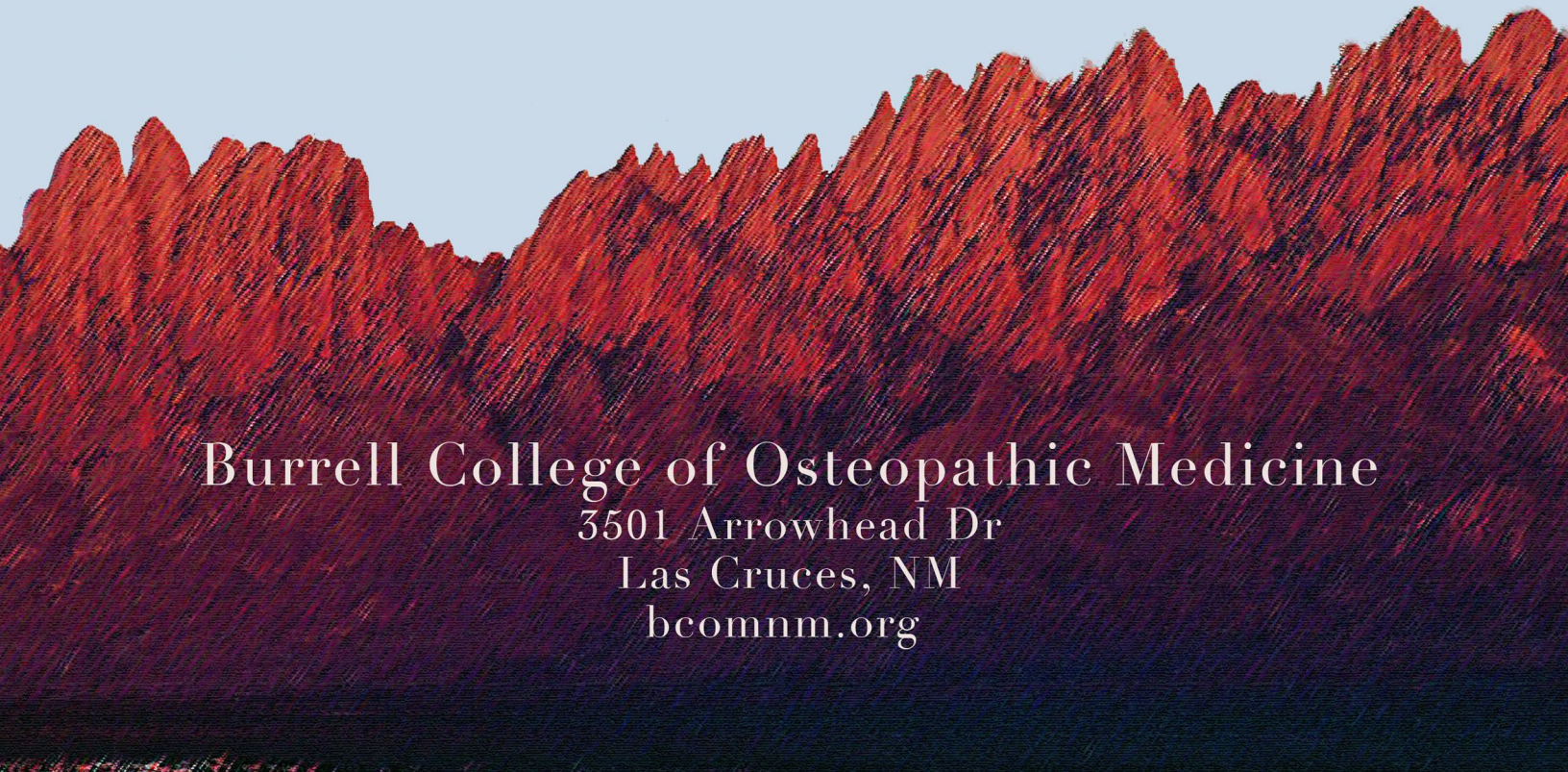
Event Program

2018

Medical Student Research Day

Monday, May 21st



Burrell College of Osteopathic Medicine
3501 Arrowhead Dr
Las Cruces, NM
bcomnm.org

The cover, **designed by Cristian Valdez**, includes an image of the unique and inspiring Organ Mountains. This rugged formation in southern New Mexico rises above the Mesilla Valley, overlooking the City of Las Cruces from the east. The Organ Mountains have served as a signature of Las Cruces, and are ingrained with the city's historical and cultural traditions. They provide for spectacular scenery, which our students are able to enjoy while studying medicine at BCOM.

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ORGANIZER'S WELCOME LETTER

Burrell College of Osteopathic Medicine
1st Annual Medical Student Research Day 2018

On behalf of the Planning and Oversight Task Force, it is with great pleasure that we welcome you to the 1st Annual Burrell College of Osteopathic Medicine Medical Student Research Day! Thank you to both our visitors and participants for helping make Medical Student Research Day an exciting and memorable event as we enthusiastically honor our medical students and celebrate their research and scholarly activity endeavors.

The organizers are pleased to announce that a total of nineteen student abstracts were submitted by first and second year medical students for the four BCOM priority research areas: biomedical science, clinical science and osteopathic manipulative treatment (OMT), population/public health, and medical education. The student research projects will be presented today during the poster viewing session and will be judged. Those that are exceptional will be presented with an award. The top research poster presentation in each priority area will be awarded a certificate and a $250 award. In addition, a grand prize will be awarded to the best overall research poster presentation, which includes a certificate and paid travel to present their research at the National Student Research Forum.

We are honored to welcome Dr. Howard S. Teitelbaum, DO, PhD, MPH, FAOCOPM, from Michigan State University and Lincoln Memorial University. Dr. Teitelbaum visits us with extensive experience and will be giving our keynote talk entitled "The Research Process -- Tips and Traps for Clinical Diagnosis". We would especially like to thank Dr. Teitelbaum for agreeing to speak today.

We will conclude the day's official events with the student poster awards presentation. Following the awards ceremony, we will offer visitors a tour of our beautiful campus. Again, thank you for joining us today to make our first-ever Medical Student Research Day at BCOM a memorable one. We hope to see you at next year's event.

Wishing you every success,

Steven J. Ontiveros, PhD, MBA
Assistant Professor of Anatomy & Cell Biology
MSRD Planning and Oversight Chair

Alex Arana, MBA
Administrative Assistant

Debra E. Bramblett, PhD
Chair and Associate Professor of Biomedical Sciences

Scott Cyrus, DO
Chair and Associate Professor of Pediatrics

Dominique Giordano
OMS-I

Samuel Kadavakollu, PhD
Assistant Professor of Biomedical Sciences

Mahrin Rahman
OMS-II

Tyler Tumey
OMS-I

MESSAGE FROM THE ASSISTANT DEAN FOR RESEARCH

Welcome to the 1st Annual BCOM Medical Student Research Day and congratulations to all of our student researchers. Research and scholarly activity is an important component of medical education. The BCOM Research Strategic Plan places mission aligned research opportunities for medical students and trainees as a major priority. Major research areas include biomedical science, clinical science, medical education, population health, and osteopathic manipulative medicine. Through the efforts put forth by the BCOM research community, we are beginning to see scholarly work from our campus that have been published in scholarly journals and presented at regional, national and international meetings. Expanding research infrastructure includes the newly commissioned BioScience Research Laboratory at the Arrowhead Park Genesis Center.

