case of Herpes Zoster Reported after Shingrix Vaccination

Nikita Dhir, Texas Tech Health Sciences Center Lubbock; Dr. Neha Mittal, Texas Tech Health Sciences Center Lubbock

Herpes Zoster is a dermatomal rash that is caused by reactivation of the Varicella Zoster Virus (VZV). VZV occurs in childhood, presenting as chickenpox, and remains dormant in the dorsal root ganglia. It is often reactivated later in life when the individual is immunocompromised from stress or increased age. Shingles presents as a maculopapular rash that can evolve into vesicular lesions with unilateral dermatomal distribution. It can be further complicated by post-herpetic neuralgia or herpes zoster encephalitis. Due to the comorbidity associated with this disease, the herpes zoster vaccine has become a widely-sought vaccine for individuals over 50 years of age.

Here we report a unique case of a 73 year old immunocompetent patient with the Zoster rash post-vaccine administration due to the Shingrix recombinant vaccine.

A 73 year old female with past medical history of hypertension, hypothyroidism, and stage IIA infiltrating ductal breast cancer reported a mild case of Zoster rash 3 days after receiving the first dose of the Shingrix vaccine. It started with vesicular lesions on her right abdomen and then progressed to her back. She described them as “tingly, itchy, and tender”. The day after the rash onset, she flew to the Philippines and returned 7 days later. She had chickenpox as a child, and had previously received the Zostavax vaccine with no complications.

Shingrix is an adjuvanted subunit vaccine made up of a single recombinant VZV antigen, glycoprotein E, and the AS01B adjuvant system. Glycoprotein E elicits anti-VZV immunity while the adjuvant system stimulates VZV-specific antibody and CD4 T-cell response. The components of this recombinant vaccine are not known to cause a reaction, and the rationale on why Shingrix caused a rash in an immunocompetent individual is not known. However, this case report should not deter physicians from administering Shingrix as it is able to prevent morbidity from the Zoster rash and post-herpetic neuralgia.

School: School of Medicine

MS3-4 DIXON, TIMOTHY

Impact of Stroke in the Perioperative period on Overall Survival of Cardiac Transplant Patients

Timothy Dixon, Nandini Nair, MD, PhD

Purpose: The impact of stroke in the immediate post-transplant period on overall long term survival has not been well defined in the literature. This study addresses the effect of stroke on overall survival in this population. Methods: The UNOS database was queried to include patients (≥ 18 years of age) between 2005 and 2015 who underwent cardiac transplantation. The data was obtained through a formal request. The final study cohort had 20,915 patients. The cohort was divided into two groups. Group A had 20402 patients who experienced no stroke while group B had 513 patients who experienced at least one stroke event in the perioperative period. The Kaplan-Meier method was used to compute estimates of survival. The log-rank test was used to make comparisons of survival distributions. Overall survival was defined as the time elapsed from date of transplant to death. Results: Of the 20915 patients studied 513 had at least one stroke event prior to discharge (group B). Of these 26.7 % died prior to discharge in group B while only 4.2 % died in group A ($p < 0.001$). Patients who did not have any in-hospital stroke event had significantly improved survival after discharge ($p < 0.001$). This study also showed increased mortality in the first year after discharge in the group that experienced a stroke event perioperatively as compared to those who did not ($p < 0.001$). After the first year post transplant the survival rate was not significantly different between the two groups (figure1). Conclusion: The impact of a stroke event in the perioperative period appears to increase the mortality in the early post-transplant period prior to discharge. It also appears to influence survival in the first year post transplant and the overall survival due to early decrease in survival. This study shows for the first time the negative impact of a stroke in the perioperative period on overall survival in the post-transplant population. The study is limited by the fact that it was not possible to precisely differentiate hemorrhagic versus ischemic strokes in the UNOS database

School: School of Medicine

MS3-4 DOMINGO-JOHNSON, E.L.

Case report: Atypical Desmoplastic Cellular Neurothekeoma

E.L. Domingo-Johnson MSIII, Brett Austin M.D., Ashley Sturgeon M.D., Michelle Tarbox M.D

Atypical Desmoplastic Cellular Neurothekeoma is a rare benign lesion that has a high propensity for the face and upper extremities of female patients. We present the case of a 42 year old woman, Fitzpatrick type I, with a several month history of a growing well demarcated pearly pink 8mm nodule with arborizing and linear irregular vessels on her mid forehead. The differential diagnosis included basal cell carcinoma, squamous cell carcinoma, amelanotic melanoma, sebaceous carcinoma, follicular neoplasm, and adnexal tumor. Histology revealed a mildly atrophic epidermis overlying a proliferation of epithelioid cells with abundant amphophilic cytoplasm and moderately pleomorphic nuclei arranged in vague fascicles embedded within a fibrous capsule. The lesion displayed an infiltrative growth pattern toward the base. Melanocytic stains Mart 1, S100, and Sox-10 appropriately highlighted a normal periodicity of melanocytes at the dermal epidermal junction. Pancytokeratin stained the overlying epidermis appropriately and did not highlight the neoplastic cells. Ki-67 demonstrated a moderately increased proliferative index. CD68 faintly highlighted the epithelioid cells of interest. CD10 and NKI-C3 strongly and diffusely stain the epithelioid cell of interest. P16 staining exhibits a biphasic staining pattern within the lesion, with strong mosaic staining in the superficial aggregates of epithelioid cells and loss of expression of p16 in the more atypical cells, with an infiltrative growth pattern toward the base of the lesion. Thus, the diagnosis of atypical desmoplastic cellular neurothekeoma was declared and complete excision is planned. The literature is limited regarding this diagnosis, and this report aims to help clinicians distinguish this neoplasm in the future.

School: School of Medicine

MS3-4 EGAN, ALEC

Student-Led Second Year Medical Student Wellness Project

Alec Egan, Megan Gates, Allison Perrin PhD, Dan Webster PhD

Background: USMLE Step 1 is a major source of stress for second year medical students at TTUHSC School of Medicine. As the results of this exam increasingly impact residency placement, students spend a significant amount of time preparing for Step 1. Many students struggle to maintain healthy habits during this period of heightened stress and anxiety. Some students become isolated as a result of poor stress management leading to negative outcomes like remediation or delayed advancement. Our goal was to encourage camaraderie and collaboration to help medical students develop healthy coping strategies.

Methods: Participation in the project was encouraged via email and a social media campaign. Students submitted entries via a Google Form tracking names, dates, and types of activity. Examples included: donut days, Grey's Anatomy watch parties, workouts, and therapy dogs. Prizes were awarded at the end of the initiative.

Results: 135 out of 183 second year medical students participated in the initiative and completed a total of 1,023 activities over 10 weeks for an average of 7.5 activities per participating student. One student participated in 66 activities. Exercise was the most common activity. 52 students of the class of 2021 completed an anonymous survey after the project. Of the initiative participants, 94% agreed that the Wellness Initiative incentivized their participation in wellness activities and 66% said that the initiative had a long term effect on their approach to stress.

Discussion: Our results indicate that an effective wellness program can be accomplished with minimal financial support from the home institution. The stress-management skills students developed by participating in the initiative had lasting impact on the students' approach to stress. With further development, this model could be sustainably reproduced by other schools to promote a medical education community that supports the wellness of students.

School: School of Medicine

MS3-4 FISHER, JOHN

Procalcitonin as an Early Marker of Septic Arthritis

Kevin West, MD, John Fisher, MBA, Cameron Cox

Early diagnosis of septic arthritis (SA) can help avoid serious complications that arise from prolonged infection of a joint, however, there is no single laboratory marker available to reliably diagnose SA. While white blood cells (WBC), erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) are often used as predictors of sepsis in synovial fluid, these markers have been shown to have low diagnostic value and are typically used to monitor known infections. Recently, procalcitonin (PCT) has come under consideration as a diagnostic biomarker SA. PCT has shown some utility at a cutoff level of 0.5ng/mL, however, literature assessing lower cutoff points is limited. The published data regarding lower cutoffs suggests that a threshold of 0.25 ng/mL provides greater sensitivity and specificity for diagnosing SA.

We retrospectively reviewed 60 consecutive patients with acute knee arthritis (26 septic and 34 aseptic), using Mann Whitney U tests and receiver operating characteristic (ROC) curve analysis to assess the accuracy of PCT, WBC, ESR, and CRP in detecting SA.

CRP ($p = 0.002$) and TKA ($p = 0.002$) levels showed significant association with presence/absence of sepsis. The area under the curve (AUC) for PCT was 0.74 ($p = 0.002$), compared to 0.74 for CRP ($p = 0.002$), 0.65 for ESR ($p = 0.002$), and 0.55 for WBC ($p = 0.002$).

Using a PCT cutoff of 0.25ng/mL, specificity and sensitivity were 84.6% and 56.2%, respectively. The ideal cutoff point for PCT was 0.275ng/mL at (sensitivity = 84.6% , specificity = 59.4%). The ideal cutoff point for CRP was 21.1mg/dL (sensitivity = 69.2%, specificity = 81.2%). The ideal cutoff point for ESR was 84.5 mm/hr (sensitivity = 50.0%, specificity = 78.1%).

The results of our study add to the growing body of literature surrounding PCT in SA and provide valuable data for physicians aiming to optimize the SA diagnostic algorithm.

School: School of Medicine

MS3-4 FROST, JOSHUA

Retrospective Pilot Study to Examine Potential Predictors of a Standardized Scoring System for Smoke Inhalation Injury

Nicole Van Spronsen BS, Grant Sorensen PhD, Joshua Frost BA, Jordan Howell MBS, Donna Ayala BS, Hasan Almekdash MA MS PhD, Rohali Keesari MPH PharmD, Jennifer Kesey MSN RN RNP-BC CWS, John Griswold MD FACS

Introduction: Smoke inhalation injury is strongly associated with increased morbidity/mortality. Bronchoscopy is used to diagnosis smoke inhalation injury, but its interpretation is subjective. This study sought to assess diagnostic significance of physical exam, history, location, and adjunct studies characteristically performed on patients suspected of smoke inhalation by comparing these findings to outcomes. The primary goal was to examine variables that could be used to create an accurate smoke inhalation injury scoring system in order to develop an objective method that considers the severity of inhalation injury.

Methods: This retrospective study evaluated demographics, clinical presentation, carboxyhemoglobin level, intubation on arrival, bronchoscopy, comorbidities, hospital course, and outcomes associated with smoke inhalation. Bronchoscopy findings included: red mucosa, carbon particles at carina, and numerical score (1-4). The primary outcome was resuscitation fluid required in the first 24 hours of treatment compared to that predicted by the modified Brooke formula ($2cc \cdot \text{weight in kg} \cdot \text{Total Burn Surface Area}$). If the patient received more fluid than predicted, this was considered positive for smoke inhalation. Differences between predictor/outcome variables were determined using Wilcoxon rank sum test for continuous variables and Chi-squared test for categorical.

Results: A positive bronchoscopy score was defined on the condition of having positive physical exam finding and/or bronchoscopy score 1-4. Physical exam findings consisted of soot or carbon sputum present on the patient along with hoarseness, wheezing, or a red oropharynx on physical exam. If the patient met one of these conditions, we considered this a positive result. Inclusion criteria: age 18-89, admission from 1/1/2004 and 5/31/18, and diagnosis of smoke inhalation injury/burn injury. There was a significant difference in positive bronchoscopy between those positive for our condition of inhalation injury and no injury ($p < 0.001$; Table 1). Patients with a positive bronchoscopy score were 9 times more likely ($OR = 9.91$, $95\% \text{ CI} = 2.8-35.01$) to be diagnosed with inhalation injury as compared to those without a positive bronchoscopy score.

Conclusions: These results display the importance of bronchoscopy in suspected smoke inhalation injury and reinforce the need for an objective bronchoscopy assessment. Future studies can build upon these results by creating an objective scoring system to guide providers performing bronchoscopy.

Applicability of Research to Practice: Due to the 9-fold benefit of performing bronchoscopy, it should be the primary tool used to assess potential smoke inhalation injury; other tests may be secondary in nature.

School: School of Medicine

MS3-4 GATES, MEGAN

Unique Aspects of Acute Colonic Pseudo-Obstruction in Morbidly Obese Burn Patients

Megan Gates, Elmira Ahnood, John Griswold M.D. FACS

Background: Acute colonic pseudo-obstruction (ACPO), formerly known as Ogilvie's syndrome, is a functional obstruction characterized by massive colonic distention. ACPO is typically seen in patients who experience an inciting event causing hospitalization such as a UTI or pneumonia in addition to existing chronic health issues. The usual presentation of ACPO includes abdominal distention, pain, nausea, vomiting, failure to pass stool or flatus, and an empty rectum. However, up to 40% of patients with ACPO may still pass flatus or stool. Gastrointestinal dysfunction is common in burn patients with ACPO being a rare life-threatening complication.

Objective: Here, we will describe two cases of ACPO with unusual presentations in morbidly obese burn patients.

Methods: Both patients presented after suffering partial and full thickness burns with a history of morbid obesity. Throughout their hospital stay, they each experienced waxing and waning episodes of abdominal pain and distension with concerns for ACPO. After conservative medical management, both improved and continued to have bowel movements with flatus. Overnight, acutely worsening distension developed in each patient.

Results: Patient A is a 55 year old male with 37% TBSA who suffered serosal tears at his distal cecum which were repaired and received a Malecot drain for decompression of the bowel. Patient B is a 54 year old male with 21.5% TBSA who had a pinpoint cecal perforation and underwent a right hemicolectomy with eventual anastomosis.

Conclusion: Because burn patients require extensive healing time, they are more prone to recurrent episodes of ACPO. Therefore, more aggressive treatments such as active colonic decompression with colonoscopy and cecostomy may be beneficial in preventing complications such as colonic perforation.

School: School of Medicine

MS3-4 GUERRERO CRIADO, ANDRES

Cloud-Based Improvement of Patient and Provider Communications Regarding Retinal Screening at Texas Tech University Health Sciences Center Free Clinic

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Introduction: Analysis of TTUHSC LIFC retinal screenings was originally done via USB between students-physicians. This was safe but inefficient, with issues in communication and chain of custody. Communication lapses meant loss to follow-up; a ubiquitous problem in free clinics. With a decentralized system for encounters, retention to resolution (R2R) was uncommon. Therefore, we analyzed predictors of retention in our system to create a Cloud-Based Electronic Medical Record (CB-EMR)

Methods: We analyzed data before/after CB-EMR implementation (N=530). Patients were contacted to reestablish, briefed on their medical prognosis and triaged by plan of care (POC) into prognosis specific categories for return to care (R2C). Upon consolidation of records with the TTUHSC LIFC Database, a CB-EMR was created.

Results: 530 encounters after CB-EMR:

R2R after 1st encounter went from 44% to 92% (↑48%)

R2C to 2 encounters went from 7% to 93% (↑86%)

R2C to 3 encounters went from 28% to 100% (↑72%)

R2C to 4 encounters went from 43% to 100% (↑57%)

R2C to 5 and 6 Encounters occurred with 3 and 1 patients only after CB-EMR. (↑100%, ↑100%)

Likelihood of R2R comparing 1st encounter patients: 44% vs 92% OR 0.0647, 95% CI (0.0193 to 0.2167) z stat 4.441, P<0.0001

Conclusion: CB-EMR addressed the pitfalls of our old system:

Lack of triage for contact and R2C. Distribution of management responsibilities. Unconsolidated previous records. Delays in communication.

Transitioning to CB-EMR streamlined access to information, allowing consistency in care. It is now over 100% more likely for R2R, and R2C skyrocketed. Now, instead of individual encounters we group patient information and follow their condition in real-time to determine what interventions are necessary to improve outcomes across specialties. This system lends itself for us to triage patient's Ophthalmologist visits based on diagnostic needs; allowing us to focus the future towards personalizing education and enhancing communication.

School: School of Medicine

MS3-4 HOPE, BRIANNA

Recurrent External Auditory Canal Meningioma: Case Report

Brianna Hope, MS3; Rahul Varman, MD; Joehassin Cordero, MD

A 49-year-old female with a history of multiple intracranial meningiomas presented to the clinic with headaches and decreased hearing on the left for 9 years. Clinical exam revealed a large bulging mass within the left external auditory canal (EAC) without visualization of the tympanic membrane. CT scan showed a soft tissue density within the left temporal bone. A left bony canaloplasty of the EAC meningioma was performed. On the third post-op visit the patient again complained of headaches and decreased hearing on the left. Further stenosis-limiting treatment was required after resection to prevent the return of her hearing loss.

School: School of Medicine

MS3-4 HOPE, LANDON

Non-HIV Kaposi's Sarcoma Managed with Intralesional Vinblastine

Landon Hope, MS3, Andres Garcia, MD, Michelle Tarbox, MD, Richard Hope, MD

We describe a 79-year-old female with non-HIV associated Kaposi's sarcoma who for the last 10 years develops approximately 10-15 cutaneous neoplasms every 2 to 4 months. Initially, smaller lesions were successfully removed using punch methods, while larger lesions would require surgical excision. However, the patient developed "surgical fatigue" with this process. For over two years she has now been successfully managed with intralesional vinblastine. This treatment has been much more tolerable for her without systemic side effects nor systemic progression of the Kaposi's sarcoma.