I wish to acknowledge the efforts of Dr. Steven J. Ontiveros and thank the members of organizing task force who have programmed our Medical Student Research Day. This event would not have been possible without them.

Today we celebrate the accomplishments of our students who are presenting their research findings along with the mentors that guide them. This is a great day for our student researchers and for the entire BCOM family. I encourage you to take time to speak with our student researchers about their work and to learn more about research at BCOM.

Joseph N. Benoit, Ph.D.
Assistant Dean for Research
Professor of Physiology & Pathology

SCHEDULE OF EVENTS

8:45 AM – 9:00 AM	**Welcome to BCOM's 1st Annual Medical Student Research Day** Dr. Steven J. Ontiveros, MSRD Chair Dr. Joseph Benoit, Assistant Dean for Research Dr. Don Peska, Dean & CAO, BCOM *Location: 1st Year Auditorium*
9:00 AM – 11:00 AM	**Poster Session** *Location: Seminar Rooms* *Rooms 152/153: Biomedical and Clinical/OMT Research* *Rooms 155/156: Population/Public Health and Medical Education Research*
11:00 AM – 12:00 PM	**Keynote Address** Dr. Howard S. Teitelbaum, DO, PhD, MPH, FAOCOPM Professor Emeritus of Michigan State University and Lincoln Memorial University *Location: 1st Year Auditorium*
12:00 PM – 1:30 PM	**Lunch** *Location: Patio*
1:30 PM – 2:00 PM	**Awards Ceremony** *Location: Patio*
2:00 PM – 3:00 PM	**Campus Tours** *Meeting Location: Front Lobby*

Welcome & Opening Remarks

Dr. Steven J. Ontiveros, MSRD Chair
Dr. Joseph Benoit, Assistant Dean for Research
Dr. Don Peska, Dean & CAO, BCOM

1st Year Auditorium
8:45 AM – 9:00 AM

Keynote Speaker

Dr. Howard S. Teitelbaum, DO, PhD, MPH, FAOCOPM
Professor Emeritus of Michigan State University and Lincoln Memorial University

Keynote Title

The Research Process – Tips and Traps for Clinical Diagnosis

1st Year Auditorium
11:00 AM – 12:00 PM

KEYNOTE SPEAKER

Dr. Howard S. Teitelbaum, DO, PhD, MPH, FAOCOPM

Professor Emeritus of Michigan State University and Lincoln Memorial University

Biographical Sketch

Howard S. Teitelbaum, DO, PhD, MPH, FAOCOPM is Professor Emeritus at both Michigan State University and the Lincoln Memorial University (LMU). He is a Distinguished Fellow of the American Osteopathic College of Occupational and Preventive Medicine.

Dr. Teitelbaum received his Doctor of Osteopathic Medicine degree from Michigan State University College of Osteopathic Medicine in East Lansing, Mich. He also holds a master of public health degree from Harvard University, a PhD and MA from Michigan State University and a BS in Mathematics from the California State Polytechnic College in Pomona, Calif. He completed his internship at Mount Clemens General Hospital in Mt. Clemens, Michigan and his residency in preventive medicine at the Yale University School of Medicine in New Haven Connecticut.

Dr. Teitelbaum has published numerous articles in peer-reviewed journals and has written a book entitled, Osteopathic Medical Education in the United States- Improving the Future of Medicine. He is also a reviewer for the Journal of the American Osteopathic Association. He has received numerous teaching awards during his career as a medical educator, including Professor of the Year at the Yale University School of Public Health, clinical Professor of the Year Award from LMU-DCOM students eight times in nine years and received LMU's Houston Award for Teaching Excellence in 2010. Dr. Teitelbaum has been named to the American Osteopathic Association's Mentor Hall of Fame every year since 1995. In 2011, Dr. Teitelbaum received the George W. Northup Educator of the Year Award from the national Student Osteopathic Medical Association.

In his career, he has served as Dean of the Des Moines University College of Osteopathic Medicine, Associate Dean for Research at the Lincoln Memorial University-DeBusk College of Osteopathic Medicine, the Director of Admissions at the Michigan State University College of Osteopathic Medicine, chaired numerous University and College committees all involved with higher education. He was part of the planning Committee for the Health Policy Fellows program and has been a presenter to that program since its inception. He has also been the team physician for the LMU Basketball and Soccer teams.

Biomedical & Clinical/OMT Research

Poster Session

Room: 152/153

9:00 AM – 11:00 AM

ABSTRACT #101

MILLION DOLLAR DRUG REVOLUTIONIZES HEPATITIS C VIRUS TREATMENT

Magana F, Hooshmand C, Ayala S, Sandhu S, and Kadavakollu S
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Introduction: Hepatitis C virus (HCV) infected patients are usually asymptomatic and as a result, patients can experience long-term effects such as cirrhosis, chronic liver disease, and liver cancer. Until recently, the standard treatment for chronic HCV has been a combination treatment of pegylated interferon and Ribavirin for 48 weeks. Harvoni is a combination pill approved to treat HCV genotype 1, 4, 5, and 6 and the benefits versus costs were investigated.

Methods: Peer reviewed journals were searched for data regarding mechanisms of action, treatment protocols, costs, and results. Data from public Gilead Sciences sources was also utilized.

Results: Hepatitis C virus infected patients are usually asymptomatic and as a result, patients can experience long-term effects such as cirrhosis, chronic liver disease, and liver cancer. Until recently, the standard treatment for chronic Hepatitis C has been a combination treatment of pegylated interferon and Ribavirin for 48 weeks. Harvoni is a combination pill approved to treat HCV genotype 1, 4, 5, and 6. Harvoni contains Sofosbuvir, a current drug used in HCV treatment, and a new drug, Ledipasvir. This combination therapy's mechanism of action is based on blocking replication of HCV by inhibiting the viral proteins Nonstructural protein 5A (NS5A) and Nonstructural protein 5B (NS5B). Harvoni has been shown to achieve 94 percent sustained virologic response (SVR) in participants who received Harvoni for eight weeks and 96 percent SVR in participants who received Harvoni for 12 weeks. This revolutionary drug offers new and effective benefits for patients suffering from HCV but comes at a price. The cost per unit dose of Ribavirin and Pegylated Interferon 2 alpha is $20.59 and $827.50, respectively. The cost of Harvoni per unit dose is $1125.00. This drug review aims to provide readily accessible data to physicians, researchers, students, and elucidate the current challenges presented to lower socioeconomic status patients with a need for HCV therapy.

Conclusion: Harvoni is the first combination pill approved to treat chronic Hepatitis C virus genotype 1, 4, 5, and 6. Harvoni has been shown to block replication of the Hepatitis C virus by inhibiting the viral proteins NS5A and NS5B, and is also the first medication developed that does not need to be taken along side interferon or ribavirin. This success has led to Harvoni becoming one of the simplest and least invasive HCV treatments on the market. Due to the high cost of production, this breakthrough drug has limited exposure to the population as a whole. Cost has made Harvoni unobtainable for patients of low socioeconomic status and thus cannot benefit the populations most at risk for acquiring HCV. The true potential of Harvoni will be revealed when it becomes financially available to the general public.

ABSTRACT #102

INNOVATIONS TOWARDS PATIENT CENTERED PROSTHETIC SYSTEMS: BREATHABLE LINERS

Marks RM[1,2], Zowada RT[1], Sanatkaran N[1], and Foudazi R[1]
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[2]Burrell College of Osteopathic Medicine, Las Cruces, NM 88001

Introduction: Lack of biocomparibility in structure and joint motion of nonphysiologic limbs persists even with the most advanced bionics. This leads to problems transcending the obvious structural deficits from the lost limb. For example, there are overlooked physical problems due to wear, pain, and compensatory mechanisms, psychological ramifications from the loss of self, adaptations to normal life, and social alienation, in addition to lack of patient accessibility to the best devices, therapists, and knowledge of changes in their health care. This project chose to start with the easily overlooked consequence of wearing a prosthetic: integumentary morbidity. The liners that are worn underneath the rigid prosthesis disrupt the homeostatic and immune functions of the hair follicles, glands, and normal flora, causing the biological mechanisms of protection to instead be reversed and threaten the overall health of the patient. Current liners are made of hydrophobic, nonporous silicone and polyurethane originally chosen for their unique mechanical properties, however, they do not allow heat nor sweat escape the limb-liner interface. Skin erosion takes place due to the pistoning effect caused by the intrinsic motion of the suspension system of the device itself and to the external longitudinal motion between the limb and device caused by heat and sweat buildup. This environment promotes a variety of conditions from bacterial and fungal infections to potential epidermoid cysts or malignancy. These conditions threaten re-amputation in all amputees but are especially dangerous in amputees with wound healing deficits due to peripheral vascular diseases (PVD) or radiation therapy who make up the majority of all amputee patients. In the PVD amputee patient population, an estimated 54% require a subsequent amputation where there is already just a 50% 5-year survival rate from the first amputation date. Although this risk is commonly identified, most advancements are not fully effective as they are adding features to current liners instead of addressing the underlying problem: poor material properties.

Methods: The project redesigned the core structure of the liner material without using either of the past materials even as a base construct material. We combined one polymer with favorable strength and structural stability with another biomimetic polymer that allows elasticity and hydrophilicity into a porous copolymer using a unique polymerization technique. This new formulation and material design balances the mechanical robustness needed for weight bearing with interconnected pore spaces for sweat and air flow through the structure.

Results: We have made an array of materials with these properties. The next steps include specifying the range of formulation combinations that provide a functional liner while allowing patient individualization. This includes extensive mechanical testing, absorption simulations, microbial growth potential and washing testing, scaling up to creating liners to full sized limb casts, and eventual clinical trials.

Conclusion: Achieving this unique balance of properties within a prosthetic liner will prevent skin wear, decrease microbial growth potential, and increase patient's comfort when translationally incorporated into current prosthetic systems. As the leading causes of post-amputation morbidity is skin infection and pain, this project has the potential to improve not only the quality of life but potentially the length in high risk populations such as those with PVD. This project is one of an intended series to address overlooked design flaws to take steps towards bridging the gap between engineering design and knowledge of patient centered care.

ABSTRACT #103

GENE REGULATORY NETWORKS CAN ACCURATELY IDENTIFY IMPORTANT GENES IN ZEBRAFISH CARDIOGENESIS AS DEMONSTRATED BY CAMTA1 KNOCKOUT

Taylor ZD[1], Ontiveros SJ[1], and Hill JT[2]
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[2]Department of Physiology and Developmental Biology, Brigham Young University, Provo, UT 84602

Introduction: Congenital heart defects continues to be one of the most common birth defects, affecting about 40,000 neonates each year. Many of the defects are due to improper looping of the developing heart. In zebrafish, a widely used model system for investigating heart development, the heart develops from a tube into a simple two chambered heart in the period of approximately 72 hours. The process of cell differentiation, proper chamber morphology, and valve formation, is controlled by a network of connected genes, many of which are not well understood. Our aim is to better characterize the genes and the gene interactions that are responsible for proper cardiogenesis. One of the genes that we believe could have an important role in cardiogenesis is camta1. In the adult heart, camta2 has been shown to function to cause hypertrophy and growth of the heart. Previous analysis of the camta1 and camta2 gene structures shows considerable conservation between the two genes. However, temporal expression patterns of the two genes do not overlap. Camta1 is found to be expressed in high levels during cardiogenesis, while camta2 is expressed only in the adult heart. For this reason, we identified camta1 as a target for investigation.

Methods: We developed an embryological zebrafish heart genetic expression profile by analyzing expression patterns during zebrafish cardiogenesis via RNA-sequencing. The differential expression of the genes were analyzed and sequence alignment was matched to known gene-gene interactions in the human heart. Zebrafish embryo hearts were collected at 6-hour intervals from 30 to 72 hours. RNA was prepared using TRIzol RNA purification protocol. To test the effects of a camta1 knockout, CRISPR/Cas9 system targeting camta1 was injected into one-cell zebrafish embryos. To aid in the visualization and analysis of heart morphology, injected zebrafish embryos contained GFP positive hearts. Prior to injection, the CRSIPR/Cas9 was tested using an in vitro cut assay on amplified camta1 DNA products.

Results: In approximately 25% of the injected embryos, it was observed that the heart morphology was atypical, displaying an enlarged atrium and shrunken ventricle. As anticipated in such a severe morphological defect, none of these embryos survived to adulthood. The phenotype observed in these zebrafish embryos resembled the observed phenotype of nkx2.5 knockout lines. Nkx2.5 has been well characterized and has been demonstrated as an important factor for proper heart development. However, to fully understand the regulation of nkx2.5 and its downstream mediators, further investigation is needed.

Conclusion: This data suggests that camta1a may play a critical role in zebrafish cardiogenesis, and could potentially interact with other cardiogenic factors such as nkx2.5 due to the morphological similarities observed.