School: School of Medicine

MS3-4 HSU, CHIA

Severe Heart Failure Secondary to Dilated Cardiomyopathy in a 33-year-old Man

Chia Hsu, E.L. Domingo-Johnson, Siroj Dejhansathit, MD, Marcella Rivas, MD.

We report a case of a 33-year-old male with medical history of dyslipidemia who presented with progressively worsening shortness of breath for 3 weeks, difficulty with daily activities especially in cold weather, and productive cough. Chest X-ray revealed patchy airspace opacities in bilateral lungs. Differential diagnosis included pneumonia, pulmonary embolism, and acute coronary syndrome due to elevated troponin levels. Transthoracic echocardiography showed an ejection fraction of $\approx 20\%$ and dilated cardiomyopathy. Upon further investigation of the heart failure etiology, it was found that the patient had been using anabolic-androgenic steroids and herbal supplements to boost his performance in weightlifting. His testosterone level was found to be elevated. In the absence of other risk factors and negative laboratory findings for other etiologies, we attribute the patient's dilated cardiomyopathy and severe heart failure to the anabolic-androgenic steroid abuse. Our case highlights the importance of considering anabolic-androgenic steroid use in the differential diagnosis of young patients who present with acute heart failure.

School: School of Medicine

MS3-4 KALAYILPARAMPIL, BELLA

Influence of Cultural Background on Newborn Care in West Texas

Bella Kalayilparampil, Stacy Philip, Alan Gonzalez, Sumesh Parat

Introduction: Healthcare providers' cultural competencies are challenged daily through the lack of cultural awareness of the diverse populations they serve. This study assesses newborn care traditions within the local community, including refugees, to help increase awareness among healthcare providers and strengthen their ability to provide exceptional health care tailored to the unique needs and customs of this population.

Methods: Data was collected via surveys distributed among mothers of newborns in the postpartum unit of Northwest Texas Hospital in Amarillo, Texas. Bilingual volunteers and certified online translation sites translated surveys from English to Spanish, Burmese, Zumi, Chin, Karen, and Somali. Questions regarded demographic information and cultural traditions surrounding newborn care practiced by parents, such as prenatal care, breastfeeding, circumcision, newborn safety, umbilical cord care, family involvement, and bonding.

Results: Respondents were Spanish speakers (80 responses) and English speakers (175 responses). Statistically significant differences were found between English and Spanish speakers in the number of women breastfeeding, father involvement in care and plan to have family or friends involved in the newborn's care; Spanish speaking women are more likely to involve the extended family in the newborn's care. Distance was the largest barrier for prenatal care for Spanish speakers.

Conclusion: This study enlightens healthcare providers on the importance of cultural competency when caring for newborns. Feeding preferences highlight the need for further education on the benefits of breastfeeding. The role of the extended family has more importance in newborn care among Spanish speakers. Distance is the most important barrier for women seeking follow up care from their doctors. Further research entails recruiting refugee participation and exploring additional disparities to address in these populations for optimal health care provisions.

School: School of Medicine

MS3-4 KELLEY, JOHN

Vaping induced Lung Injury and DVT

John Kelley MS4, Dr. Shane Metzler

We present a 35-year-old female patient with no significant past medical history who developed vaping induced pneumonia then subsequently developed ARDS. We will review how to approach vaping induced lung injury and its potential sequelae and how to address them clinically in this poster.

School: School of Medicine

MS3-4 KHANDELWAL, JAANKI

POTENTIAL PITFALLS OF SMART-PHONE APP BASED EVALUATION OF FOOD INTAKE IN POPULATION OF PREGNANT WOMEN AT THE PERMIAN BASIN: PRELIMINARY REPORT

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Introduction: Increasing maternal mortality in US is a pressing public health problem. Innovative smart phone-based technologies have been powerful tools in diseases management. Goal of this study was to evaluate application of Mobile app (MyFitnessPal) documenting food intake in rural population of pregnant women as a platform for nutritional interventions.

Study Design. Women were enrolled in first trimester of pregnancy (IRB protocol # L20-032) and asked to log food intake using MyFitnessPal two weeks in first trimester of pregnancy. Food intake was shared using specific ID and incorporated in mobile app. Medians (25th; 75th percentile) of main nutrient groups (Protein [P], Carbohydrates [COH], Fats [F]) and total energy (TE) calculated and compared to EAR. Outcomes compared with published reference values [REF] (1,2) in Wilcoxon signed rank tests using R statistical software (version 3.5.2) and (SPSS).

Results. From 19 enrolled patients, three discontinued study, nine had not shared food entries yet or had incomplete/absent record data; seven completed first trimester food entries. Age of patients was 24.4±2.9 years, weight 177.8lbs±41.3lbs and BMI 32.1±7.2 kg/m². F, COH and P intakes were similar published study (n=30) (1). TE, P and COH were 87.5% < 9946 kJ REE, 75% < 71 g/day RDA and 12.5% < 135 g EAR respectively.

Discussion Ongoing study, food intake continues in the second trimester, target number of patients is 50. Despite rural population, data was similar to reported for European population, but it was different from Mexican population (2). Investigators are creating novel computerized patient-investigator interface for personalized app application.

Conclusion. In pregnant population, applications of smart phone-based apps require additional adjustments and multidisciplinary team-based approach. Despite revealed pitfalls, MyFitnessPal gave accurate food intake for first trimester and might be used as platform for nutritional intervention in pregnancy.

School: School of Medicine

MS3-4 LEE, SHANSHAN

A rare case of rapidly progressive metastatic paraganglioma

Shanshan Lee; Lukman Tijani, MD

Introduction: Paraganglioma is a rare neuroendocrine tumor found in 2 out of a million people annually. It is a benign, slow growing cancer, with 25% of cases associated with hereditary syndromes. It is extra-adrenal tumor arising from sympathetic and parasympathetic paraganglia. Known as the “pharmacologic time bomb,” it can release catecholamines in uncontrolled bursts, causing high blood pressure, stroke, heart attacks, death.

Case: A 31 year old male presented with right-sided abdominal pain, 20lb weight loss in two months, bilateral leg weakness, and bowel retention. Pelvic CT and lumbar spine MRI showed a kidney mass on the psoas muscle and a paraspinal mass at T10 with vertebral invasion, cord impingement, and compression fracture. Neurosurgery performed a laminectomy with tumor resection from T9-T11; pathology came back as paraganglioma. He completed radiation therapy with Temodar. Last xray of the thoracic and lumbar spine showed no acute findings and he was lost to follow-up.

Four months later, he presented with left arm numbness and tingling, left facial and neck paresthesia. CT chest showed diffuse pulmonary and osseous metastasis with pathologic compression fracture deformity from T10-T12. CT abdomen, pelvis, head, and spine showed extensive metastasis involving the liver and lung; C6, C7; L3, L4, L5 with mass effect on cauda equina; S1, S2, bilateral ilium, paraspinal muscles extending into the lumbar spine and epidural space. Three weeks later he developed tachycardia, bilateral lower leg pain with decreased strength and limited range of motion on the right. He started palliative chemotherapy with Temodar and Capecitabine as the extent of metastasis made surgery unfeasible.

Conclusion: Histopathologically, it is impossible to tell if the paraganglioma is benign or malignant; metastasis is the only definitive sign of malignancy. Thus adequate completion of therapy and close follow-up afterward are vital in monitoring for recurrence and metastasis.

School: School of Medicine

MS3-4 LIN, CHRISTINE

Plasma Rich Protein as a Novel Therapy for Lipedematous Alopecia in a Hispanic Female

Christine P. Lin, BA, Jeannie Nguyen, MD, Michelle Tarbox, MD

BACKGROUND: Lipedematous alopecia (LA) is a rare, nonscarring alopecia that manifests with increased thickness of the subcutaneous fat layer in the scalp. Etiology of LA is unknown but has been predominantly described in women of color and may be present simultaneously with an inflammatory alopecia. Exam reveals a thickened, boggy scalp, usually favoring the vertex or occipital scalp. Currently, there are no guidelines that exist for the treatment of LA. In general, the literature has shown platelet rich plasma (PRP) to be a valuable therapeutic option for other types of alopecias. Thus, we decided to undertake a trial of PRP as a treatment option for our patient with LA. To our knowledge, we report the first known case of LA with good therapeutic response to PRP.

CASE: A 44-year-old Hispanic female presented with a thickened, boggy frontal and vertex scalp for many years. The patient endorsed scalp pruritus, burning, and tenderness with pressure. Ultrasound imaging and a biopsy showed findings consistent with LA. Throughout the next 6 years, she was recalcitrant to several antibiotics, several injections of intralesional triamcinolone, clobetasol solution, tazarotene gel, and finasteride. The patient subsequently opted to undertake a trial of PRP. She has undergone 6 injections of PRP to date with significant improvement clinically and on post-procedural ultrasound and biopsy.

CONCLUSION: Therapeutic prognosis for LA has thus far been demonstrated to be poor as topical and intralesional steroids, surgery, and systemic therapies have shown minimal or no improvement in reported cases. However, PRP acts on growth factors required for the survival of hair follicle-keratinocytes and has been successful in the treatment of conditions such as androgenic alopecia, alopecia areata, and cicatricial alopecia. PRP is a modality that warrants consideration in the treatment of LA.

School: School of Medicine

MS3-4 LLOYD, NATHAN

An Anomalous Case of Profound Mixed Hearing Loss in an Older Child

Nathan Lloyd, Joshua Demke MD

Hearing loss can be classified as conductive, sensorineural or mixed. Conductive hearing loss occurs when pathology of the outer or middle ear prevents vibrations from reaching the round window. Sensorineural hearing loss occurs when damage or disease directly affects the cochlea and/or the Vestibulocochlear nerve. Mixed hearing loss occurs when both conductive and sensorineural hearing are affected simultaneously.

A 10-year-old patient was referred to our service for evaluation of hearing loss following a traumatic brain injury (TBI). Initial imaging in the emergency department revealed an acute subdural hematoma in the left posterior fossa with left cerebellar hemispheric hemorrhage, cerebral edema, a left temporal bone fracture with external auditory canal displacement and left transverse parenchymal hemorrhage. Active bleeding from the left ear was appreciated on initial physical exam.

One month later, the patient presented with persistent hearing loss, tinnitus, ear pain and ear discharge in the left ear. In-office exam of the left tympanic membrane (TM) was difficult. Pure tone audiometry demonstrated profound mixed hearing loss and tympanometry demonstrated reduced TM compliance with possible effusion.

On Exam under anesthesia (EOA), the patient was found to have an atretic canal without an acquired scar. The lack of acquired scar suggests that the atresia was congenital. To better characterize the degree of deformity in this patient, we elected to image the temporal bone. Computed tomography (CT) demonstrated stenosis and deformity of the bony portion of the external auditory canal as well as soft tissue density in the hypotympanum and mastoid air cells.

Synthesizing the findings of the patient's history, EOA, and CT, it was determined that the cause of the conductive hearing loss was likely the previously undiagnosed congenitally atretic bony portion of the external auditory canal. The cause of the sensorineural hearing loss is presumed to be the patient's TBI.

School: School of Medicine

MS3-4 MANIAM, GANESH

Current Hypotheses of Granuloma Annulare Pathogenesis: A Case Report

Ganesh Maniam, MSIII; Dr. Jack Waller, MD

Introduction: Granuloma annulare is a rare dermatopathology that is idiopathic and generally asymptomatic aside from mild pruritis. This case presents an uncommon case of granuloma annulare with a discussion of differential diagnosis, risk factors, pathogenesis hypothesis, as well as the lesions for physicians.

Case Report: A 65-year-old female presented for a routine visit but was mildly concerned about a new rash on her arm. She had no other symptoms, and the rash had been misdiagnosed as nummular eczema and treated with triamcinolone cream. Upon gross examination and biopsy, the lesion was instead determined to be granuloma annulare. The patient was referred to outpatient dermatology for removal.

Discussion: Granuloma annulare is an idiopathic skin lesion disorder that most commonly presents as a localized plaque with raised borders, typically the upper & lower extremities. The etiology of the disease is yet unknown, though the risk factors have been well-identified: predisposing factors include family history, female sex, young age, diabetes mellitus, thyroid disease, HIV, and tuberculosis; environmental exposures include local trauma, tattoos, and animal bites. Several proposed mechanisms have been suggested by the literature including hypersensitivity reactions, defective neutrophil chemotaxis, and macrophage damage. The disease is often self-limiting, but patients may desire treatment when it persists. First-line treatment includes intralesional injections of triamcinolone, while other options include phototherapy, cryotherapy, and saline injections.

Conclusion: Successful treatment of rare dermatopathology requires exclusion of common mimics and the correct diagnosis. Granuloma annulare is one such disease that is often misdiagnosed due to its relative rarity. In the case of granuloma annulare, evaluation by a trained dermatologist is typically warranted – biopsy of the lesion is the gold standard diagnostic method for such presentations.

School: School of Medicine

MS3-4 MAVEDDAT, ASHLEY

Acute Lung Injury Secondary to Inhalation of Toxic Compounds

Ashley Maveddat, Trisha Modi, Santhosh Koshy, MD, Swagat Parajulee, MD

Background: The use of electronic-cigarettes (e-cigarettes) has resulted in increased vulnerability to pneumonia in the young population. The most dreaded presentation of life-threatening e-cigarette associated lipoid pneumonia involves a decline in clinical status with acute lung injury presenting as hypoxemia with pulse oximetry $\leq 90\%$ on room air, WBC count, bilateral lung infiltrates on CXR with bronchoalveolar lavage showing lipid-laden macrophages. Epidemiologically, it is found in a young adult aged 18-35 clinically experiencing tachypnea, increased work of breathing, nausea, vomiting, fever, and a history of extensive use of marijuana oils or concentrates found in e-cigarettes, which can possibly lead to an even more rapid progression of lung damage when compared to other toxins like cigarettes.

Case: A 31-year-old female, with a significant 3-year history of e-cigarette use, presented to the ER with symptoms of worsening dyspnea, pleuritic chest pain, non-productive dry cough, vomiting, subjective fever, and a 15 lb weight loss over a two-week period. She was afebrile during admission though her respiratory status significantly fluctuated. She gave a 3-year history of heavy vaping and 11 year history of smoking nicotine. CT showed bilateral interstitial, alveolar infiltrates and normal WBC count on admission. She was initially treated for community acquired pneumonia with IV Ceftriazone/Azithromycin. Despite antibiotics, her clinical condition worsened during the initial 2 days with significant neutrophil leukocytosis and worsening hypoxemia with increasing need of supplemental oxygen. In view of the possibility of vaping induced pneumonitis, she was managed conservatively with bronchodilators and respiratory toilet. She showed clinical improvement on the 5th day with improving oxygenation and decreasing WBC count. This case highlights the severity of the decline in lung function of a young patient with pneumonia after the recent heavy use of e-cigarettes.

School: School of Medicine

MS3-4 MODI, TRISHA

Delirium Due to Polypharmacy in a Psychiatric Patient

Trisha Modi, Simon Choi

Introduction: Delirium presents with disturbances in attention and awareness, can develop acutely and fluctuate in severity, and must be diagnosed after all other medical causes have been ruled out. When present in a patient with a significant psychiatric history, diagnosis and treatment may be delayed or missed.

Case Presentation: A 57-year-old female nursing home resident with a past medical history of bipolar 1 disorder presented to the ED in acute psychosis with paranoid delusions and response to internal stimuli. History was notable for a suicide attempt in her 20s and a benzodiazepine overdose 6 days prior to this admission. Her current medication list indicated polypharmacy to control her bipolar I disorder, insomnia, seizures, hypertension, and chronic pain. Upon admission for her psychosis, laboratory studies showed: normal TSH, low free T4, hyponatremia (96mEq/L), hypochloremia (133 mEq/L), and elevated BUN (21 mg/dL). A urine drug screen was positive for opiates. Per biopsychosocial formulation, precipitating factors include amitriptyline initiation 4 weeks prior to admission and insomnia due to the recent loss of family members. Perpetuating factors include polypharmacy, while protective factors include no suicide attempts in over 30 years. All psychotropics were held. On day 2, the patient had no pressured speech and a normal mental status exam. On day 3, she deteriorated with complete metabolic panel indicating marked hyponatremia (125 mEq/L) and hypochloremia (93 mEq/L), though her blood and urine cultures remained negative.

Discussion: This case highlights a delay in the treatment of delirium in a patient with a significant psychiatric history. The patient's delirium was likely due to anticholinergic toxicity with polypharmacy. Bipolar mania can be diagnosed only if all delirium criteria are not met. She maintained good mental status and electrolyte balance with better management of anticholinergic and hypertensive medications.

School: School of Medicine

MS3-4 MORENO, TANIR

Accuracy of Reporting Estimated Blood Loss in Open Repair of Pelvic and Acetabular Fractures

Tanir Moreno, BS; Samudani Dhanasekara PhD; Nicole Van Spronsen, BS; Caroline Chung, BS; Cyrus Caroom, MD; Robyn Richmond, MD; Ariel Santos, MD

Background: Pelvic injuries are frequent after blunt trauma, and the mortality rate of patients with pelvic ring fractures is approximately 6%. In addition, surgeries to repair pelvic and acetabular fractures often results in high blood loss. The aim of this study is to evaluate the reported intraoperative blood loss (RBL) as compared to the total calculated perioperative blood loss using the Gross Method of estimated blood loss (EBL).