ABSTRACT #104

ROLE OF CANONICAL NFκB SIGNALING WITHIN THE PULMONARY EPITHELIUM IN THE DEVELOPMENT OF ALLERGIC AIRWAY INFLAMMATION IN RESPONSE TO PRIMARY PULMONARY INFECTION WITH *CRYPTOCOCCUS NEOFORMANS*

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[2]Department of Biomolecular Chemistry, School of Medicine and Public Health, University of Wisconsin-Madison, Madison, Wisconsin, United States of America
[3]Department of Medical Microbiology and Immunology, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, United States of America
[4]Department of Internal Medicine, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin, United States of America

Introduction: Pulmonary challenge with the ubiquitous fungus *Cryptococcus neoformans* results in allergic airway inflammation (AAI) characterized by robust recruitment of eosinophils and T-cells producing type 2 cytokines to the lungs. Previous studies have demonstrated a critical role for NFκB activation within lung epithelial cells (LECs) in driving AAI in response to protein allergens, yet the role of LEC-intrinsic NFκB in promoting AAI following exposure to *C. neoformans* is poorly understood.

Methods: To investigate the role of LEC-intrinsic NFκB in promoting AAI following *C. neoformans* challenge, we utilized $IKK^{\Delta LEC}$ mice, which lack canonical NFκB activation specifically within LECs. $IKK^{\Delta LEC}$ and littermate control mice were intranasally challenged with 10^6 CFU of *C. neoformans* strain 52D, and lung tissues were collected at days 7, 14, and 21 post infection to assess the development of AAI.

Results: Notably, the absence of epithelial NFκB signaling did not affect the magnitude or kinetics of lung eosinophilia when compared to the response in wild-type control mice. The total numbers of lung T-cells producing the type 2 cytokines IL-5 and IL-13 also were unchanged in $IKK^{\Delta LEC}$ mice. Furthermore, $IKK^{\Delta LEC}$ mice showed no defect in the recruitment of protective IFNγ-producing CD4 T-cells to the lungs, fungal clearance, or host survival as compared to controls. Immunofluorescence imaging surprisingly revealed no evidence of nuclear localization of NFκB in LECs in response to *C. neoformans* challenge, indicating that NFκB is not activated within these cells.

Conclusion: Taken together, these data strongly suggest that NFκB signaling within LECs does not promote AAI observed in response to *C. neoformans* pulmonary infection.

ABSTRACT #201

ALTERED CEREBROCORTICAL ACTIVITY IN PATIENTS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Introduction: Recent studies have suggested that an anterior cruciate ligament reconstruction (ACLR) correlates with neuroplastic changes in the brain associated with muscle coordination. However, it remains unclear how an ACLR patients' brain responds during postural control, which is a good clinical indicator for muscle coordination. The purpose of this study is to examine differences in brain activity during postural control testing between ACLR patients and healthy controls.

Methods: Data collection is ongoing, currently four healthy controls (CONT; 21.8 ± 2.2yrs, 84.8 ± 28.3kg, 180.3 ± 5.08cm) and four ACLR patients (ACLR; 28.5 ± 10.7yrs, 83.9 ± 23.3kg, 179.1 ± 10.5cm) participated. Frontal theta (Fz, 4-8Hz) and Parietal alpha-2 (Pz, 10-12Hz) electrocortical activations (μV^2/Hz) were quantified using mobile electroencephalography (EEG) during one-legged postural stability testing. Independent t-tests were used to determine electrocortical activation differences between groups.

Results: The ACLR had a lower Alpha-2 power at *Pz* (32.71 ± 3.33 μV^2/Hz) compared to the CONT (38.76 ± 3.24 μV^2/Hz) during postural control ($p = 0.041$). No difference in frontal Theta power existed between the groups (ACLR; 38.46 ± 1.02μV^2/Hz, CONT; 41.63 ± 4.34 μV^2/Hz, $p = 0.205$).

Conclusion: Our findings reveal a decrease in parietal Alpha-2 power in the ACLR patients compared to the healthy controls, with no difference in frontal theta power between groups during postural control. These suggest that ACLR patients may have greater neural demands in the somatosensory cortex to compensate for altered proprioception from the reconstructed knee. During critical decision making, such as high intensity athletics, this heightened somatosensory cortex activation could disrupt the rapid response mechanisms, and it may explain why some ACLR patients suffer poor muscle coordination and are at higher incidence of re-tear.

ABSTRACT #202

REGULARLY APPLIED LYMPHATIC PUMP TECHNIQUE REDUCES DURATION OF UPPER RESPIRATORY INFECTIONS

Ellis M, Hanka E, Javadi S, Liao V, Margaria B, Reyes S, Richardson S, Roque R, Siegel R, Wu M, Yao P, Laboy III F, and Shipley T

Department of Osteopathic Manipulative Medicine (BCOM Multispecialty Clinic), Burrell College of Osteopathic Medicine, Las Cruces, NM 88001

Introduction: Studies in canines of the effects of lymphatic pump techniques (LPT) have shown that LPT mobilizes leukocytes, thereby providing rationale that LPT may enhance immunity. Moreover, in post-operative cholecystectomy patients that received LPT, “earlier recovery and quicker return to preoperative values" with regard to forced vital capacity has been demonstrated. However, longitudinal evaluations of the effects of utilizing regular LPT to ameliorate disease outcome has not been investigated in humans. We hypothesized that administration of regular LPT to non-immunocompromised human subjects would reduce frequency and/or duration of upper respiratory infections (URIs).

Methods: Following approval by the Burrell College of Osteopathic Medicine (BCOM) institutional review board (IRB), participants were recruited from BCOM student, staff, and faculty populations, as well as students from New Mexico State University (NMSU). During twelve weeks of the cold and flu season, LPT was administered three times per week to the experimental group while the control subjects received sham treatments three times per week. Data were gathered during each visit through self-report surveys given to the participants. Seventy-six participants completed the study out of 86 who enrolled.

Results: Among the 76 participants who completed the study, there was a statistically significant difference in duration of illness with 6.96 days duration of illness in the experimental group and 9.81 days duration of illness in the control group ($p=0.0463$).

Conclusion: The results suggest that regular application of LPT reduces duration of URIs, and supports the concept that regularly applied lymphatic techniques increase lymphatic flow/drainage and immune surveillance to enhance immunological responses against infections. These data are in line with research conducted by Noll, et al 2010, which demonstrated decreased length of hospital stays, reduced antibiotic treatment, and reduced morbidity/mortality in pneumonia patients who received Osteopathic Manipulative Treatment (OMT) during their hospital stay.

ABSTRACT #203

"I CAN'T WALK!" A UNIQUE PRESENTATION OF A SACRAL OSTEOGENIC SARCOMA IN RURAL TANZANIA

Mssika N, Jiganti M, and Waggner R
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Introduction: Osteosarcomas belong to a mesenchymal tumor family originating from bone. This family also includes other highly heterogeneous subtypes including ewing sarcoma, fibrosarcoma and chondrosarcoma. Osteogenic sarcoma is the most frequent malignant primary bone tumor, with higher incidence in adolescents, most frequently affecting long bones. Sacral involvement is not common.