Methods: A cohort study was conducted at a Level 1 trauma center. The population studied were patients requiring acetabular fracture repair and/or open repair of pelvic fracture between ages 18 to 89 years old from 3/1/2017 to 2/28/2019. RBL was taken from the anesthesiology reports in each case. EBL was calculated using the Gross Method using the preoperative and 2-3 days postoperative hematocrit values. All statistical analyses were conducted using R statistical software. Medians and inter-quartile ranges were used to summarize variables and a two-sample Wilcoxon signed rank test was performed to compare the group medians, considering-values less than 0.05 as significant. The agreement and reproducibility of RBL and EBL were examined by calculating concordance correlation coefficients (CCC) via a bootstrap approach employing 50 iterations and Bland-Altman plots using the agRee and blandr packages in R statistical software.

Results: RBL was significantly under-reported as compared to EBL ($\Delta = -1691.981$ ml, $W = 2277$, $p = < 0.001$). The Bland-Altman plot showed a consistent under-reporting in RBL with regard to EBL. The CCC between RBL and EBL was 0.035 [-0.016, 0.089] and was not significantly different from zero. Hence, there is poor agreement between the two methods.

Conclusions: Reporting of intraoperative blood loss correlates poorly with total perioperative blood loss estimations using calculations. Findings suggest that intraoperative blood loss is only a small contribution to overall blood loss.

School: School of Medicine

MS3-4 MUELLER, KARL

A Case of a Patient with a Mediastinal Mass, an Important Association with Hyperthyroidism

Karl Mueller, Ana Rivas-Mejia

Thymic hyperplasia is commonly associated with Graves' disease. Because of the potential concern for malignancy, many of these patients have thymectomies without a proper endocrine workup to establish the etiology of the thymic hyperplasia. These benign masses often resolve upon treatment of the underlying hyperthyroidism. Here we report a 64 year old man with untreated hyperthyroidism and positive thyroid stimulating immunoglobulin. The patient's thyroid function tests revealed his Thyroid Stimulating Hormone (TSH) was 0.01 μ Unit/mL and his Thyroxine (T4) was 2.08 ng/dL. The patient was treated with methimazole. Understanding the relationship between hyperthyroidism and thymic hyperplasia is critical to preventing unnecessary procedures in patients with Graves' disease.

School: School of Medicine

MS3-4 NGUYEN, EMILY

Hansen's Disease (Leprosy) in the Texas Panhandle: A Case Series

Emily Nguyen; Ganesh Maniam; John Scott Milton, MD; Jack Waller, MD

Background: Hansen's Disease, or leprosy, is caused by *Mycobacterium leprae*, an acid-fast bacillus that causes significant disease of the skin, peripheral nerves, and eyes. Long-term complications include type 2 erythema nodosum leprosum, neuropathy, and blindness. We report 5 cases of lepromatous leprosy that were treated in West Texas in the last 5 years. These cases demonstrate the diversity of presentation and treatment of leprosy and its complications in the United States.

Case Presentations:

Case 1: A 39-year-old male presented with diffuse nodular rash and lagophthalmos of 8 months. He developed unilateral blindness.

Case 2: A 20-year-old female with a history of previously treated leprosy presented with painful nodular rash and fever that improved with corticosteroids. She developed steroid-induced glaucoma.

Case 3: A 41-year-old male with a history of previously treated leprosy presented with erythematous nodular rash and fever that resolved with thalidomide.

Case 4: A 57-year-old male with a history of previously treated leprosy presented with 6 months of diffuse burning pain that improved with gabapentin and prednisone. He developed avascular necrosis of the femoral head.

Case 5: An 81-year-old male with type II diabetes and a history of armadillo contact presented with diffuse hypopigmented lesions of 18 months.

Discussion: These cases highlight the importance of recognizing complications as well as adverse effects of treatment with long-term corticosteroids. Early diagnosis and judicious treatment are crucial in preventing permanent disability.

School: School of Medicine

MS3-4 OSEMWENGIE, BRADLEY

Alopecia in African Americans: A literature review

Bradley Osemwengie, E.L. Domingo-Johnson, Lance Mwangi, Dr. Anastasia Ruiz, Dr. Steven Berk

Background: Alopecia is broadly defined as hair loss. It has historically been considered a cosmetic condition which means that most insurance companies do not cover the cost of care. This is problematic for those with lower socioeconomic status who either have no health insurance coverage or who cannot afford more expensive plans that could help to augment the cost of treatment. Patients do not see alopecia as a purely cosmetic condition. Hair, especially among the U.S. female population is often associated with attractiveness, fertility, and femininity. If hair loss occurs, it not only detracts from perceived attractiveness, but it has been shown to be associated with a lower quality of life. To address the medical opportunities, the psychosocial barriers, and the ethical dilemmas posed by this literature review and research survey, the medical community must identify a need and solution for disparities in dermatology.

Methods: This literature review and research survey intends to synthesize high quality research evidence. The medical aspect addresses scientific strategies to prevent and treat alopecia specifically in the African American population. The psychosocial goal is designed to ascertain whether there is a knowledge disparity regarding alopecia in individuals from a variety of communities and economic backgrounds. Ethically, the project raises thoughtful questions about whether ethnic and socioeconomic factors should be considered during the educational period of medical school.

Results: A survey was taken of 277 black women and of the 117 that did not seek care from any physician either a primary care provider or a dermatologist 27.35% said it was because they did not know a dermatologist could help with hair loss, 16.23% said it was because they did not believe that a dermatologist could help with their specific hair texture, and 8.55% did not have money, transportation or time to see a physician. Of the patients who did receive care from a dermatologist 34.78% were unsatisfied with their physicians knowledge of African American Hair.

Conclusion: With alopecia in African Americans now gaining recognition, a new issue arises regarding the amount of education

there is about African American skin and hair. Research needs to be conducted to assess the level of knowledge in the medical community about African American skin and hair conditions, and how they ought to be managed. Levels of knowledge about this specific population not only need to be sought out by medical students and practitioners, but they also need to be integrated in the curriculum for these individuals as well.

School: School of Medicine

MS3-4 RAJASEGARAN, ABIRAMI

Pseudo mass of the urinary bladder: A possible developmental variant

Abirami Rajasegaran

A 7-year-old male with history of left hydronephrosis initially presented to a Urology clinic for the evaluation of urinary retention and possible urethritis. The patient had hesitation with voiding but denied urgency, incontinence, or enuresis. The physical exam was unremarkable.

Renal ultrasound showed trace pelviectasis in the left kidney and normal appearance of the right kidney. In addition, multiple images demonstrated a focal area of thickening in the anterior wall of the urinary bladder. Due to concerns of focal cystitis or neoplastic pathology, a repeat ultrasound was done two weeks later, which showed the persistent abnormality in the anterior bladder wall. A subsequent pelvic MRI showed stable size of the mass involving the bladder wall with signal characteristics similar to muscle.

Differential considerations included leiomyoma versus inflammatory pseudotumor versus focal cystitis. At three-month follow-up, no evidence of the mass could be visualized on cystoscopy. Repeat ultrasound showed the stable intramural mass along the superior portion of the urinary bladder.

It was concluded that the structure was unlikely to be malignant or cystic but may potentially represent a urachal remnant. At the most recent one-year follow-up, ultrasonography showed an unchanged or possibly slightly smaller size in comparison to prior ultrasonography. No further urology intervention or management was planned.

Upon completing a review of the literature, it was determined that this mass-like region in the bladder wall had not been extrapolated upon in previous urological and radiological studies. It is unclear whether the mass is a variant of a urachal remnant or the result of another embryological structure during the formation of the hindgut.

School: School of Medicine

MS3-4 ROUSE, MARY

A Case of Erythema Nodosum in Multiple Family Members with Fever of Unknown Origin

K. Higgins MS4*, M. Rouse MS4*, C. Cooper MD, M. Strong MD, R. Lampe MD, J. Wilson MD

*These authors contributed equally to this work

Erythema Nodosum is a rare skin manifestation characterized by tender, erythematous, subcutaneous nodules due to a type IV delayed hypersensitivity. Some of the most common causes in children are bacterial and fungal infections, drug exposure, autoimmune conditions, and malignancy. We report the case of a 9-year-old male who presented with a 10-day history of fever and 4 days of erythematous tender nodules on his shins and forearms. Upon admission, he was febrile but overall well appearing. Laboratory evaluation revealed mild leukocytosis and thrombocytosis with an elevated ESR and CRP. CXR revealed patchy interstitial infiltrates in bilateral perihilar regions despite minimal respiratory symptoms. During admission, he continued to have daily fevers and worsening erythema nodosum. During patient's disease course, his two brothers and mother developed similar symptoms including fever and erythema nodosum, and his father developed fever. Family reported multiple possible infectious exposures that widened the differential to include Mycoplasma, Coccidiomycosis, Histoplasmosis, Tularemia, Yersinia enterocolitica, Tuberculosis, Bartonella, Q fever and Group A strep. Serologies were obtained based upon infectious exposure history and were consistent with a diagnosis of Mycoplasma Pneumonia. With positive mycoplasma IgM on serology, a 5-day course of Azithromycin followed by a

10-day course of Doxycycline were given. Mycoplasma serologies were also obtained from the patient's family, showing an IgM response from the older brother and an IgG response from all other family members. Despite persistent daily fever, patient was stable for discharge on day 17 of illness with close infectious disease follow up. While erythema nodosum alone due to any cause is relatively rare, cases of erythema nodosum in multiple family members simultaneously due to Mycoplasma infection has been rarely documented. We present these cases to highlight a rare presentation of an unusual condition.

School: School of Medicine

MS3-4 SINGH, SIMRAN

Can Variations in Insulin Requirements be an Early Indicator of Sepsis in Burn Patients?

Simran Singh, BS, MBA, Samudani Dhanasekara, MBBS, PhD, Nadia Tello, BS, MBA, Parker Southerland, BS, Adel Alhaj Saleh, MD, Jennifer Kesey, MSN, APRN, FNP-BC, CWS, Sharmila Dissanaiké, MD.

Introduction: Early recognition of sepsis is the key step toward reducing morbidity and mortality in all patients. Burn patients were excluded from most major studies on sepsis because of challenges in identifying sepsis in burn patients due to hypermetabolic state and loss of primary barrier to infection.^{1,2} Hence, there is no clear protocol for early recognition of sepsis in burn patients.³ The hyperglycemia in burn patients is tightly controlled with daily insulin injections or intravenous drip.^{4,5} The American Burn Association (ABA) diagnostic criteria includes an increase in insulin requirement >25% over 24 hours of sepsis as an indication of possible sepsis.⁶ However, the exact time point where the insulin requirement increase is not evident. We aimed to determine if variation in daily insulin requirements is a sensitive early indicator of sepsis.

Methods: A retrospective chart review was performed in non-diabetic burn patients admitted during 2010-2018 with $\geq 20\%$ TBSA who obtained a blood culture for suspected sepsis according to 2007 ABA diagnostic criteria. Absolute insulin requirement at intervals (24, 48, 72, and 96 hours prior to obtaining a blood culture) were analyzed using mixed-effects models accounting for within-patient dependencies using the lmerTest package in R in order to compare insulin requirement for each time point.

Results: Fifty-eight patients were included in the study. When daily insulin requirement was regressed on each time points (24, 48, 72, and 96 hours prior to obtaining a blood culture) in a mixed effects model including 96 hours as the reference category, statistically significant positive effects were observed for 48 and 24 hours ($\beta=22.432$, $SE=11.022$, $t=2.035$, $p=0.0434$ and $\beta=25.943$, $SE=11.022$, $t=2.354$, $p=0.0197$, respectively). The increase in daily insulin requirement at 48 and 24 hours were 32.71% and 37.83%, respectively.

Conclusion: Our results show that the daily insulin requirement increases at 48 hours prior to development of signs of sepsis. Therefore, daily insulin requirement could be a sensitive marker for diagnosis of sepsis in burn patients.

School: School of Medicine

MS3-4 SORENSEN, GRANT

Tube Feeding Through Surgery, Impact on Glucose Control in Burn Patients

Grant Sorensen, MS, PhD, Andrea Hess, Chloe Cooper, Brianna Hope, Landon Hope, Clayton Wagner, MS, Scott O'Banion, PharmD, BCNSP, CNSC, Jennifer Kesey, MSN, RN, FNP-BC, CWS, John Griswold, MD, FACS

Introduction: The hypermetabolic state experienced by burn patients post injury puts nutritional support at the forefront of these patients' care. Enhanced Recovery After Surgery (ERAS) algorithms include a radical approach of feeding patients up to surgery with reported advantages like earlier recovery of GI function, among others. The purpose of this study was to assess perioperative blood glucose (BG) levels in patients fed up to and through surgery at our institution.

Methods: Charts of selected surgical burn patients were reviewed and categorized on the basis of diabetic status and whether they had procedures in which feeds were continued to within four hours of surgery ("fed") and stopped at least four hours prior to surgery ("unfed"). Percent change in pre- and post-op BG levels were compared between groups. Wilcoxon Rank-Sum and Two-Sample testing were used for statistical analyses.

Results: Data collection yielded 32 patients with 106 unfed and 92 fed procedures. There was a significantly larger percent change in BG levels from 24-hr pre-op to 12- and 24-hr post-op in the unfed vs. fed groups across all procedures, prior to grouping based on diabetic status ($p = 0.014$ and $p = 0.009$, respectively). There was a statistically significant difference in the percent change in BG levels from 24-hr pre-op to 12- and 24-hr post-op in the pre-diabetes group ($p = 0.021$ and $p = 0.026$, respectively).

Conclusions: Our data shows better BG control in fed procedures with lower percent change from pre-op to post-op overall, and in the pre-diabetes group. These findings are in line with ERAS literature. Controlling BG ranges post-op is critical to prevent complications and promote healing. Improved BG control using perioperative nutrition could guide practices related to perioperative workup of burn patients. This is worth further investigation since better BG management has been associated with superior patient outcomes.

School: School of Medicine

MS3-4 STEWART, CALEB

Stabbing With a Blunt Object: A Rare Cause of Penetrating Brain Injury

Caleb Stewart, Elmira Ahnood

Penetrating brain injury (PBI) is rare outside of war zones; however, it is still seen in car accident, work-related injuries, suicide attempts, and assault. PBI is potentially life threatening and can have serious short and long-term consequences. Hereby we present a rare case of assault with a round metal knife sharpener. A 28 year old woman was brought to the ER with multiple stab wounds to neck and abdomen, and a retained metal object in her skull. She was then taken to the OR for emergent laparotomy and craniectomy. Patient was discharged on postop day eleven, with motor aphasia and right sided hemiparesis. She made a full recovery of motor function within six months, but still needed to communicate via writing on a pad. This case presents the sequelae of low velocity blunt force penetrating brain injury to the bilateral frontal cortices.

School: School of Medicine

MS3-4 TANGELLA, NIKITA

The progression of tonsillitis to severe thrombophlebitis in a young college student

Ashley Maveddat MS3, Nikita Tangella MS3, Robert Foy MD, Leila Rubio MD, Esther Robbins MD

Background: Lemierre's syndrome is a rare, disguised condition that can be life-threatening if not found or treated properly. This syndrome is defined by a persisting pharyngeal infection, complicated by internal jugular vein thrombosis and septic emboli, most commonly due to *Fusobacterium necrophorum*.¹ The syndrome declined in incidence in the 1960s due to the introduction of antibiotics, with a current incidence rate of 3.6 cases per 1 million.² Because there is a high prevalence of benign pharyngitis in the younger population, the proper diagnosis of Lemierre's syndrome can be difficult, delaying necessary treatment.

Case: A 19- year- old male with no past medical history was admitted for worsening of sore throat, fever, chills, body aches, syncope, hematemesis. On admission, his BP was 97/52 fluid responsive, tachycardic, febrile to 102.4. Vancomycin/Zosyn treatment was initiated. Shortly after admission, the patient was pancytopenic with critical thrombocytopenia s/p platelets transfusion. EGD showed reflux esophagitis and non- bleeding gastric ulcer, FOBT positive. Additional work up including Monospot, Rapid beta strep, Influenza A/B test was negative. After the patient reached euvolemic status, he continued to be febrile with chest pain, dyspnea, and left jaw/neck pain. CT neck showed L peritonsillar abscess with thrombus occluding the inferior portion of the left internal jugular vein. Blood cultures grew *Fusobacterium* spp, confirming the diagnosis of Lemierre syndrome. The patient was switched to Unasyn for effective coverage. On day 7, the patient's respiratory status declined and developed limited ROM of L upper extremity swelling. The U/S of LUE demonstrated superficial thrombus, therapeutic anticoagulation was continued. The patient developed septic pulmonary emboli which led to a large peri- pneumonic effusion. The patient's symptoms improved once U/S guided thoracentesis was performed and appropriate antibiotics were given.