Case Presentation: In the present case, an otherwise healthy 16 year-old male presented to a rural clinic in Arusha, Tanzania with the chief complaint of "I can't walk". His symptoms started about 6 months prior after a minor tackle to the low back during a friendly soccer match. Over the next several months, he noticed progressively worsening low back pain and paresthesia along with weakness of the lower extremities. Prior evaluations by multiple local medical providers failed to identify key physical findings and no diagnostics studies were obtained. Approximately 2 weeks prior to his presentation he noticed weak urine flow and constipation. Osteopathic structural examination was significant for lumbar tissue texture changes, vertebral tenderness, diminished pain and temperature sensation of bilateral lower extremities in addition to gross ataxia. A non-contrast magnetic resonance imaging (MRI) of the lumbar spine showed an ill-defined presacral/sacral mass largely extending from S1 to S3 vertebrae measuring 9cm x 2.5cm x 8cm. A biopsy revealed infiltrating neoplasms composed of large spindles with oval hyperchromatic prominent nuclei and prominent nucleoli, consistent with sacral osteogenic sarcoma. The patient was consulted by an oncologist and a neurosurgeon who deemed the tumor to be inoperable, so he was discharged home and expired on the date of this abstract submission.

Discussion: A review of relevant literature highlights the pathophysiologic processes, standard diagnostics, and management options for sacral osteosarcomas. In this case presentation we will highlight the importance of the osteopathic structural physical examination and its correlation with symptomatology. Lastly, we will discuss barriers to treatment currently existing in Tanzania as related to medical infrastructures and the financial constraints.

ABSTRACT #204

A NOVEL METHOD FOR DIAGNOSING SACROILIAC JOINT DYSFUNCTION: SACROILIAC JOINT GAPPING – A PILOT STUDY

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Introduction: Sacroiliac joint dysfunction (SIJD) is a common cause of lower back pain. Some studies have shown that 15-30% of lower back pain is due to SIJD. Trauma, childbirth, and obesity have all been implicated in contributing to SIJD, making it a common cause of lower back pain. However, due to vague pain presentation and lack of reliable diagnostic exams, SIJD is often difficult to accurately diagnose. The aim and purpose of this project is to evaluate the sacroiliac joint gapping exam (SIGE) for its accuracy and reliability in diagnosing SIJD.

Methods: Up to this point, we have evaluated the sacroiliac joint in two phases. Phase one addressed the differences between SIGE and the current gold standard non-invasive exam. Currently, the most commonly used and taught non-invasive exam for diagnosing sacroiliac joint dysfunction is the standing flexion test (SFT). We gathered 70 participants for phase one. The participants were divided into two groups to be evaluated with both SIGE and SFT. One group was evaluated with SIGE first, while the other was evaluated with SFT first. The results were then analyzed using the Fisher exact text for binomial data. In phase two, we collected 10 subjects at random and used the SIGE to diagnose any pelvic innominate somatic dysfunction. Firstly, we lateralized the sacroiliac joint with the SIGE, followed by assessment of the anterior superior iliac spine (ASIS) and the posterior superior iliac spine (PSIS). After these landmarks were thoroughly assessed, we determined an innominate diagnosis and treated the associated somatic dysfunction utilizing muscle energy. After treatment was completed, the patient's ASIS, PSIS, and sacroiliac (SI) joints were reassessed.

Results: In phase one, it was found that only 55.7% of the participants produced the same results between the two exams. When analyzed with the Fisher's exact test for count data, the difference between agreement and non-agreement produced a p-value of 0.3337, indicating no significant difference between the agreement and non-agreement. In phase two, we found that five patients had the same SIGE lateralization, four patients had the opposite SIGE lateralization, and lastly one patient was determined to be symmetrical after muscle energy treatment of the pelvic innominate. When comparing initial ASIS positioning pre- muscle energy treatment with reassessment of the ASIS positioning post- muscle energy treatment, nine out of the ten patients showed improvement, whereas one patient out of the ten patients demonstrated no improvement. Additionally, when comparing initial PSIS positioning pre-muscle energy treatment with reassessment of the PSIS positioning post-muscle energy treatment, seven out of the ten patients showed improvement, two out of the ten patients showed symmetry, and lastly one out of the ten patients showed no improvement.

Conclusion: The data from phase one and phase two indicates that the SIGE produces different results compared to the SFT. At this point more data needs to be collected for the phase 2 aspect before any conclusions can be determined.

ABSTRACT #205

MISSED OPPORTUNITIES FOR DIAGNOSIS OF NEW ONSET TYPE 1 DIABETES DURING MEDICAL ENCOUNTERS WITHIN FOUR WEEKS PRECEDING DIAGNOSIS

Vidal K, Snell-Bergeon J, Pyle L, and Alonso GT
Barbara Davis Center for Childhood Diabetes, University of Colorado, Aurora, CO; Department of Pediatrics, University of Colorado School of Medicine, Aurora, CO; Department of Biostatistics and Informatics, Colorado School of Public Health, Aurora, CO

Introduction: Diabetic ketoacidosis (DKA) is the most common cause of hospitalization and death in children with type 1 diabetes mellitus (T1D), and nearly 50% of children newly diagnosed with T1D in Colorado experience DKA at diagnosis. Risk for DKA increases when treatment is postponed due to delay in seeking medical care or missed diagnosis by a healthcare provider. The causes of delayed diagnoses of new onset T1D were investigated.

Methods: Medical records were reviewed for 407 patients aged 18 years and under with new onset T1D seen at the Barbara Davis Center in Aurora, CO between 2011 and December 2016. New onset dates, diabetes type, and DKA at diagnosis were validated through chart review. All heath care encounters within 4 weeks preceding diagnosis or T1D were obtained from All Payer Claims Database (APCD). Descriptive statistics were obtained by group (DKA at onset and missed opportunity, DKA at onset and no missed opportunity, no DKA at onset and missed opportunity, no DKA at onset and no missed opportunity) for each predictor of interest. Descriptive statistic were also obtained by DKA onset and by missed opportunity. Two-sample Satterwaite t-tests were utilized to determine whether there was a significant difference in continuous variable between DKA 'yes' and DKA 'no' participants and Chi-squared tests and Fisher's exact tests were used for categorical variables. The same was done for grouping by missed opportunity. A frequency table of missed opportunity and DKA at onset was obtained and a chi-squared test was utilized to determine whether there was a significant association between DKA at onset and missed opportunity. Logistic regression was used to determine whether there was a significant association between each predictor variable of interest and DKA at onset, as well as with missed opportunity.

Results: 87 patients (21%) had at least one healthcare encounter in the month preceding diagnosis. Of these, 59% (N=51) presented in DKA at diagnosis, compared to only 49% (N=36) of patients without a missed opportunity for diagnosis (p=0.10). Patients with DKA at diagnosis had a hemoglobin A1c (HbA1c) of 12.3%, while patients with no DKA at diagnosis had a HbA1c of 10.9% (p=0.91). The odds of having DKA at onset increase 1.3 times for every additional % in A1c (p<0.0001) at diagnosis.

Conclusion: Because the data regarding health care setting, provider credentials, and insurance type has not yet been obtained, this project is still underway. Next steps will include multivariate modeling to explore how demographics, community level socioeconomic indicators, healthcare setting, and provider types are associated with the outcomes of DKA and missed opportunity for diagnosis. Temporal trends will be explored. Risk factors for missed opportunity for diagnosis of T1D will be identified and will allow clinicians to design and test interventions to support healthcare providers in the diagnosis of T1D in children.

Population/Public Health & Medical Education

Poster Session

Room: 155/156

9:00 AM – 11:00 AM

ABSTRACT #301

BARRIERS TO CARE: A RURAL MAYA INDIGENOUS WOMAN WITH A RARE CHRONIC DISEASE

Cnop K, Martinez B, and Austad K
Maya Health Alliance | Wuqu' Kawoq

Introduction: The rising burden of chronic non-communicable diseases offers insight into the shortcomings of health systems. In this case report, we detail the presentation and treatment of a 28-year-old indigenous Guatemalan woman with severe Dermatomyositis (DM) in relation to lack of provider capacity, limited infrastructure to test and treat rare diseases, and poor continuity of care. This case report also highlights challenges with chronic non-communicable disease care and potential solutions for management of such complex diseases in a low-resource setting.

Methods: This patient initially presented at a local government-run healthcare facility where she received oral steroids and a presumptive diagnosis of DM. She was lost to follow up due to cultural, financial, and transportation barriers. Months later, she presented to a non-governmental organization tailored to the needs of Maya patients with severe dysphagia, hypophonia, numerous dermatologic findings, and weakness that prevented her from sitting. Care began immediately with home IV pulse dose methylprednisone in the absence of first-line biologics. After initial improvement of symptoms and conduction of laboratory and genetic studies, longitudinal care included intense patient and family education, multiple medications to treat DM and associated symptom, and physical therapy over biweekly to weekly home visits.

Results: Her initial labs results revealed elevated creatinine phosphokinase (CPK) of 14,644 U/L and CK-MB of 1367, in addition to a positive ANA 1:80, positive anti-double stranded DNA antibody 1:70, and negative anti-Jo antibody, confirming the diagnosis of DM. After 6 months of treatment the patient obtained a CPK of 373 U/L, CK-MB of 53.1 UI/L, AST of 30 UI/L, and ALT of 32 UI/L. Through longitudinal home-based care, she achieved a symptom free recovery.

Conclusion: Through this case of DM in an indigenous Guatemalan woman, we provide potential solutions for health management and treatment of chronic diseases in low-resource settings, with particular attention to social determinants of health.

ABSTRACT #302

NO GIRLS ALLOWED: GENDER THREAT, MALE DOMINANCE, AND MASCULINITY CREATE A PERFECT STORM FOR WORKPLACE AGGRESSION

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Introduction: Higher prevalence of gender harassment has previously been identified in male dominated workforces, but not in academia. Factors such as implicit bias, male dominance, perceived gender threat, and heightened masculinity may increase the likelihood of gender harassment occurring in an academic setting.

Methods: College males and females from male dominated (MD) and gender equivalent (GE) majors were recruited for Study 1 and males from MD and GE majors were recruited for Study 2. In Study 1, explicit attitudes regarding gender and authority, and implicit associations regarding gender and careers, were measured. Additionally, female participants completed a sexual experiences questionnaire. In study 2, men from MD majors completed a group task with a female confederate leader serving as a gender threat in half the conditions, and then had their subsequent affect, perceptions of leadership effectiveness, and behavioral aggression measured.

Results: In study 1, men from male dominated majors did not exhibit more *explicit* attitudes favoring men in authority than men from gender equivalent majors (p = .220, d = .26), but did exhibit more *implicit* bias stereotyping men as associated with careers and women with the family (p = .017, d = .51). Additionally, females from male dominated majors experienced more gender harassment than females from gender equivalent majors (p = .017, d = .55). In study 2, Men from male dominated majors and men who had received a gender threat did not differ from men from gender equivalent majors and men who had not received a gender threat on affect, perceptions of leadership effectiveness, or behavioral aggression (ps > .201, $\eta p2$s ≤ .007). However, additional analyses revealed that as masculinity increased among men from male dominated majors under gender threat, they became more behaviorally aggressive (b = 5.92, p = .003) and perceived their female's leader's leadership as being less effective (b = -0.83, p = .076).

Conclusion: Based on these findings, it is recommended that future research on gender harassment focus on men from male dominated majors who are high on masculinity, and work on ways to improve the experiences of women in male dominated majors.

ABSTRACT #303

PUBLIC HEALTH EFFECTS OF RECREATIONAL MARIJUANA LEGALIZATION IN WASHINGTON

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Introduction: Over the past decade marijuana reform has become a major chief concern with a steady increase in public support for legalization. The purpose of this research is to compile and describe statistics related to the legalization of recreational marijuana in the context of public health in the state of Washington, with the intention of serving as a model for states with current legalization campaigns since estimates show that six to eight states will consider and/or vote on legalizing recreational usage.

Methods: This study addresses and analyzes data related to recreational marijuana before and after legalization in the state of Washington. Six variables were chosen which include, youth usage rates, traffic safety and motor vehicle accidents, tax revenue, marijuana related-crime, treatment admissions, and teen educational attainment as a means to quantify public health effects. These variables were selected based on the availability on the data and due to the highly contested nature of these items. In short, researchers relied on existing data where possible and contacted departments for data where necessary.

Results: The Washington State Marijuana Impact Report (2016) indicates that Washington youth marijuana usage rates have been 2-3% higher than the national average. Northeast Seattle high schools reported an increase in seniors attending school under the influence of marijuana and an increase in the confiscation of drug paraphernalia. Obtaining a blood sample is a big challenge in enforcing marijuana impaired DUI laws. There is a delay in drawing blood of active THC positive drivers (median time 139-165 min), indicating that impaired driving is highly underestimated. Between January and April 2015, 44% of marijuana DUI cases were over the legal limit of 5 ng/ml. According to the Washington State Marijuana Impact Report, between June 2014 and July 2015, total revenue of state tax was $76,621,302 and $11,031,511 from recreational marijuana and medical marijuana markets respectively. Between the years of 2011 to 2013, the number of primary narcotics offenses decreased by 57.58%, while marijuana-related incidents decreased by 57.81%. Overall, all categories of marijuana law violations are down 63% and marijuana-related convictions are down 81%. Standardized test scores in reading proficiency of high school students in Washington show no significant changes since legalization, however, research has demonstrated a decline in cognitive development due to white matter damage.