School: School of Medicine

MS3-4 TRAN, TIMOTHY

A Case of Generalized Pustular Psoriasis

Timothy Tran MS, Daniel Baird MD, Brent Austin MD, Ashley Sturgeon MD

Generalized pustular psoriasis is a rare subtype of psoriasis that can present in a variety of clinical manifestations. Of the different classifications of generalized pustular psoriasis, acute generalized pustular psoriasis (AGPP), also known as von Zumbusch psoriasis, is one of the most severe variants and may be fatal without appropriate treatment. This form typically presents as a generalized pustular eruption accompanied with systemic symptoms (i.e. pain, fever, and chills) and lab abnormalities (hypoalbuminemia and hypocalcemia). Because of its varied clinical presentation, it is important rule out Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) from the differential. Here, we present the case of a 72-year-old man presenting to our dermatology consult service for a 2-week history of rash to rule out TEN, ultimately leading to a diagnosis of acute generalized pustular psoriasis.

School: School of Medicine

MS3-4 UMELO, JONATHAN

Unusual Mechanism and Duration of Injury of an Open Lisfranc Fracture and Other Open Foot Fractures in a Professional Bull Rider – A Case Report

Jonathan Umelo, BS; Stephen Sierra, MD; Kevin West, MD; Christopher Lee, BS; Matthew Ferguson, MD

American bull riding is the most dangerous organized spectator sport in the world. Head, shoulder, and knee injuries are the most common, and 36% of injuries to bull riders are considered severe. Fractures are the most common severe injury. While Lisfranc fracture dislocations are somewhat common in elite athletes and generally have minimal effect on career production, open Lisfranc fractures from sport are much less common, with little documentation of recovery and return to elite competition.

Lisfranc fracture dislocations are often the result of high-velocity traumas. In our case, a large bull stepped on the patient's foot during a competitive event, resulting in an open left foot first metatarsophalangeal dislocation and Lisfranc fracture/dislocation along with comminuted fractures of the second through fifth metatarsals and cuboid. This injury is much more severe than the Lisfranc injuries among professional athletes documented in other studies, and therefore the road to recovery and return to competition is notable.

School: School of Medicine

MS3-4 VAN SPRONSEN, NICOLE

Eagle Syndrome: An Atypical Neurological Presentation

Nicole Van Spronsen BS, Rahul Varman MD, Joehassin Cordero MD FACS

Eagle Syndrome occurs in approximately 4% of the population and is commonly asymptomatic. This disease occurs secondary to the elongation of one or both styloid processes, causing symptoms like dysphagia, a clicking sensation when turning the head, headache, otalgia, and other cervical symptoms. Here we present a unique case of a 43-year-old female who presented for ENT evaluation after undergoing bilateral carotid artery stent placement and treatment for a left frontal lobe stroke who subsequently developed otalgia and a clicking sensation when turning her head. The CT obtained upon her initial presentation for stroke symptoms was re-evaluated and noted to have bilateral elongated styloid processes. Although an atypical presentation, due to the elongated styloid processes and the patient's active symptoms, it was decided that the benefits of an exploratory surgery were warranted in order to evaluate the potential need of styloidectomy. The patient subsequently underwent styloidectomy on both sides which led to relief of her ongoing symptoms. The neurological findings of this patient upon initial presentation are atypical for the classic case of Eagle Syndrome. Although our treatment plan and surgical approach is not novel, we believe that this unique presentation is of benefit to the further understanding and work up of Eagle Syndrome. In conclusion, we deem it appropriate to consider Eagle Syndrome in the differential in a patient presenting with obstructive or stenotic carotid pathology.

School: School of Medicine

MS3-4 WALTERSCHEID, BROOKE

Atypical presentation of histiocytoid Sweet's Syndrome

Walterscheid, Brooke, Eshak M.D., Nouran, Tarbox M.D., Michelle

Sweet syndrome, a neutrophilic dermatosis, is a dermatologic condition characterized by a neutrophilic accumulation in the dermis. Its etiology is often idiopathic, though it is linked to underlying malignancy, allergies, and inflammatory and autoimmune disorders. Women ages 30-50 are the dominant demographic. Typical features include tender papules and nodules on the extremities, face, and neck in addition to fever, myalgia, and arthralgia.

We present an atypical case of Sweet syndrome, in which a 71-year-old female was initially transferred to our service with concern for Stevens-Johnson syndrome (SJS) secondary to Plavix administration after stent placement. Pruritis, diffuse joint pain, and erythematous conjunctiva were notable additional symptoms. Relevant past medical history included rheumatoid arthritis, end-stage renal disease on hemodialysis, coronary artery disease, hypertension, hypothyroidism, hyperlipidemia, and type II diabetes mellitus. On physical examination, tender hemorrhagic bullae were demonstrated on the patient's extremities and at the base of the tongue, however, there was no skin desquamation, reducing the likelihood that this was SJS. Dermatology was then consulted, with bullous drug eruption and bullous pemphigoid leading the differential diagnosis based on physical findings. Initial biopsy suggested medium vessel vasculitis, though p and c-ANCA were negative. Over the course of the patient's hospital stay, new lesions continued to develop on the upper extremities. A second punch biopsy was consistent with a diffuse neutrophilic dermatosis, specifically a rare variant called histiocytoid Sweet's syndrome which shows an inflammatory infiltrate of histiocytoid mononuclear cells. This variant is seen in patients with hematologic disease, malignancy, and autoimmune disorders, thus the patient's history of rheumatoid arthritis was likely a factor. The bullous lesions began to improve with administration of high-dose prednisone.

School: School of Medicine

MS3-4 WILKERSON, HANNAH

An Adult Patient with Human Herpesvirus 6 Meningitis

Ganesh Maniam, MSIII; Hannah Wilkerson, MSIII; Dr. Scott Milton, MD

Introduction: Human herpesvirus 6 (HHV-6) is a common herpesvirus, which most individuals have been subclinically infected with in their childhood. However, this paper presents a rare case of HHV-6 meningitis in an adult patient.

Case Report: : A 62-year-old female presented to the hospital with status epilepticus and altered mental status, including visual hallucinations. An EEG showed significant abnormalities suggesting temporal lobe seizure activity, which resolved with administration of antiepileptics, but was followed by a postictal coma. An MRI and cardiac testing were both negative. A lumbar puncture revealed pleocytosis and PCR tested positive for only HHV-6. Patient was therefore started on IV ganciclovir, and then gradually emerged from her coma by day 14 of inpatient ganciclovir.

Discussion: It is certainly appropriate to question the validity of HHV-6 testing in this case, but a study of HHV-6 diagnostic assays found that PCR detection of the viral DNA was 92% sensitive. However, since chromosomally integrated viral DNA (ciHHV-6) is present in 1% of the population, specific tests are needed to differentiate between ciHHV-6 and true HHV-6 meningitis - but these tests are not routinely available at most hospitals. Therefore, diagnosing HHV-6 meningitis requires that clinicians must instead rely on their test results in the context of the clinical picture.

Conclusion: Successful recognition and treatment of HHV-6 meningitis requires exclusion of more common viral etiologies. In this specific case, the test was performed twice on our patient and found to be positive both times for HHV-6 while negative for any other viral etiologies; this evidence, along with the marked clinical improvement upon administration of ganciclovir to the patient, supports the diagnosis of HHV-6 meningitis. In cases of viral meningitis in which the causative agent is unclear, it is important to keep rare causes such as HHV-6 on the differential.

School: School of Medicine

MS3-4 WRIGHT, KANDIS

Multi-color immunophenotyping of M1 and M2 polarized macrophages and monocytes in primary mouse tissue that has vast application in mouse models including transplantation

Kandis Wright PhD, Brian Reilly PhD, Gurbinder Kaur PhD, and Jannette Dufour PhD

Flow cytometry (FCM) immunophenotyping, is an important tool in biomedical research to study diseases, discover treatments, and develop panels that could be utilized clinically to diagnose, prognose, and monitor diseases such as hematological neoplasms, immunodeficiency, and organ transplantation. However, developing FCM panels in mouse models is difficult, especially when analyzing rare immune populations including macrophages (MOs). MOs are large phagocytic cells critical in innate immunity that are polarized as M1 pro-inflammatory or M2 anti-inflammatory. They are important in chronic diseases such as atherosclerosis, asthma, rheumatoid arthritis, and organ transplantation. Thus, in this study we developed a FCM panel characterizing M1 and M2 mouse MOs that applies to many primary mouse models including our transplantation model. First, primary mouse peritoneal and bone marrow MOs were isolated, polarized as M1 or M2 in vitro, and the corresponding FCM antibodies were titrated and voltages optimized. Briefly, we gated on single cells, followed by live cells (excluding dead cells, T-cells, dendritic cells, B-cells, granulocytes) and then MOs which were further gated as M1 and M2 MOs and monocytes. Of the M1 only population, there were 50.83% iNOS+CD38+M1 MOs. Of the M2 only population, there were 40.10% CD206+Arg-1+ M2 MOs and 59.44% CD206+Arg-1- M2 MOs. Finally, when M1 and M2 MOs were mixed and identified, it resembled a similar profile to that of either M1 or M2 MO populations alone, indicating that the panel can correctly identify M1 and M2 MOs from a mixed population. Therefore, this panel was used to characterize M1 and M2 MOs in mouse spleens, lymph nodes, peritoneum, blood, and transplanted grafts to analyze innate immune responses generated post transplantation. Based on these data, this panel can be utilized in all types of mouse models to analyze primary M1 and M2 MO populations and will improve studies of diseases in which MOs play crucial roles.

School: School of Medicine

SCHOOL OF NURSING

NURSE SAMREEN ALI & GABRIELA PETROZZI

BRCA Gene and Breast Cancer

School: School of Nursing

NURSE ELANA SHERWOOD & JANELLE CALLOWAY

Best Practice: Adolescent Substance Abuse Disorder

School: School of Nursing

NURSE MICHELLE KUTCHA BSN, RN & SHANDRAE RUNNELLS BSN, RN

Treatment of Adolescents with Traumatic Brain Injury

School: School of Nursing

NURSE ASHLEY JAMES, BSN, RN & JULIE VEREEN, BSN, RN

Implantable Cardioverter Defibrillators: Their Impact on Quality of Life

School: School of Nursing

NURSE ALEXANDRIA SMITH & CANDACE FLORES

Preventing UTI's in Patients with Long Term Indwelling Urinary Catheters

School: School of Nursing

NURSE CLAIRE CHAMPION & JACQUELINE SWINEY

Appraising the Evidence: Cargiver Fatigue

School: School of Nursing

NURSE KENIA MARTINEZ-FLORES & SANDRA AREVALO

Management of Increased Intracranial Pressures Hypertonic Saline vs Mannitol

School: School of Nursing

NURSE MATT ELLIS & TROY FAULKNER

Corneal Abrasion Management Guidelines

School: School of Nursing

NURSE AUTUMN KAINES, MACKENZI LAIN, KEVIN BARKER, LAUREN BROWN, & MIRANDA COCHRAN

Pneumothorax

School: School of Nursing

NURSE DANIELLE ARGUELLO, TIFFANY ELDER, & LAURA LOZANO

Preoperative Education Decrease Anxiety

School: School of Nursing

NURSE MARY KATHERINE RICHEY, JOSHUA SMOTHERMON, & ERICA WALKER

Treatment of Infants with Community Acquired Pnewumonia

School: School of Nursing

NURSE ANGELA LETBETTER & BRITTA MAXWELL

Presenting Symptoms and Myocardial Infarction Mortality

School: School of Nursing

NURSE AUDRA ELLIS & TIFFANY JACKSON

Treating Depression in Perimenopause: Hormone Therapy, SSRI or Both?

School: School of Nursing

NURSE SCOTT MCCARTY BSN, RN & CHRISTOPHER C. MARTIN, BSN, RN

Triple Therapy vs. Monotherapy - Emphysema

School: School of Nursing

RESIDENTS & CLINICAL FELLOWS

R&CF BOOTHE, WILLIAM

Massive facial hyperkeratosis resembling severe ichthyosis diagnosed as seborrheic dermatitis

William Boothe

79 year old presents with a history of an asymptomatic scaly eruption on face for 4 years. She denies other symptoms such as fatigue, lymphadenopathy, night sweats, bloody stool, or other malignancy related symptoms, but has recently had a 7 pound weight loss in 6 months. Physical exam revealed a confluent 1 cm thick brown hyperkeratotic scale involving the entire forehead, nose, and medial cheeks. Punch biopsy of the left cheek showed massive hyperkeratosis along with numerous budding yeast forms within the stratum corneum. Given these budding yeast forms, she was diagnosed with hyperkeratotic seborrheic dermatitis. She has refused all lab tests and work-up for internal malignancy. Treatment with weekly diflucan 150mg and ketoconazole shampoo 2x weekly, along with 20% urea cream resulted in marked improvement within two months.

School: Texas Tech University Health Sciences Center

R&CF COOPER, CLAIRE

Putting the Pieces Together: A Teenager with Unexplained Weight Loss

Blayne Street, DO; Claire Cooper, MD; Andres Ruiz, MD; Alexandra Townes, MD

A 13 year old male presented to the ED with vomiting and 15 pound weight loss over the past 18 months. He reported frequent panic attacks, and night sweats. He denied intentional emesis or body dysmorphia, however per family's report he had been exercising more and seemed to be dieting. On exam, patient was found to be febrile, hypertensive, tachycardic with bounding pulses and new murmur. Work-up included full HEADSS assessment, CBC with differential, CMP, blood culture, urinalysis, thyroid studies, urine metanephrines, MRI, echocardiogram, and electrocardiogram. Work-up was negative except for elevated urine norepinephrine and VMA, and MRI showing suprarenal mass, confirming the diagnosis of pheochromocytoma.

Pheochromocytomas arise from the adrenal gland and secrete catecholamines (epinephrine and norepinephrine) which can cause hypertension, weight loss, headaches, and sweating among other symptoms. These tumors are relatively rare, occurring in 2-5 people per million, and only 10% of cases occur in children. Pediatric cases are more likely to be hereditary, and are associated with certain genetic syndromes such as, but not limited to, neurofibromatosis type 1, multiple endocrine neoplasia type 2 or Von Hippel-Lindau disease. Our case highlights the importance of clinical findings being combined with laboratory and imaging findings for the early and appropriate diagnosis of a rare tumor despite confounding findings.

School: Texas Tech University Health Sciences Center

R&CF COX, BRITTANY

B-cell acute lymphoblastic leukemia presenting with focal lytic lesions and initially normal blood counts

Brittany Cox MD; Chibuzo O'Suoji MD

A relatively common presentation of acute leukemia in the pediatric population is a limping child. Given the typical range of conditions that present with limping and/or hip pain, leukemia is often a diagnosis that is delayed. We present the case of a 15-year-old male who was ultimately diagnosed with B-cell acute lymphoblastic leukemia after months of hip pain, limping and several visits to the emergency room with predominantly normal blood counts and multiple normal x-rays.

During two separate presentations to the emergency department he was imaged via x-ray and no acute findings were noted. The patient was diagnosed with hip strain both times, as he is an avid basketball player and advised to manage the pain conservatively at home. It was not until an MRI was done at the third ED visit (due to his persistent pain despite normal x-rays) that focal lytic bone lesions were revealed and led physicians to broaden the differential to an oncological process.

The radiographic finding of lytic bone lesions in acute leukemia is frequently accompanied by other laboratory abnormalities, most commonly hypercalcemia; however, our patient's laboratory values were within normal limits with the exception of a mild normocytic anemia. In patients with bone pain as a primary presenting feature, blood counts are often within normal or close to normal limits and the time from initial symptoms to diagnosis can take two weeks longer or more. In the present case, bone marrow biopsy was hypercellular with 21% blasts. Further cytogenetic and chromosomal studies revealed a translocation t(1:19), consistent with leukemia.

This case demonstrates that early differentials should be broad. Providers are reminded that persistent pain despite an initially normal evaluation should continue to be investigated for new findings that might aid in diagnosis.

School: Texas Tech University Health Sciences Center

R&CF COX, CAMERON

Elevated Hemoglobin A1c Is Not Associated with Risk of Postoperative Complications in Elective Hand and Upper Extremity Surgery

Cameron Cox, BBA; Stephen Sierra, MD; Alec Egan, BS; Desirae McKee, MD

Background: Studies addressing the utility of hemoglobin A1c (HbA1c) levels in predicting surgical complications have reported mixed results. In practice, many surgeons use traditional HbA1c cutoffs to determine a patient's eligibility for elective surgery. The literature is especially limited in evaluating HbA1c as a risk factor in elective hand and upper extremity surgery.

Questions/Purposes: This study aims to evaluate the association of elevated HbA1c levels with risk of postoperative complications in elective hand and upper extremity surgery.

Patients and Methods: We performed a chart review of patients who underwent these elective operations performed by a single surgeon at a single institution. The outcomes of 930 surgeries were collected, 334 of which had pre or postoperative HbA1c levels recorded. All 930 surgeries were reviewed for association between diabetes mellitus (DM) and complication rates.

Results: Subsequent analysis revealed no significant correlation of elevated HbA1c levels or DM with increased risk of postoperative complications.

Conclusions: Glycemic control is not significantly associated with increased risk of complications in elective hand and upper extremity surgery. HbA1c should be included as one element of the surgical preparedness algorithm, rather than an independent disqualifying factor.