Conclusion: The data reflects that youth usage rates in Washington are higher than the national average, and have remained steady among youth since legalization. School systems have identified an increasing trend in the amount of students attending school with marijuana intoxication, which could suggest that a normalization is taking place among youth. Marijuana intoxication found in drivers in fatal car crashes has doubled since recreational legalization. Although these findings maybe attributed to many factors, it is important to note that marijuana has been tied to decline in acute mental cognition. Marijuana-related crime has decreased the board, and marijuana-related incidents, offenses and convictions are all down. Data on educational attainment rates is scarce, but there seems to be no effect on reading proficiency among high school students in Washington, despite studies demonstrating links between youth use and decline in cognitive development.

ABSTRACT #304

MRSA & MEDICAL STUDENTS: A LONGITUDINAL COHORT STUDY

Hooshmand C, Ayala S, Meza S, Ponce de Leon M, Ortega A, Lay WT, Johnson E, Dominguez D, Woods M, and Bramblett D

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Introduction: Methicillin resistant staphylococcus aureus (MRSA) poses a health risk to both hospital patients and members of the community. Medical students play an active role in the care of hospital patients and may play a role in the transmission of this bacteria. It is unclear whether medical students acquire MRSA as they transition from their preclinical to clinical years. We hypothesize that medical students will acquire nasal colonization of MRSA as they transition from their preclinical to clinical years.

Methods: Nasal swabs will be performed on subjects and controls and streaked for isolation on Mannitol Salt Agar. If mannitol fermentation is observed, a coagulase test will be performed to ensure the species is S. aureus. If the samples result in being coagulase positive, the DNA will be extracted using Qiagen's DNeasy Blood & Tissue Kit according to the manufacturer's instructions for gram-positive bacteria. The amplicons will be viewed on a 2% agarose gel containing ethidium bromide.

Results: 36 samples have been collected thus far from 32 subjects and 4 controls. 33.3% of the samples have resulted positive for S. aureus. At this point, none have resulted in being positive for MRSA.

Conclusions: Preliminary results thus far show no positive results for MRSA. Of the isolates obtained, 33% were positive for S. aureus. This is in line with our hypothesis that medical students will acquire MRSA as they transition from preclinical to clinical years. We hope that the results of this study will help improve patient outcomes in the future by contributing to the research on nosocomial infections.

ABSTRACT #305

PUBLIC HEALTH EFFECTS OF RECREATIONAL MARIJUANA LEGALIZATION IN THE STATE OF OREGON

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Introduction: According to the National Institute of Drug Abuse, research suggests that tetrahydrocannabinol (THC), the principal psychoactive component of cannabis and other cannabinoids may have potential in the treatment of pain, nausea, epilepsy, obesity, wasting disease, addiction, autoimmune disorders, and other conditions. Previous discourse nationwide has centered on medicinal marijuana and its use for medicinal purposes, however there is an increasing wave of recreational marijuana legalization sweeping the nation, which warrants discussion on the public health effects of such legalization. Currently, twenty-nine states plus the District of Columbia have legalized medicinal marijuana. Additionally, seven states plus the District of Columbia have legalized marijuana for recreational use. Estimates indicate that over ten states will consider recreational marijuana legalization in 2017, and even more in coming years. The purpose of this study is to examine the public health effects of recreational marijuana legalization in the state of Oregon in hopes of serving as a model system to make known the possible effects of legalization and to inform potential legislative efforts on this matter in the state of New Mexico. The independent variable will be defined as recreational marijuana legalization. The dependent variables will be defined as youth usage rates, traffic safety and motor vehicle accidents, tax revenue, marijuana related crime, treatment admissions, and teen educational attainment. Our goal is to establish the relationship between legalization of recreational marijuana and the effects on the public health.

Methods: This is a retrospective review and analysis of information pertaining to the use of recreational marijuana that was collected from the Public Health Division, and data from the Multnomah County Health Department senior research scientist and epidemiologist, Julia Dilley. Statistics on youth usage rates, traffic safety, marijuana related crime, and treatment admissions were gathered from Julia via e-mail and the published annual marijuana report of the Oregon Public Health Division. Statistics on the effects on educational and tax revenue was determined from other public domains and peer-reviewed articles.

Results: Data reflects that youth usage rates of marijuana in Oregon are higher than the national average. There is a correlation of increased use among youth where marijuana is being grown. The state of Oregon found that a third of adult users admit to driving within 3 hours of marijuana use. Results have shown that cannabis impairment while driving has increased, while traffic collisions and fatalities have remained stable. Marijuana related crime has decreased in all categories including marijuana related incidents, offenses and convictions. Marijuana treatment admissions to emergency departments have increased dramatically in 2016. Oregon high school graduation rates have increased. Overall, tax dollar revenue has increased in Oregon as a result of legalizing marijuana for recreational use.

Conclusion: This analysis demonstrates both advantages and disadvantages of recreational marijuana legalization in the state of Oregon, which could prove vital to states that are considering legalization in the future. One parameter that is important to assess is the actual relatedness of high school graduation rates and legalization. Due to the wide variability in factors affecting teen educational attainment, it is hard to directly comment on the relatedness of marijuana usage to high school graduation rates. We did observe an increase in emergency department treatments for marijuana, but these could be attributed to either increased usage or that individuals are more willing to receive treatment for incidents since the legalization. One interesting result was an overall decrease in violent crimes, but additional studies are needed to correlate with the legalization. Overall, additional parameters will need to be evaluated in order to make a full assessment on the public health effects of the legalization of marijuana.

ABSTRACT #307

NEW MEXICO AND THE IMPACT OF THE ACA

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Introduction: In 2010, the Obama Administration signed into law one of the most comprehensive medical system reforms observed within the U.S. The Patient Protection and Affordable Care Act (ACA) provides states the option to expand the Medicaid policy for the uninsured population and lowers eligibility requirements to individuals under the age of 65 with annual incomes at or below 138% below federal poverty levels (FPL). Despite being signed into law more than 5 years ago, the impacts of such a momentous reform are still unknown, especially if the current administration intends on repealing the ACA. Our study aims to analyze the impacts of the ACA on the state of New Mexico and the potential effects if repealed.

Methods: We are performing a comparative analysis for the state of New Mexico before and after the ACA was enacted. The information and data regarding the ACA's impact on New Mexico was collected through databases such as the New Mexico Department of Health, U.S. Census Bureau, and peer-reviewed articles from PubMed. Peer-reviewed articles that emphasized New Mexico's health outcomes and percentage of uninsured individuals from 2006 until the present were analyzed to illustrate the benefit of the ACA's implementation in 2010 for the state's elderly, rural, and underserved populations.