School: Texas Tech University Health Sciences Center

R&CF DANIELE, CHRISTOPHER

Novel origin of cerebral phaeohyphomycosis: A case report

Christopher Daniele, Miriam Ferguson, Cooper Phillips, Jinesh Lachmansingh, Jacob Nichols, John Fisher, Brady Holstead, Akwasi Opoku

Cerebral phaeohyphomycosis is infection of the central nervous system (CNS) by dematiaceous fungi. Most common mechanisms of infection are by direct extension via the paranasal sinuses or hematogenous spread. The mortality rate is high and ranges from 50%-79% in the limited studies on this topic. Our case describes a young man without any preexisting disease who acquired cerebral phaeohyphomycosis following nasal inhalation of garden mushrooms. Despite aggressive therapies, he ultimately died due to this severe infection. Our case report discusses our treatment approach and the results of our literature review of this deadly infection.

School: Texas Tech University Health Sciences Center

R&CF HAMDI, ANAS

A case series suggesting a novel association between Methamphetamine use associated with neurogenic bladder.

Anas Hamdi, MD, James Cammack, MD

Urinary retention is a common urological presentation, due to bladder outlet obstruction or neurogenic bladder in majority of cases. We present a series of cases that suggests a novel association between methamphetamine use and neurogenic bladder. Our case reports include patients that presented with acute urinary retention and documented methamphetamine use without other identifiable etiology for urinary retention.

School: Texas Tech University Health Sciences Center

R&CF KUMAR, MANISH

A phone survey of no-shows in an urban psychiatric outpatient clinic

Wakefield, Sarah M.D1, Dr. Sullivan Zachary D.O1., Kumar, Manish M.D1., Daren Fred, Ruiz, Anastasia M.D., Bayazit Huseyin, M.D, Baronia Regina

Department of Psychiatry

Objective: To Investigate the potential factors that influence non-compliance of psychiatric out-patient appointments in an urban health care setting.

Introduction: Failure to appear to an initial appointment is common occurrence for most clinics, which poses significant barrier to consistent and effective mental health treatment. Patients with many no-shows have a two-to-three times fold increase in the rate of psychiatric readmissions to the hospital (Koch & Gillis, 1991). It has been hypothesized that common factors listed in survey questionnaire are more likely reasons for no-shows. The study was conducted to identify the reasons and factors contributing towards not showing up on the initial appointment at an outpatient psychiatry clinic.

Methods: The study was conducted at the university based resident run outpatient psychiatry clinic. A total of 100 subjects were called out with in month of no-shows and only 30 subjects participated in the survey. Study participants were 16 males and 14 females from ages 3 to 77 years, who did not show up on their initial scheduled appointments. Patients were called using “structured phone interview” to find out the reasons for not utilizing the psychiatric outpatient services. Data analysis was carried out using descriptive statistics in form of tables and graphs.

Results: A total of eleven subjects, 36.7 % reporting dependence on family and friends for their appointment compliance. Of the total thirty participants, ten subjects, 33.3% subjects reported that they forgot about their appointments or overslept on day of appointments. Another seven subjects, 23.3% reporting transportation as one the major contributors for missing their scheduled appointments. A total of eleven participants, 36.7% reporting medical co-morbidities at time of phone survey, however only one subject was too sick to come for appointment Twenty-six, 86.6% subjects reported that they had full access to healthcare insurance at time of scheduled appointment.

Conclusion: The study suggested transportation, dependence on family or friends, forgetfulness and lack of effective communications between providers and patients were some of the common reasons for patients to miss out their initial appointments. Based on the findings the Authors have several recommendations to improve the no-show rates- improved public transport services or insurance aided transportation especially in vicinity of mental health clinics; use of auto-generated reminders in form of text messages or phone calls prior to scheduled appointments; and effective communication between providers to help reduce the number of “no-shows” at the mental health clinics.

School: Texas Tech University Health Sciences Center

R&CF LOVELESS-HOFFMAN, KELSEA

Expanding the Longevity of Exclusively Breastfed Infants at the 2 Week Well Visit

Sonia Durham MD, Kelsea Loveless-Hoffman MD, Lisa Pomeroy MD, Brian Pomeroy MD, Kirsten Robinson MD

Background: Although the benefits of breastfeeding during infancy are well documented, many mothers who start breastfeeding in the newborn period have often started supplementing with formula or stopped breastfeeding all together by the time the infant is evaluated at their 2 week exam. Our aim was to increase the rate of exclusively breastfed infants evaluated at the 2 week well baby exam by 15% over the span of 6 months.

Methods: The study was aimed at patients delivered at University Medical Center, without a NICU stay, attended a UMC weight check, and had their 2 week newborn visit at the pediatric continuity of care clinic. Interventions consisted of (1) a visual depiction of newborn stomach size at 1 and 3 days, 1 week, and 1 month of life, (2) handout detailing ways family members could assist the breastfeeding mother, (3) standardized weight check template residents to go through with each mother, and 4) teaching session for residents by a certified lactation counselor. Data was collected from patients through chart review at the 2 week visit for each intervention cycle. Outcomes that were assessed included those that were exclusively breastfeeding or continued breastfeeding.

Results: Baseline data showed an average rate of exclusive breastfeeding at the 2 week visit was about 41%, following four interventions this increased to 69%. Significantly, special cause variation was seen in the rate of overall breastfeeding in conjunction

with formula feeding following the four interventions.

Conclusion: The compounding effect of all interventions in the nursery setting seemed to make the most profound difference in continuation of overall and exclusive breastfeeding at the two week visit, employing visual and auditory forms of learning. The education provided appeared to be most effective by targeting all involved family members in addition to the physicians that were providing the education.

School: Texas Tech University Health Sciences Center

R&CF METZLER, SHANE

Testosterone Replacement Can Send You to the Cath Lab

Shane Metzler, MD, Mohamed Elmassry, MD, John Kelley, Ty Whisenant, MD, Drew Payne, MD

Introduction: Testosterone causing slow flow in the coronary arteries is not well documented. Testosterone increases hematocrit, which is associated with an increase in blood viscosity. Testosterone can increase hematocrit by several methods including setting a new erythropoietin set point and stimulating the bone marrow. Coronary slow flow is where the blood in the coronary arteries takes more time to move in the absence of significant coronary stenosis.

Case Summary: A middle-aged man with past medical history of low testosterone came in because of a headache he has had for days. He had diarrhea for a few days and woke up with chest pain in the morning that lasted a few minutes, no radiation, and pressure like but no longer has chest pain. The chest pain was associated with diaphoresis. His blood pressure on admission was 146/93. EKG showed J-point elevation in precordial leads and III but no acute ischemia.. The troponin was 60.1 on admission and went to 129.6 in about 11 hours. The hematocrit was 55.3. The patient was started on 150 ml/hr NS. The patient had a coronary artery angiogram performed the next day and it showed slow flow diffusely and no coronary artery disease. The patient was diagnosed with coronary low flow and hyper viscosity was suspected. Hematocrit improved to 50.5 so no phlebotomy was performed. Testosterone was measured a month later after being off testosterone for about 6 weeks and was 5.32 and erythropoietin was 2.9. The patient was amphetamine and benzodiazepine positive.

Discussion: Frequent phlebotomies may have helped avoid this complication of testosterone replacement. An undiagnosed disease such as sleep apnea could have contributed to the elevated hemoglobin.

Conclusion: Coronary slow flow due to testosterone replacement needs to be investigated further.

School: Texas Tech University Health Sciences Center

R&CF MILAD, MOHEB

Improving Hypertension Identification Rates in Outpatient Pediatric Clinical Setting

Moheb Milad, MD

Introduction: The American Academy of Pediatrics (AAP) released a clinical practice guideline in 2017 which cited the prevalence of HTN at 2-4% in children and adolescents and prehypertension prevalence at 14.8%. The AAP guideline also provides cutoff blood pressures which require further evaluation based on the child's age in years. In the pediatric outpatient setting blood pressures are typically done on all children at or above the age of 3. However, pediatric hypertension is routinely not addressed in any way by the primary care physicians in the documentation.

Design: Project designed to address the key drivers behind the issue of documentation of hypertension in the pediatric outpatient setting. We focused on the key drivers of increasing provider education, ease of reference and multidisciplinary communication and designed interventions with the goal of increasing documentation of hypertension in pediatric population ages 3-18 in outpatient setting by 20% in 3 months.

Methods: Team utilized Powerchart to review the vital signs of all patients above the age of 3 seen in the outpatient setting at the clinical site. If the child's blood pressure met the cutoff for further evaluation (per AAP guideline), child's note was examined to see if the BP was taken note of or addressed in any way. We then examined the percentage of children with elevated BP which had

the issue addressed. Interventions included providing physicians with access to the blood pressure cutoff references. Providing the nursing staff with the same references. Then implementing a mechanism for nursing staff to inform physicians of elevated BPs.

Results: Data collection and interventions are still ongoing. However, initial data collection showed that only about 5% of the charts on patients ages 3-18 with elevated blood pressures had the issue addressed. We are currently in the process of implementing the final interventions and collecting and analyzing the data.

School: Texas Tech University Health Sciences Center

R&CF NGUYEN, JEANNIE

Report of a Case of Onychomycosis secondary to Cryptococcus albidus and a Review of the Literature

Jeannie Nguyen, MD, E. L. Domingo-Johnson, Andres Garcia, MD, Ashley Sturgeon, MD

We report a case of a 33-year-old healthy male with onychomycosis refractory to 2 six-week courses of oral terbinafine, subsequently found to have *Cryptococcus albidus* on nail fungal culture. To our knowledge, this is the first report of *Cryptococcus albidus* causing onychomycosis in an immunocompetent host. In immunocompromised patients *Cryptococcus* accounts for 33-55% of systemic infections and 10-15% of skin infection. The most common pathogen is *Cryptococcus neoformans*. A review of the literature to date shows four cases of onychomycosis secondary to *Cryptococcus* species. These four cases include *Cryptococcus friedmannii*, *Cryptococcus albidus*, *Cryptococcus uniguttulatus*, and *Cryptococcus laurentii*. Of the four cases, three were immunocompromised patients with uncontrolled diabetes mellitus type II including the case due to *Cryptococcus albidus*. Generally, *Cryptococcus albidus* is generally considered a harmless commensal constituent of the human microflora. Our patient had an unremarkable work-up for immunosuppression, and he has responded well to oral itraconazole.

School: Texas Tech University Health Sciences Center

R&CF PATEL, PANNA

The Effects of Osteopathic Manipulative Medicine as an Adjunctive Treatment in Bipolar Patients Struggling with Adequate Sleep

Panna Patel DO, Trisha Modi MSIII

Introduction: In a patient with a significant psychiatric history, it can be difficult to distinguish whether musculoskeletal pain causing poor sleep and irritability can mask the positive effects of psychotropic medications. Osteopathic principles can help focus on manipulating the body physically to aid in medical treatment, by decreasing pain response to evaluate the efficacy of medication management.

Case: A 64-year-old male with a past medical history of bipolar I disorder presented to the ED in an acute manic state after jumping off a bridge. Upon admission for his mania and neck pain, he was started and titrated on risperidone, however, he acutely developed extrapyramidal symptoms. Administration of oral NSAIDs, oral acetaminophen, and transdermal lidocaine patches failed to control the patient's musculoskeletal pain. Over the course of his 6-week hospitalization, trials of multiple psychotropic medications including valproate and olanzapine failed to control his symptoms. During his fourth week of hospitalization, the patient had four osteopathic manipulative medicine (OMM) treatments focusing on soft-tissue manipulation with co-treatment with lithium. This decrease in musculoskeletal pain with subsequent improvements in sleep led to decreased irritability, such that the physicians were able to appropriately assess the efficacy of lithium.

Discussion: Bipolar disorder has an inherent association with high-risk behaviors that can cause musculoskeletal pain, exacerbate symptoms of irritability, and decreased sleep; these factors may all contribute to prolonged hospitalization. In a bipolar patient with acute pain symptoms, OMM can function as an adjunctive treatment for the evaluation of the efficacy of medical therapy.

School: Texas Tech University Health Sciences Center

R&CF ROACH, JENNA

Dermatology Sharps Injuries

Jenna Roach MD, Michelle Tarbox MD

Needle stick injuries are a potential occupational hazard of working in the health care field. However, these injuries come with associated financial and psychosocial issues. Firstly, it is estimated that the cost of a single needle stick injury is \$500-\$4000. Costs include labs and postexposure prophylaxis. Lab testing includes HIV, HBV, and HCV. HIV includes 3 different tests, but some will follow up for a year. HBV and HCV usually test once, at 4 months post exposure. For postexposure prophylaxis of HIV, AZT is usually started within 72 hours of exposure and continued for at least 1 month. For HBV, some patients will be treated with Hep B Ig. Additionally, there is a psychosocial component of needle stick injuries. Since the exposed healthcare worker must be removed from direct patient contact and replaced by someone else while drawing blood, filling out paperwork, and follow up investigation into the patient's records, the exposed healthcare worker can feel that they have done something wrong. This may lead to underreporting of injuries. Also, the exposed worker may feel in a state of anxiety and unrest while waiting for labwork to return to see if they have contracted a life threatening illness. Eliminating sharps injuries is multifactorial and relies in safer devices, safer sharps containers, leadership focus, and safety process adoption.

School: Texas Tech University Health Sciences Center

R&CF RUIZ, ANASTASIA

Not Your Grandma's Marijuana – An Investigation into Cannabis Concentrates

Anastasia Ruiz, MD; Jennifer Phan, BS; Manish Aligeti; Jessica Nelson, MD; Sarah Wakefield, MD.

Use of concentrates is not only concerning due to its high THC potency and its association with adverse physiological effects (Zuurman et al., 2009), “psychological effects; paranoia, anxiety, and hallucinations have been observed in those administered high doses of THC (Sagar, Kelly A. et al., 2018). It is also a concern that impurities find their way into the final BHO product causing toxicity (Raber JC et al, 2015)(Meehan-Atrash J et al, 2017).

In the wide usage of cannabis in patients presenting for psychiatric care, it is important to obtain details of the type of cannabis being used, and to provide information and counseling on the potential dangerous effects of cannabis concentrates.

School: Texas Tech University Health Sciences Center

R&CF SARANGI, ASHISH

Dystonia and Management in Patients with Hypersensitivity to Anticholinergics

Ashish Sarangi MD PGY3, Domingo El-Johnson MS3, Lance Mwangi MS3

Since Dystonia was first coined by Oppenheim in 1911 as “dystonia musculorum deformans,” or hypotonic muscle in one instance, and then hypertonic in another upon movement, the classification of this condition has evolved. Initially, Dystonia was categorized into two groups following the First International Dystonia Symposium in 1975; the first was primary dystonia, which referred to how heritable the condition was (Huntington's, Wilsons, and neuroferritinopathy), and the second was dystonia due to environmental conditions (carbon monoxide, viral infection, and levodopa antagonists).

More recently, dystonia has been redefined as uncontrollable muscle contractions, that can cause a person's body parts to twist involuntarily, and result in repetitive movements, or abnormal positions. The etiology of this condition is now categorized by two axes. The first axis includes clinical features such as age of onset, body distribution of the condition, temporal pattern (referring to

whether or not it's progressive or static), duration following onset, and lastly, it's associated features. The second axis focuses on the etiology of the dystonia. It's classified as a sequela of some kind of nervous system pathology, heritable condition, and if all else is excluded, its defined as idiopathic dystonia(Albanese et al., 2013).

Over the years, the treatment of dystonia has evolved, and more options are available in the management of dystonia. Despite this, there have been few reviews that properly address the risks associated with those who develop hypersensitivity reactions to anti-histamines, and how they should be managed. This study compiles relevant pubmed articles over the last 3 decades with emphasis on the management of patients with multiple medications who have dystonia, the treatments available for those who are allergic to anticholinergics, as well as some of relevant symptomatology seen in those who develop hypersensitivities to anticholinergics.

School: Texas Tech University Health Sciences Center

R&CF SECKEL, SHANNON

Fourth of July firework-related injuries in three infants requiring BICU admissions: A case report

Shannon Seckel, DO and Patti Patterson, MD

Firework-related burns in infants are a fairly rare finding that can result in a myriad of diverse outcomes, ranging from superficial to life-altering or even life-ending injuries. The significance of firework-related burns in this young population is largely undocumented in the literature as it is more often seen with older children. In this case report, three children under the age of 12 months presented to the same University Medical Center, on the same day, with burns secondary to fireworks requiring BICU admissions. Each patient was medically stabilized and provided adequate pain management, with one patient additionally requiring surgical intervention with an autologous skin graft. Each patient was eventually discharged and followed closely in the burn clinic with resolution to their injuries. This case reports highlights the importance of educating both practitioners and home care providers about firework safety with infants.

School: Texas Tech University Health Sciences Center

R&CF SHARP, LEIGHA

Improving Employee Morale: A Quality Improvement Project

Leigha Sharp, M.D., Cloyce Stetson, M.D.

Low morale can have a negative impact on productivity, cooperation, errors, absenteeism, and turnover. Hills developed twenty-five strategies to boost low morale in a medical practice team. This quality improvement project implemented strategies to increase staff morale and evaluated progress utilizing a quick 10-question survey to assess change in employee morale. Our findings indicate employee morale can be positively impacted by implemented strategies focused on boosting morale.

School: Texas Tech University Health Sciences Center

R&CF SHOJI, ERI

Delirious Mania in Bipolar 1 Disorder and Parkinson's Disease

Eri Shoji, Ashley Maveddat, Regina Baronia, Yasin Ibrahim

Background: Mania can present with elevated mood, agitation, hallucinations, and thought disturbances. Symptoms may overlap with psychosis secondary to neurodegenerative disorders like Parkinson's Disease (PD) or metabolic conditions including lithium toxicity. Lithium toxicity has been reported to cause persistent delirium in geriatric patients with organic factors such as brain atrophy. We present a manic patient with Bipolar 1 Disorder, PD, and Chronic Kidney Disease (CKD).

Case History: A 69-year-old man with bipolar I disorder, PD, and Stage 3 CKD, was admitted for agitation and confusion, after adjustment of parkinsonian medications and mood stabilizers. Three months prior, worsening PD motor symptoms precluded his work and driving. One month prior, he was admitted for confusion and was discharged with a diagnosis of lithium toxicity due to CKD and accidental overdose. Lithium and amantadine were discontinued. Valproate was initiated. Post-discharge, he had visual hallucinations. On follow up, the patient presented with altered mental status, paranoia, pressured speech, grandiosity, agitation, and hypersexuality; and was admitted to the inpatient psychiatry unit.

Conclusions: Diagnosis was complicated by potential overlapping symptoms of PD psychosis, PD dementia, persistent delirium triggered by lithium toxicity complicated by CKD, and bipolar 1 manic episode. This complex case may have been precipitated by cognitive impairment secondary to PD leading to accidental overdose. Lithium and kidney functions were not monitored for a decade. This presented as delirious mania, triggered by lithium toxicity. It was exacerbated by suboptimal levels of valproate. Hence, we urge close monitoring of drug levels and comorbid conditions.

School: Texas Tech University Health Sciences Center | **Campus:** Lubbock

R&CF STANLEY, RUSSELL

Pilot Study: Investigating oral agents for urine staining to facilitate intraoperative observation of ureteral jets

Russell Stanley, D.O., Ann Erickstad, M.D., Cornelia deRiese, M.D.

Objective: This study evaluates oral agents used to visualize ureteral jets at the time of intraoperative cystoscopy. Agents examined by the study are oral pyridium and vitamin B riboflavin. The study looks to determine if administration of a standard oral dose of vitamin B riboflavin is a comparable oral agent to pyridium for evaluating patency of ureteral jets at the time of intraoperative cystoscopy.

Methods: A 3 arm double-blinded, randomized controlled pilot study was performed. Group 1 was administered thiamine as a placebo, Group 2 was administered pyridium, and group 3 was administered vitamin B riboflavin. The surgeons and patients were both blinded to the treatment. The agents were administered to the subjects on the morning of surgery 1 hour (+/- 15 minutes) prior to the procedure. A data sheet with a urine color scale was used intraoperatively as a grading system by the surgeons to grade the color of the urine jet and to evaluate the strength of the urine jet.

Results: The Cochran-Mantel-Haenszel for ordinal outcomes was used to compute the appropriate Chi-square test for equivalence between color intensity of the three groups. Results after completion of 85 patients reveal statistical significance for slightly colored to bright colored urine stain for both pyridium and riboflavin.

Conclusions: Vitamin B riboflavin is an appropriate comparable oral agent to pyridium for producing urine staining and evaluating the patency of ureteral jets at the time of intraoperative cystoscopy. Although the urine stain for riboflavin was not as statistically significant as the stain for pyridium, one can conclude that riboflavin is a very safe and has proven to be an effective agent for causing urine staining.

School: Texas Tech University Health Sciences Center

R&CF WALLIS, DANIEL

Ophiasis Alopecia Areata Treated With Microneedling: A Novel Therapy

Usman Asad, BS; Daniel Wallis, MD; Michelle Tarbox, MD

Alopecia areata (AA) is a T-cell mediated autoimmune disease resulting in the destruction of hair follicles. Ophiasis refers to a subtype of AA that presents as a symmetric, band-like hair loss pattern of the occipital, temporal, and parietal regions of the scalp. We present a case of a 58-year-old Caucasian male with alopecia areata, ophiasis pattern, who was treated with clobetasol 0.05% solution and four treatments of microneedling with Kenalog over the span of 6 months. He underwent gradual improvement, most notably on his left occipital scalp where his hair loss was most prominent. At 6 month follow up, we noted near complete hair regrowth on his left occipital scalp. We conclude that microneedling with triamcinolone can be considered as a promising treatment in cases of ophiasis AA, particularly when considering its favorable side effect profile relative to other treatments.

School: Texas Tech University Health Sciences Center | Campus: Lubbock

R&CF WU, AMY RUOMEI

Novel approach using shock pulse lithotripsy for surgical management of bladder calculi

Amy Ruomei Wu, MD, Robert H. Grand, MD, Thomas Nelius, MD, Pranav Sharma, MD, and Werner DeRiese, MD.

There are a variety of techniques available to treat bladder calculi. The transurethral approach is commonly utilized as it can be done on an outpatient basis with a short recovery time. Because bladder stones can be difficult to fragment, treatment of stones transurethrally can pose a challenge. We present a novel approach for treatment of bladder calculi using an Olympus nephroscope in combination with shock pulse lithotripsy technology. Review of the literature shows transurethral shock pulse lithotripsy technology has not yet been used for treatment of bladder stones. In our study, we have shown that treatment of stones using this method is both safe and effective for patients.

School: Texas Tech University Health Sciences Center

SCHOOL OF HEALTH PROFESSIONS

SHP BASSETT, CAMERON

Shearwave elastography measured differences between unembalmed and embalmed knee tissue stiffness.

Cameron C. Bassett PT DPT1, Kerry K. Gilbert PT ScD1, Troy L. Hooper PT ATC PhD1, Roger James PhD FACSM1

INTRODUCTION: Cadavers are valuable resources for education, research, and clinical simulation, however, there is no quantitative data to compare cadaver tissue stiffness relative to the embalming condition. This research provides recommendations for unembalmed and embalmed cadaver use based on quantitative in situ tissue stiffness using shearwave elastography (SWE).

MATERIALS AND METHODS: Tissue stiffness values of the patellar tendon (PT), vastus medialis oblique (VMO) and superficial medial collateral ligament (sMCL) were measured in 10 cadavers (5 unembalmed and 5 embalmed) using SWE at five and 20° of knee flexion. Intrarater reliability was analyzed using the intraclass correlation coefficient (ICC (3, 3)). The SWE data of the embalmed conditions and knee flexion angles were analyzed using a two-way mixed ANOVA.

RESULTS: Good intrarater reliability measures found for the PT (ICC (3, 3) = 0.969), VMO (ICC (3, 3) = 0.976), and sMCL (ICC (3, 3) = 0.826). Tissue stiffness measurements were significantly different between embalming conditions for the PT and VMO (PT $p < 0.001$; VMO $p = 0.008$), but sMCL data is inconclusive. There were no significant tissue stiffness differences between five and 20° of knee flexion (PT $p=0.473$; VMO $p=0.598$; sMCL $p=0.348$).

CONCLUSION: The SWE reliably measured cadaveric tissue stiffness and found greater stiffness values in embalmed cadaver tissues for the PT and VMO. Tissue stiffness does not appear to change between five and 20° of knee flexion. Based on tissue behavior, embalmed cadavers are recommended for educational study and unembalmed cadavers are recommended for research and clinical simulation.

School: School of Health Professions

SHP DRUSCH, ALEX

The Effect of a Volitional Preemptive Abdominal Contraction on Biomechanical Measures During a Front versus Back Loaded Barbell Squat

Alex Drusch, Joe McCormick, Troy Hooper, Brad Allen, Dennis G. O'Connell, Antonio Vintimilla, Phil Sizer

Context: Olympic powerlifting is growing in popularity among recreational and competitive athletes. The barbell back squat (BackS) is commonly prescribed, while the barbell back front squat (FrontS) is less commonly included. The purpose of this study was to measure the effect of volitional preemptive abdominal contraction (VPAC) on trunk muscle activity and lower quarter kinematics, kinetics and neuromuscular control of both squat variations. **Methods:** Twenty-six healthy university male subjects (18-35 years old) completed informed consent, demographic/medical history questionnaires and an instructional video. Subjects practiced VPAC and received feedback. Surface electromyography (sEMG) electrodes and kinematic markers were applied. Maximal voluntary isometric contractions established reference sEMG values. A squat one-rep-max (1RM) was predicted. Subjects performed BackS trials at 75% 1RM while FrontS trials were performed at 75% BackS weight, both with and without VPAC. Subjects performed three repetitions of each condition with feet positioned on two adjacent force plates. Significant interactions and main effects were tested using a 2(VPAC strategy) x 2(squat variation) and 2(VPAC strategy) x 2(direction) within-subject repeated measures ANOVAs. Tukey's Post-Hoc tests identified the location of significant differences. **Results:** Trunk muscle activity was significantly higher during FrontS versus BackS regardless of VPAC condition. A VPAC increased performance time for both squat variations, which may be associated with decreased detrimental force potential on the lumbar spine and knees. A VPAC improved ability to maintain a neutral lumbar spine during both squat variations. This finding is associated with decreased detrimental force potential on the lumbar spine. **Conclusions:** These findings could help guide practitioners and coaches in selecting squat variations and incorporating VPAC strategies for core control during their treatments and/or training programs.

School: School of Health Professions

SHP GILES, JENNIFER

A Phonological Approach to Treat Consonant Clusters in Children with Repaired Cleft Palate via Telepractice

Jennifer Giles and Sue Ann S. Lee

This study evaluated the effectiveness of using a phonological approach for speech intervention via telepractice in two adopted siblings from China who had undergone cleft palate repair surgery at TTUHSC. There are two major approaches (articulation approach and phonological approach) to treating speech production errors in children with cleft palate. However, limited evidence is available over using a phonological approach to treat these children in the United States. Children with cleft palate may improve their speech after surgical procedures are done. However, approximately 30% of children still demonstrate misarticulation because they cannot change their learned articulatory behavior. Thus, speech therapy is necessary for these children to improve their speech accuracy by eliminating their learned behaviors.

There is increasing evidence on the effectiveness of the telepractice service delivery model in the US., however, telepractice has not been fully adopted for treating children with cleft palate. Only one study is currently available. Telepractice was an important service delivery method for the participants in this particular study because they lived in a rural area, about 1.5 hours away from the nearest speech clinic, and they required therapy and maintenance after repair surgery due to compensatory misarticulations and the existence of developmental errors.

The articulation of the children in the current study was evaluated using the Goldman Fristoe Test of Articulation-Third Edition. Based on evaluations, three s-stop consonant clusters (i.e., sp, st, sk) were selected for both children in this study. In addition to the target sounds of each child, the /r/ phoneme was also treated.

Speech intervention was conducted twice a week during 30-minute sessions for 10 weeks via telepractice using the Cisco WebEx video conferencing platform. Microsoft PowerPoint software was used to present pictures of target stimuli. The children viewed the pictures using the shared screen function. The program was interactive, and the children were allowed to draw lines and circles or move pictures using the manipulation tools. Therapy sessions primarily employed a minimal pairs approach

The present study found that three /s/ consonant clusters were produced with 100% accuracy during a post-treatment maintenance session, thus exhibiting a significant increase in both children via telepractice. This study contributed to determining whether a phonological intervention approach is effective for treating speech production errors in children with cleft palate. Additionally, it contributed to determining if telepractice is an effective service delivery model for children with cleft palate.

School: School of Health Professions

SHP LIU, YILAN

Differences in nasalance and nasality perception between Texas South and Mid-Atlantic dialects

Youkyung Bae, Sue Ann Lee, Karl Velik, Yilan Liu, Cailynn Beck, and Robert Allen Fox

Previous studies have been examined the dialectal influence on speakers' nasalance scores, however, information on cross-dialectal variation in nasality perception is limited. This study investigated the effects of speakers'/listeners' dialectal background on their oral-nasal balance characteristics estimated by nasalance, as well as nasality perception measured by direct magnitude estimation with modulus (DME-M). The participants were obtained from two geographically distinct regions, Texas South and Mid-Atlantic dialects, since the two dialects of these regions lie at opposite ends of normal nasalance variation (Awan et al., 2015). Mean nasalance of various speech stimuli and DME ratings on synthesized vowel stimuli with varying degrees of nasalization were obtained. The results revealed that Texas South speakers/listeners showed significant higher nasalance scores on the reading passages and higher nasality ratings on the synthesized auditory stimuli than Mid-Atlantic speakers/listeners. These findings indicate that, in addition to production variations of oral-nasal balance characteristics, perceptual variations of nasality exist at a dialectal level.

Keywords: Nasalance, Nasality perception, Dialect

School: School of Health Professions

SHP MURPHY, BRANDI

Auditory Processing Disorder in Relation to Blast Exposure: A Future in fMRI Analysis

Brandi Murphy, Candace Hicks, LeighAnn Reel, and Tori Gustafson

In the field of audiology, patients can exhibit symptoms of hearing loss; however, their hearing can still be within normal limits. Auditory processing disorders (APD) may further explain patient's difficulties understanding speech with an absence of hearing loss. Common symptoms include: academic difficulties in reading/spelling areas, deficits in integration of auditory-visual information, poor articulation of /l/ and /r/ sounds, difficulty understanding others, prosody/intonation confusion, poor attention, poor discrimination, difficulty understanding rapid speakers and foreign accents, poor memory, difficulty following directions, difficulty with expressive language and emotional presentation, repetition requests, poor music abilities, difficulty understanding phone conversations, poor localization, and difficulty attending to target speech in noise. Assessing a person's auditory abilities and disabilities can explain the patient's difficulties understanding speech with an absence of hearing loss. Auditory processing evaluations can aid in further evaluation of the auditory system through the brainstem.

This research summarizes phase I of a two phase process. In phase I, our goal is to determine an appropriate neural based auditory processing disorder (APD) protocol that can be utilized in an fMRI setting. The first condition included testing in the sitting position with stimuli presentation via audiometer. The second testing condition included testing in a lying position with stimuli presented via computer. Participants were neuro-typical adults between the ages 18-30. Differences in testing performance between the two conditions were evaluated and compared to age appropriate norms to determine if results were negatively impacted by the conditions. Future studies: Phase II will include fMRI technology with a similar stimulus presentation. This new technology will allow rehabilitation to become individualized and focus on areas of difficulty.

School: School of Health Professions

SHP NATESAN, KARTHICK

Effect of VPAC on Muscles, in Healthy Humans.

Natesan K, Drusch A, Garcia L, Kunkel B, Hooper T, Kublawi M, Brismee J, Yang H, Sizer P.

Context: Low back pain has a profound effect on daily activities of many Americans. To facilitate the rehabilitation process, improvements in muscle activation patterns during functional activities is warranted. Objective: The determine the effect of volitional preemptive abdominal contraction (VPAC) on abdominal and superficial multifidus activation during a lower extremity (LE) unipodal functional task in healthy subjects. Subjects either used an abdominal bracing maneuver (ABM), abdominal drawing in maneuver (ADIM), or no VPAC while performing the Y-balance test (YBT). Design: Within-subjects, repeated measure cohort design; 2015-2017. Setting: Clinical laboratory setting. Subjects recruited from the local community. Participants: Convenience sample of 30 healthy individuals, ranging 20-41 years (\bar{x} = 27.2 yrs). Intervention: Surface electromyography data was recorded on subjects' L5 superficial multifidus (Mf) and obliques while performing the YBT in the anterior (ANT), posteromedial (PM), and posterolateral (PL) directions, using either ABM, ADIM, or no-VPAC. Results: One-way ANOVAs showed there was a significant main effect for VPAC strategy for both IO and EO activation in all YBT directions ($p < .05$). The 2(Mf side) x 3(VPAC) repeated measures ANOVAs found a significant interaction between Mf side and VPAC strategy in the PM ($p = .002$) and PL ($p = .003$) directions, favoring stance side Mf. Pearson r correlation analyses revealed no Mf activation and YBT reach distance relationship. Conclusion: In addition to producing an abdominal co-activation, healthy subjects used VPAC to produce improved superficial Mf activation in the PM and PL YBT directions, most significant on the stance side. No relationship was found between trunk activation and YBT reach distances. These findings will help rehabilitation professionals understand the role abdominals and multifidus play during unipodal functional reaching activities.

School: School of Health Professions

SHP PINGSTERHAUS, ASHLY

Acoustics of Noise-Adapted & Clear Speech in Individuals with Elevated Depressive Symptoms

Ashly Pingsterhaus, B.S. & Hoyoung Yi, Ph.D. CCC-SLP

It is widely acknowledged that individuals with depression have deficits in communication. A majority of people with dysarthria due to stroke and Parkinson's disease also experience depressive symptoms. Based on the hypo- and hyper-articulation (H&H) theory, talkers spontaneously and reliably enhance their speech production to facilitate speech perception for listeners, especially in challenging communication environments due to the presence of background noise (noise adapted speech, NAS) or a situation to talk to a listener with reduced comprehension (clear speech, CS). A previous research has revealed that people with high depressive (HD) symptoms benefited less from the CS modification compared to talkers with low depressive (LD) symptoms. The current study will further examine acoustics of NAS and CS modification in individuals with elevated depressive symptoms. The findings will provide a better understanding of the nature of communicative deficits in individuals with depressive symptoms and have a potential of aiding speech therapy plan for maximizing intelligibility in talkers with speech sound disorders accompanied with depressive symptoms. This project aims to understand how elevated depressive symptoms (non-clinically diagnosed) affect spoken language processing based on different acoustics of NAS and CS, and provide a resource to establish valid assessment protocols and intervention plans for clinical populations who need speech production enhancement by using CS and NAS enhancement. Talkers with HD symptoms showed NAS alteration in all acoustic measures and CS modification in speech rate and f0 range, but different to LD talkers, talkers with HD did not show significant CS enhancement in energy in 1-3 kHz and f0 mean. Findings have implications for the potential to aid speech therapy plan for maximizing intelligibility in individuals with speech sound disorders accompanied with depressive symptoms.

School: School of Health Professions

SHP SANDERS, EMMA

Comparing Caregiver-Child Dyad Language Productions During Traditional Toy and Tablet-based Play Interactions

Emma Sanders, B.S., Tobias Kroll, Ph.D., CCC-SLP

This study examined how mobile screen devices impact the language of preschool children and adult caregivers during play. A total of 6 dyads consisting of a typically developing child (between 3;0 and 4;11) and one primary caregiver were recorded playing with physical and tablet-based toys. A repeated-measures design was utilized to collect samples of language during alternating trials as each dyad interacted with the two variables separately (i.e., physical toy, tablet-based toy). An analysis of the resulting utterance length and semantic complexity of language was measured using mean length of utterance (MLU), type-token ratio (TTR), and a qualitative discussion regarding communicative intents. Results point to clinical implications regarding professional recommendations for parents of young children as well as a need for additional research in the area.

School: School of Health Professions

SHP STEVEN, KHALID

The Effect of Executive Cognitive Distraction on Sustaining a Volitional Preemptive Abdominal Contraction During a Unipodal Functional Movement in Healthy Subjects.

Stevens K, Garcia L, Kunkel B, Hooper T, Drusch A, Kublawi M, Brismee J, Sargent E, Wilhelm M, Yang H, Gan J, Sizer P.

Context: Daily distractions can affect the muscle performance during a functional task. Rehabilitation professionals should demonstrate a better understanding of cognitive distraction on trunk and lower extremity (LE) muscle activation patterns. Objective: To determine the effect executive cognitive distraction (ECD “Stroop effect”) has on the ability to maintain a volitional preemptive abdominal contraction (VPAC) in healthy subjects while performing a unipodal functional task. Subjects used an abdominal bracing maneuver (ABM), or No-VPAC, with and without ECD, while performing the Y-Balance Test (YBT). Design: Within-subjects, repeated measure cohort design. Setting: Clinical laboratory setting. Subjects recruited from local community. Participants: Convenience sample of 30 healthy individuals, ranging 20-41 years ($x = 27.2$ yrs). Intervention: Surface electromyography data was recorded on subjects’ moving and stance internal obliques (IO) and external obliques (EO) while performing the YBT in the anterior (ANT), posteromedial (PM), and posterolateral (PL) directions. The auditory Stroop program consisted of masculine and feminine terms, requiring subjects to respond by moving the appropriate 5th finger. Results: The 2 (VPAC) x 2 (ECD) ANOVA revealed a main effect for VPAC strategy for ECD in all YTB direction ($p < .05$). Repeated measures ANOVA revealed a main effect for Stroop to PM reach distance ($p = .006$). In addition, the repeated measures ANOVA revealed a main effect for stance IO and moving EO VPAC in the PM direction, as well as for moving EO in ANT direction ($p < .05$). Conclusion: Our study revealed that normal subjects were able to perform a VPAC during a LE reaching task, even when cognitively distracted. YBT reach distances were affected by Stroop distraction in the PM YBT direction. This study served to inform health professions on the effect ECD has on VPAC strategies during LE reach task, such as during a recreational or daily living activity.

School: School of Health Professions

SHP VINTIMILLA, ANTONIO

Biomechanical Responses to Volitional Preemptive Abdominal Contraction and Stabilization Belt Use During a Loaded Squat

Lynch D, Vintimilla A, Drusch A, Hooper T, James CR, Brooks T, Sizer P

Core stabilization has been associated with improved athletic performance and a decreased risk for injury. Abdominal bracing and stabilization belts are incorporated to increase trunk stability, but these strategies have not been compared. PURPOSE: To investigate the effect of volitional preemptive abdominal contraction (AB) versus stabilization belt (StB) use on lower quarter neuromuscular control during a loaded barbell squat (LBS). METHODS: Twenty-eight healthy males (19-29 years) were recruited from a university population. Lower extremity biomechanical and surface electromyography (sEMG) variables were obtained during testing. Subjects’ 75% one-rep-max (1RM) was calculated using 3-to-5RM LBS. Subjects performed 3 LBS repetitions at 75% 1RM under 4 conditions: no bracing/belt (NoSS), bracing AB, StB, and combined bracing and belt (AB+StB). Subjects performed the NoSS condition followed by the remaining conditions in random order. The sEMG, velocity, acceleration and time variables were assessed via a 2(phase) x 4(stabilization strategy) ANOVA, while peak angle data was assessed using a 1(side) x 4 (stabilization strategy) and 2(side) x 4(stabilization strategy) ANOVA’s. Tukey’s Post-Hoc tests identified main effects. RESULTS: Abdominal muscle activity was significantly greater during AB and AB+StB conditions ($P < 0.001$) while no other significant differences were found between conditions. Lumbar extensor and quadricep sEMG was significantly higher during the up versus down lift phases ($P < 0.01$). The lumbar peak angle was significantly lower while the hip peak angle was significantly greater and achieved faster during StB and AB+StB conditions versus NoSS and AB conditions ($P < 0.01$). Total LBS time was significantly greater during the AB condition compared to NoSS and StB conditions ($P < 0.001$). CONCLUSIONS: This was the first study to compare AB versus StB use during a LBS. These results will inform coaches and athletes about safer and efficient LBS programming.

School: School of Health Professions

UNDG BALL, REAGAN

The Function of Nuclear PEDF in Prostate Cancer Cells

Reagan Ball, Dr. Stephanie Filleur, Dr. Souad Sennoune

Despite clinically controlled growth of localized prostate cancer (PCa), metastatic PCa remains largely incurable, with rapid onset of lethality, even after intensive multimodal therapy. The development of new therapeutic alternatives with increased efficacy thus represents an urgent unmet need in PCa. The Pigment Epithelium-Derived Factor (PEDF) is a naturally expressed and secreted protein in the Serpin family that displays anti-angiogenic, anti-tumorigenic, and neurotrophic functions throughout the body. Recent findings from our laboratories demonstrated that PEDF is a therapeutic target for PCa. While PEDF secretion has been widely described as reduced in PCa when compared to normal cells, we surprisingly observed PEDF expression within the nucleus of PCa cells. The aim of this project is thus to characterize the function of nuclear PEDF in PCa cells. In these cells, we hypothesize that nuclear PEDF is functioning as a transcription factor. To test this hypothesis, we measured the expression of mRNA effectors of the PI3-Kinase/AKT pathway through Real-Time quantitative PCR analysis. We demonstrated that PEDF significantly inhibits the mRNA expression of the catalytic subunit of the PI3-Kinase, AKT1 and PDK1, identifying novel target genes for PEDF. As a next step, we will use chromatin immunoprecipitation to validate the binding of PEDF to the promoters of these genes of interest. We hope our research will advance the understanding of PCa and contribute to the development of improved treatment methods and therapeutic approaches for metastatic PCa patients.

School: Texas Tech University

UNDG DELGADO, BETSAIDA

Isolation and Characterization of Gardnerella vaginalis Clinical Isolates

Betsaida Delgado, London Mena, Gary Ventolini, Jane Colmer-Hamood, and Abdul Hamood

Bacterial vaginosis (BV) is the most common vaginal infection in women of reproductive age. It is associated with an increased risk for pre-term birth, miscarriages, and pelvic inflammatory disease. When healthy, the vagina is predominated by lactobacilli. During BV, the lactobacilli are replaced by facultative anaerobic bacteria, the most prominent being Gardnerella vaginalis (GV). This population shift may be due to the ability of GV to compete with lactobacilli through: efficient biofilm development, tolerance to the lactobacilli-produced lactic acid and hydrogen peroxide (H₂O₂), or the presence/absence of virulence-associated genes. In this study we analyzed 17 GV isolates for the described possibilities. Biofilm analysis of the isolates, through crystal violet staining, revealed that the isolates produced biofilms masses that varied from 0.15 to 0.98 OD₆₀₀. Lactobacilli produce 72 mg/mL D-lactic acid and 7 mg/mL L-lactic acid. Thus, we measured the resistance of the GV isolates to these concentrations. We found that the lactic acid treatment reduced the growth of 14 of the isolates. At 0.049 mM concentration, H₂O₂ reduced the growth of the isolates by 4 to 6 logs. At 0.195 mM and 0.39 mM concentrations, eight isolates survived and at 0.78 mM concentration, seven isolates survived. Finally, we tested the isolates for the presence of: sialidase, biofilm associated protein (BFAP), vaginolysin, siderophore uptake genes by specific primers and PCR. Results showed that 82% of the isolates carried the sialidase gene, 73% carried the BFAP gene, 91% carried the vaginolysin gene, and 18% carried the siderophore uptake gene. Our results suggested that: with the exception of the siderophore uptake gene, many virulence genes are conserved among GV clinical isolates; GV isolates efficiently develop biofilms; GV isolates are not resistant to Lactobacillus-levels of lactic acid or H₂O₂; and certain strains of GV resist high levels of H₂O₂ through a potential unique mechanism.

School: Texas Tech University

UNDG IBRAHIM, ANDREW

Thioredoxin as a Treatment for Diabetic Patients: The Protective Effects of Thioredoxin Against Cardiac Endothelial Cell Death and Mitochondrial Damage under Hyperglycemia

Andrew Ibrahim

Cardiovascular complications are highly prevalent in diabetic patients. Hyperglycemia has been linked to mitochondrial dysfunction and cell injury, with the formation of harmful reactive oxygen species (ROS), such as superoxide. However, how hyperglycemia affects cardiac endothelial cells and their mitochondrial metabolism is not clear. Within mammalian hearts, endothelial cells are the most numerous, constituting up to 64% by number, and undergo apoptosis prior to cardiomyocytes. As such, they are the focus of our study.

The thioredoxin class of proteins, however, has been found to play a role in protecting against harmful ROS such as superoxide. In this study, we investigated the role of thioredoxin in protecting against glucose induced DRP1-facilitated mitochondrial fission. This experiment was four-pronged – human endocardial endothelial cells (HECECs) were exposed to hyperglycemic conditions (25 mM glucose) and treated with thioredoxin vs. without. We (1) measured mitofission in the form of visible mitochondrial breakage under microscope, (2) measured apoptosis rates among cells through flow cytometry, (3) measured the amount of superoxide produced using electron paramagnetic resonance, and (4) measured activation of the DRP1-protein, a protein that mediates mitofission through Western blotting.

We found that mitochondria were shorter and fragmented in cells when exposed to hyperglycemia; however, cells not treated with thioredoxin were more fragmented compared to those with thioredoxin. Thioredoxin treated cells also resulted in less apoptotic rates and less superoxide formation in HECECs.

These findings indicate that the (1) fission-mediated fragmentation of mitochondria, along with the (2) production of harmful superoxide and the (3) death of endocardial endothelial cells, is lowered in HECECs treated with thioredoxin as compared to without. This points to possible protective effects of human thioredoxin against cardiac damage in diabetic patients.

School: Texas Tech University

UNDG KARIAMPUZHA, WILLIAM

Estimating Lexicon Size Based upon Zipf's law and its Alternatives

William Kariampuzha

Zipf's Law approximates the relative frequency of a word given its statistical rank in terms of the frequency of the most used word in the lexicon at a particular point in time. Applying Zipf's Law to each word in the lexicon yields an approximating sequence of the frequency for every word in a language. Assuming perfect fit, the number of words in a language can theoretically be estimated with the n th partial sum of the Zipf harmonic series. Here, I demonstrate that a piecewise summation of the Zipf-Mandelbrot hyperharmonic series with a number of datapoints from the Google Ngrams, Historical American English, and Brown corpora are able to estimate the true size of the English lexicon in 1961. Estimating the size of the lexicon can allow us to better understand and model the rate of change of all languages. In the future, natural language processing systems (e.g. Siri, Amazon Alexa, Google Assistant, automatic hospital translators) may be burdened with decades of outdated words, phrases, and dialects. However, applying these derived formulas to accurately approximate lexicon size allows these voice-based systems to adjust their databases in order to function accurately in our rapid paced world.

School: Texas Tech University

UNDG KJELLGREN, ABBEY

Selective inhibition of different isoforms of connexin hemichannels by new amphiphilic aminoglycosides

Abbey Kjellgren, Mariana C. Fiori, Madher N. AlFindee, Yagya P. Subedi, Srinivasan Krishnan, Cheng-Wei T. Chang and Guillermo A. Altenberg

Connexins hemichannels (HCs) from adjacent cells form gap-junctional channels that mediate cell-to-cell communication. Abnormal opening of “free” undocked HCs can produce cell damage and participate in the mechanism of disorders such as cardiac infarct, stroke, deafness, skin diseases, and cataracts. Connexin 43 (Cx43) HCs play a role in cardiac infarct and stroke, whereas abnormally active connexin 26 (Cx26) HCs have been associated with deafness. Therefore, selective inhibitors of connexin HCs have great pharmacological potential. Antibiotic aminoglycosides (AGs) have been recently identified as connexin HC inhibitors. Here, we synthesized and tested several amphiphilic AGs derived from kanamycin that do not have antibiotic effect, but still inhibit connexin HCs. Using a newly developed cell-based bacterial growth complementation assay we found several leads with superior inhibitory potency on Cx43 vs. Cx26 HCs when compared to the parent compound, kanamycin A. Unlike traditional AGs, these amphiphilic AGs are not bactericidal and are not toxic to mammalian cells, making them better than traditional AGs as HC inhibitors for clinical use and other applications.

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School: Texas Tech University

UNDG LOPEZ, ANDREA

In vivo detection of polymicrobial bacterial biofilm with real-time fluorescence imaging

Andrea J. Lopez¹, Landrye Reynolds¹, Isaiah George¹, Rachel C. Diaz¹, William Little¹, Laura M. Jones², Monique Y. Rennie², and Allie Clinton Smith¹

Department of Honors Studies, Texas Tech University¹; MolecuLight Inc.²

Chronic wounds are a significant cause of patient morbidity and mortality in the US annually, and commonly harbor polymicrobial biofilms, generating infections that are difficult to characterize and to treat. Current diagnostics methods require long periods of testing for microbial identification, but often provide little information on the complex characteristics of the chronic wound environment. An essential step to the healing process for a patient with a sophisticated wound is accurate diagnosis to better provide customized care. Bacterial fluorescence imaging with the handheld MolecuLight i:X device uses safe violet light to detect autofluorescent properties of most clinically-relevant species of bacteria, allowing detection of relative bacterial bioburden in a wound in real time. In this study, we assessed the ability of the MolecuLight i:X device to detect autofluorescent properties of a polymicrobial bacterial biofilm utilizing an established chronic wound murine model, and were able to demonstrate that bacteria encased within the extracellular matrix of the biofilm still exhibit detectable autofluorescence. These data demonstrate that the device has the ability to detect bacteria encased within a biofilm, which further validates the MolecuLight i:X device for patient use.

School: Texas Tech University

UNDG OSTERMAIER, EMILY

Optimization of a High-throughput Liposomes Fluorescence Assay for the screening of drug libraries with potential therapeutic use for ion channel dysfunction related diseases

Cuello, Luis and Ostermaier, Emily

Voltage-gated sodium and potassium channel dysregulation and overexpression have been found to be the leading cause of many channel-related diseases, including epilepsy, Alzheimer's disease, schizophrenia, and most recently, several cancer types. In relation to cancer, potassium channels can become dysregulated, allowing an increased efflux of positively charged potassium ions out of the cell, overriding many checkpoints within the cell cycle, and permitting the cell the ability to divide uncontrollably as a result. It has also been found that overexpression of potassium channels also promotes cell mobility of cancer cells, often leading to metastasis. KcsA (a prokaryotic K⁺channel) is the archetypal potassium channel that would be used in the study of finding therapeutic drugs that could act as a "gatekeeper" (in the case of an inhibitor) to regulate the flow of water molecules as a consequence of positively charged ions (K⁺-ions) moving out of the cell. We attempt to do this by employing a liposome fluorescence assay in which the fluorescent signal decay indicates channel activity. The presence of an inhibitor can therefore "block" (or inhibit) the K⁺ channel activity, halting the decay in the fluorescent signal, and potentially identifying a putative therapeutic novel blocker. Finally, electrophysiology will be utilized to track the movement of K⁺-ions across the cell membrane, as well as the blocking properties of putative new therapeutic drugs. The development of this novel high-throughput functional assay will provide a robust and reliable first drug screening approach to identify ion channels blockers in general.

School: Texas Tech University

UNDG REYNOLDS, LANDRYE

Detection of Staphylococcus aureus Small Colony Variants in Chronic Wounds

Landrye Reynolds¹ and Isaiah George¹, Klara C. Keim¹, Nicholas Sanford², Allie Clinton Smith¹

Department of Honor Studies, Texas Tech University¹; Southwest Regional Wound Care Center²

Staphylococcus aureus Small Colony Variants (SA-SCV) are a novel colony phenotype of Staphylococcus aureus. SA-SCVs differ from wild-type Staphylococcus aureus (SA) by the formation of smaller colonies and decreased growth rate, hemolysis, pigmentation, and antibiotic susceptibility. SA-SCVs are induced under stressful microbial environmental conditions, such as coinfection with Pseudomonas aeruginosa, common in chronic wound specimens. Differences in SA-SCV morphology and biochemical reactions from SA are responsible for errors in SA-SCV detection, which can contribute to delayed wound healing and treatment failure. In a clinical setting, SA-SCVs present difficulties such as decreased antibiotic susceptibility and reoccurring infections. In this study, we sought to evaluate the prevalence and consequence of SA-SCVs in chronic wound specimens by obtaining and screening samples for the presence of SA-SCVs. All suspected SA-SCVs were assessed for their biochemical reaction and identification via routine diagnostic testing. Our results suggest that chronic wound specimens harbor a previously unrecognized burden of SA-SCVs, which has implications for diagnostic and patient care.

School: Texas Tech University

UNDG SCHNEIDER, REBECCA

Characterizing the Phenotypic Transition of Pseudomonas aeruginosa from the Hospital Environment to Nosocomial Infections

Rebecca Schneider, Derek Fleming, Garrett Welch, Hui Hua, Angel Cueva, Lauren Choate, and Kendra Rumbaugh

Combatting nosocomial infections is a significant challenge facing modern medicine. In the Intensive Care Units (ICUs), pathogens, such as *Pseudomonas aeruginosa* (PA), thrive. However, the requirements for transitioning from environment to patient have been understudied. We isolated PA from both hospital sinks and infections and characterized the phenotypes of the isolates to determine which virulence factors promote pathogenesis. To study this phenomenon, we compared biofilm formation, quorum sensing activity, pyocyanin production, hemolysis, and protease activity. Analysis by ICU type revealed that strains isolated from the Medical ICU produced higher levels of pyocyanin compared to isolates from the Burn ICU. Considering the documented ability of pyocyanin to damage host tissues, we theorized that increased pyocyanin production is beneficial for invading the more intact tissues of MICU patients but is less necessary for the rapid spread through the dead and damaged tissues of BICU patients. Through examination of the differential virulence of environmental and patient isolates, we found that biofilm biomass was higher for patient isolates than for environmental isolates. Similarly, both total quorum sensing and beta hemolysis of red blood cells were elevated in patient isolates. The most dramatic result was the remarkably higher protease activity among patient isolates compared with environmental isolates. Having determined the protease production of all isolates in vitro, we selected strains with the highest and lowest activity, from both patients and the environment, for comparison in vivo. In our murine chronic wound model, environmental isolates with high protease activity were more capable of establishing a wound infection and causing sepsis. Overall, we conclude that certain virulence factors greatly influence the ability of PA to cause infection. This knowledge may allow us to better predict and react to episodes of PA outbreak in the hospital.

School: Texas Tech University

UNDG WOLPERT, JOHN

Interaction of Valproate and EAAC1/Redox Network

John Wolpert¹, Xiaobo Liu¹, Brent Kisby¹, Praneetha Panthagani¹, Srivatsan Kidambi², Susan E. Bergeson¹, Lenin Mahimainathan³, George Henderson¹, Madhusudhanan Narasimhan¹

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Background: Autism Spectrum Disorders (ASD) is a complex neurodevelopmental disability that affects one in 59 births. Genetic (33%) and environmental (55%) influences such as in utero exposure to pollutants and pharmaceuticals determine the ASD pathogenesis. Prenatal administration of sodium valproate (VPA), a drug used to treat epilepsy and mood disorders enhances the risk of developing ASD. Redox abnormalities are strongly correlated to the interactions between different toxic exposures and ASD-related clinical outcomes. Glutathione (GSH), an antioxidant essential for regulating neuroblasts viability in the growing brain requires “Excitatory Amino Acid Transporter 3” (EAAC1)-cysteine transporter as it supplies the precursor for GSH. Importantly, EAAC1 mutation is linked to schizophrenia, obsessive-compulsive disorder, intellectual disability, all of which shares many characteristics at the behavioral and molecular level to ASD. Thus, in this study we investigated EAAC1-VPA drug interaction and its relevance to ASD-related phenotype.

Methods: Spontaneously immortalized rat neuroblasts from embryonic day-18 brain cortex and EAAC1 knockout mice were utilized. VPA was used at concentrations of 25, 50, 100, 200, 400 μ M for 24h in the neuroblasts.

Results: MTT results demonstrated that VPA significantly decreased the viability of neuroblasts ($P < 0.05$) with a maximal inhibition (15%) at 400 μ M. ROS levels measured by fluorimetry were significantly increased by 61% ($p < 0.05$) at 400 μ M. Concomitantly, EAAC1 protein levels along with GSH levels were significantly ($p < 0.05$) reduced at 400 μ M VPA. The VPA-elicited ROS and GSH reduction were further enhanced upon EAAC1 silencing in neuroblasts. VPA experiments in EAAC1 mice are underway.

Conclusion: Our biochemical results indicate a critical role for EAAC1 in redox maintenance in the undifferentiated neuronal precursors and can be viewed as basis to study the in vivo gene-environment (EAAC1-VPA drug exposure) interaction in ASD.

School: Texas Tech University

UNDG YOUNG, KOBE

Development of a Premedical Student Volunteering/Mentorship Program Designed to Address the Economic Problem of the Care-giver-Patient Ratio in Skilled-Care Geriatric Memory Units

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Unpaid caregivers provided 18.5 billion hours of care to patients with age-related dementias in 2018.¹ Despite this, the lifetime cost to a patient diagnosed with dementia for skilled care, medical attention, and housing is crippling, at approximately \$321,780.¹ Our objective was to develop a way to provide supportive care for dementia patients without increasing financial burden. We created a platform at a nursing home for pre-health students to perform dementia caregiving tasks including emotional support, respite for paid caregivers, managing behavioral symptoms, feeding, and entertainment. We recorded the number of volunteers each week through an online database, documented custom project outcomes, and recorded time spent on leadership outside of volunteer events. Pre-health students received “pay” for their work through improvements to their medical school applications (volunteer hours in a healthcare setting). We calculated the value of the care provided to patients and documented the benefits for the pre-medical students. Over the past four years, our group contributed ~1700 hours of unpaid care, with 480 hours of volunteer work provided in the past four months. We estimated the value of this care to be ~\$5,355 per year and \$12,096 in the past semester alone. If similar groups were established at every US university, the value of this care would be \$51,988,608 per year. The sustainability of our work was made possible by a mutually beneficial relationship between pre-health students, members of the American Geriatrics Society Student Interest Group, memory care staff, and dementia patients. Memory patients need supportive care, and pre-health students benefit from providing supportive care. Therefore, pre-health students are a currently untapped resource that if appropriately mobilized, could contribute 4,126,080 hours per year paid for in professional development, which does not increase the financial burden on either patients or the US economy.

School: Texas Tech University

UNDG ZHU, CHARLES

An Adaptive Approach to Improving Outreach Centered Around Group-Based Learning

Charles Zhu, William Kariampuzha, Elizabeth Koch, Tingzeng Wang, Viren Vasadani, Nicolas Fonseca-Escobar, Daniel Xue, Dzmity Savitski, Radha Patel, Chad Cain, Michael San Francisco

In recent years, there has been an increased interest in innovative teaching strategies and their effectiveness in the K-12 classroom. The STEM & Leaf Corps, a Texas Tech University Honors College organization, has implemented novel project-based enrichment activities in a group setting to instill a passion for education and cultivate an interest in STEM fields in students from the Lubbock Independent School District (LISD). Comprehensive feedback forms from students have yielded qualitative and quantitative data that have informed and enabled us to create adaptive projects that meet individual student needs. Feedback was collected from two after-school centers for K-5 students as well as one middle school and one high school. Student feedback data was accumulated via post-project feedback forms as well as a general mid-semester feedback form. Results reveal that group activities have positively impacted the students' engagement in learning. In addition, we have seen students improve their communicative and collaborative skills along with an overall enhancement of the group-based learning activities that we have implemented. In the near future, we hope to expand our activities to the regional level in order to make a greater impact on the wider U.S. education system, and we anticipate that the insights from our studies may serve as a foundation for reexamining how effective educational outreach programs can be constructed, evaluated, and integrated into existing scaffolds.

School: Texas Tech University

POSTER ASSEMBLY

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CREATING YOUR POSTER:

Although some bulletin boards are larger, the maximum bulletin board space allowed for your poster will be 44" Vertical X 44" Horizontal. Please do not write on or damage the bulletin boards.

Arrange materials in columns rather than rows. It is easier for viewers to scan a poster by moving systematically along it rather than zig-zagging back and forth in front of it.

Make sure that your poster includes the following information:

- **Title**
- **Authors (contributors to your work; your advisor)**
- **Institution where the work was performed**
- **Abstract/Introduction**

This should be placed at the upper left in large typeset. There is no need to include the abstract number as it will be on the bulletin board in the upper left-hand corner.

- The **Body** of the poster should contain figures, and may include a hypothesis, a methods/approach section, and a discussion.
- **Figures and Figure Legends**

Bear in mind that Figures may be viewed from a distance. To assist the viewer, you may indicate the correct sequence of your Figures with numbers or letters at least 1 inch high, preferably in bold print. Each Figure (graph, table, diagram, etc.) should have a heading and a brief summary.

Figure legends should be concise, describing the content of each figure and the conclusions derived from them.

- **Conclusions and Future Directions**

This should be placed at the lower right in large typeset.

MOUNTING MATERIALS:

If multiple pieces, they should all be mounted on colored poster board or matting materials. Other appropriate formats include the laminated/un-laminated "all in one or one piece" large posters. Push pins will be provided at your assigned bulletin board for hanging. You may want to group logically consistent sections or columns of the poster on backgrounds of the same color.

POSTER PLACEMENT AND REMOVAL:

All poster presentations, Tuesday - Thursday, will take place on the **1st and 2nd floor of the Academic Classroom Building (ACB) lobby.**

Please see below for instructions regarding your specific presentation time slot:

Tuesday, March 10, 2020, afternoon session (1:00 PM-2:00 PM)

Poster boards will be available for presenters to hang their posters on Monday evening at 5 PM. All presenters must have their posters in place by 8:30 AM Tuesday. Posters must be taken down by 5 PM on Tuesday. Any poster not hung or removed by this time will be disqualified- no exceptions.

Wednesday March 11, 2020, morning session (9:00 AM-12:00 PM) and afternoon session (1:00 PM-4:00 PM)

Poster boards will be available for presenters to hang their posters on Tuesday evening at 5 PM. All presenters must have their posters in place by 8:30 AM Wednesday. Posters must be taken down by 5 PM on Wednesday. Any poster not hung or removed by this time will be disqualified- no exceptions.

Thursday March 12, 2020, morning session (9:00 AM – 12:00 PM) and afternoon session (1:00 PM-4:00 PM)

Poster boards will be available for presenters to hang their posters on Wednesday evening at 5 pm. All presenters must have their posters in place by 8:30 AM Thursday. Posters must be taken down by 5 PM on Thursday. Any poster not hung or removed by this time will be disqualified- no exceptions.

PRESENTING YOUR POSTER:

If you are not in front of your poster at the beginning of your designated time you will forfeit your opportunity to present your poster. The total allotted time for each poster presentation will be ten (10) minutes. During that time, there will be no interruptions by the judges. Two (2) additional minutes of questions from the judges will follow each presentation. Point deductions will be enforced if the 12 minute time frame is exceeded.

In the case of group presentations, only one individual may verbally present their poster to the judges. However, the remaining members of the group may participate in discussions during the open presentation during the 'Poster Exhibit' (see below).

POSTER EXHIBIT SESSION

Similar to a conference poster session, the 'Poster Exhibit' serves as an open poster session for students to discuss their research with attendees. This event will follow the afternoon poster sessions on Wednesday and Thursday from 12:00 – 1:00 pm. **THIS EVENT IS REQUIRED BY ALL PARTICIPANTS** to be considered for poster competition prizes. We hold this session to encourage participants to learn about exciting new research and network with other students and professors.

Please check the time and date of your poster presentation and attend your respective Poster Exhibit Session time below:

For all Tuesday (afternoon) poster competition participants:

Attend the Tuesday Poster Exhibit Session 12:00 – 1:00 PM

For all Wednesday (morning and afternoon) poster competition participants:

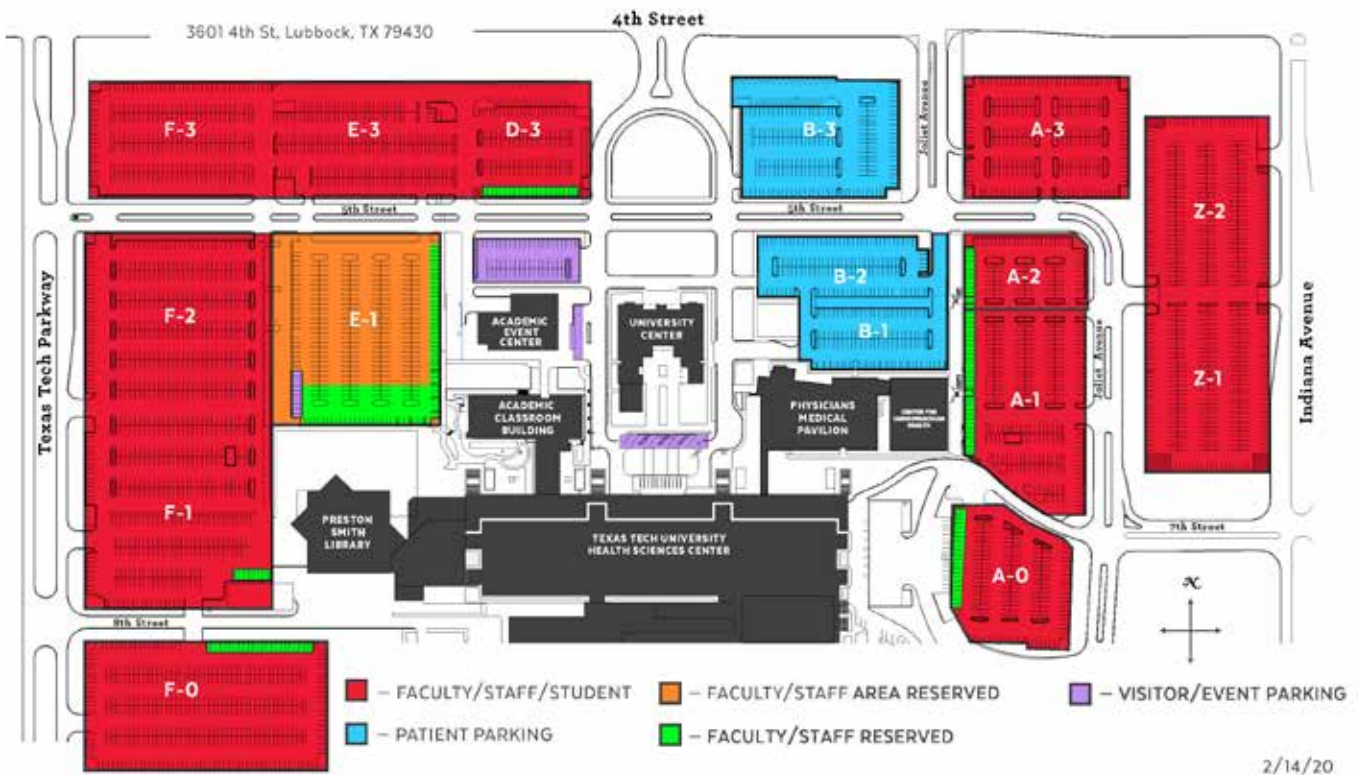
Attend the Wednesday Poster Exhibit Session 12:00 – 1:00 PM

For all Thursday (morning and afternoon) poster competition participants:

Attend the Thursday Poster Exhibit Session 12:00 – 1:00 PM

PARKING MAP

TTUHSC Lubbock Main Campus Parking



TTUHSC Students, Faculty, and Staff from Lubbock, Amarillo, El Paso, or Odessa with valid TTUHSC permits may park in Faculty/Staff/Student parking: F-0, F-1, F-2, F-3, E-3, D-3, A-0, A-1, A-3, Z-1, and Z-2.

Out of town guests and those without TTUHSC parking permits, including those with valid TTU permits may park in visitor parking: B-2, B-3, and A-2.

ADA parking is available in lots E-2 and B-1.

A big thank you to H-E-B for their generous donation for Student Research Week!



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VENDORS

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