Results: Before the ACA, many of the implemented programs in New Mexico were intended to increase healthcare accessibility and improve the state's health outcomes. In 1997, the University of New Mexico Care program collaborated with the Advanced Health Care Clinic to provide healthcare services, which resulted in a reduction in the number of clinic visits of uninsured Bernalillo County citizens, and a 31% decrease in follow-up visits by these patients. In 2005, the Behavioral Health Care Reform developed a consumer driven, care appropriated affordable healthcare to low-income individuals. Regardless of these efforts, from 2006-2009 the number of uninsured individuals from the ages 0-64 was around 24.8%, which was significantly higher when compared to the National average of 16.9%. Once the ACA was implemented, additional coverage options became available, but its effects on the uninsured population remained an issue. The effectiveness of the Medicaid expansion policy depends heavily on states' decision to move forth with its changes. The Kaiser Family Foundation reported an approximate number of 3 million uninsured who fell within the range between 44% FPL and 100% FPL that would have been eligible for Medicaid – if their residing state had opted to expand policies. Interestingly, for those states that opted out of Medicaid expansion, data demonstrates that the number of uninsured individuals will continue to remain unchanged. One study determined that the insured were more likely to have routine female health screenings and physical exams than the uninsured. The uninsured were less likely to have chronic health conditions compared to their insured counterparts, thus the uninsured saw no significant benefit in adopting a health plan. One issue concerning impoverished states, such as New Mexico, is the inflexibility to withstand changes that affect the access of healthcare to lower socioeconomic classes.

Conclusion: A repeal of the ACA as well as the removal of the Medicaid Expansion without an efficient replacement for New Mexico's unique needs would have dire effects on the state's population, and most likely result in pre-2014 levels of mortality and decreased life expectancy. Closer investigation of the data, cultural health needs, and distance between healthcare facilities illustrates an increased need for supplementary healthcare funding for the most sensitive populations, such as Native Americans, children, and the elderly.

ABSTRACT #401

DEVELOPMENT OF AN ONLINE, MEDICAL EDUCATION TOOL FOR PHARMACOLOGY

Jiganti M, Henke P, Hunsaker B, Reinken R, Edge L, Nelsen A, Garnat A, Check L, Ivey K, Nguyen T, Chan C, Longmore R, and Milane L
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Introduction: In the current electronic world, there is a demand for online educational resources that reinforce medical knowledge in preparation for the United States Medical Licensure Exam. Once downloaded, students will be able to access the study program on their laptops to fulfill this demand. Students at Burrell College of Osteopathic Medicine (BCOM) desire a pharmacology review tool that summarizes drug prototypes for each drug class, has question/answer functionality, and links each drug class to prior curriculum content. This comprehensive tool will enable students to review drug classes, solidify knowledge and recognize knowledge gaps, and directly navigate to connected content and recorded lectures in the prior Year 1 and Year 2 curriculum. Ultimately, our unique pharmacology study tool will aid medical students' performance and the modular design of this platform can be adapted for any medical school curriculum. IRB has not been achieved and our goal is to apply after our national board test in the summer of 2018.

Methods: Students at BCOM will be given access to the pharmacology study tool to use at their own will. The online tool (developed using Articulate's© Storyline 360™ software) is a flash-review study resource for each drug class and includes parameters such as mechanism of action, indications, contraindications, toxicity, and pharmacokinetics. Content for each drug class was developed in Microsoft® PowerPoint and imported into Storyline 360™ software. Content was then arranged in a modular/menu design within the software. The resource includes a question/answer bank and curriculum mapping by providing links to relevant lecture recordings where specific drugs and/or indications are discussed by BCOM faculty. In May, a survey will be given to students who have used the tool as a study aid. This survey will determine the frequency of use, total time of use, and student's background pharmacology knowledge prior to use. This survey will generate the efficacy of our study tool compared to others, once results of the study are gathered. For the study, a short pharmacology quiz will also be given to the Year 1 and Year 2 Medical Students to aid in evaluating the tool. The quiz will be taken both before and after substantial use of the tool. The quiz results will be evaluated along with the self-reported data to evaluate the utility of the tool.

Results: The online flash card program has been made, however, evaluation is to be determined of this tool and will be self-determined by current second year BCOM students, through the use of a Likert scale survey. The tool will also be evaluated by first year medical students who will be given the survey and a 'before and after use' pharmacology quiz (25 questions). The survey will evaluate the efficacy of the tool by assessing previous exposure to pharmacology, number of times per month the student used the tool and their duration of use per study session. The quiz results and data will be analyzed to assess the utility of the tool in helping students retain pharmacology knowledge.

Conclusion: An online pharmacology education tool that provides flash review of drug class data, question and answer banks, and curriculum mapping may solidify comprehensive pharmacology knowledge, promote knowledge retention, and result in higher exam scores. The tool's greatest potential impact on users will be provided by the accessibility of links on each card that will contain lectures on the drug being studied. This will provide a 'double-coding' feature to the study plan that will help knowledge retention. We plan to apply for IRB approval and begin collecting data on classes are BCOM following are national board exam in the summer of 2018.

ABSTRACT #402

EFFICACY OF COLLABORATIVE TESTING FOR LONG-TERM RETENTION OF MEDICAL KNOWLEDGE

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Introduction: Collaborative testing is a trending tool in higher education where 2-3 students are grouped together to complete an exam (Rao, Collins & DiCarlo, 2002). Research has shown that collaborative testing enhances student learning and retention when compared to individual testing (Cortight, Collins, Rodenbaugh, & DiCarlo, 2003). However, the existing literature does not address how collaborative testing affects long-term knowledge retention, which is critically important for medical students who must retain knowledge for clinical application and board exams. Mixed methods were used to study the effects of collaborative testing on long-term knowledge retention, as well as how students approach and perceive collaborative testing.

Methods: First-year medical students were tested on basic science knowledge through two renal course exams spaced 1.5 weeks apart. For each exam, questions were equally divided into two conditions: "collaborative testing" and an "exam review" group. Both testing conditions consisted of groups of 2-3 students. For collaborative testing, groups discussed and answered exam questions after completing the exam individually. However, the correct answers were never revealed. The exam review groups reviewed exam questions with the correct answers provided. To rule out a temporal effect, the students were randomly divided into two groups. The exam was also divided in half. Group A took their collaborative questions immediately after the individual exam followed by the exam review of questions with answers, and Group B experienced the two conditions in the opposite sequence. To assess long-term knowledge retention, students took a post-test of basic science renal content at the start of their clinical renal course 8 months later. 20 questions with strong point biserial values were selected, 5 each from the collaborative and exam review conditions of the two renal exams. Questions selected from the two conditions covered similar content and had similar student performance (Table 1). Knowledge retention was computed, and a paired t-test was used to compare retention values between the two conditions. Qualitative data included student responses to a survey on process and perceptions of the conditions and was collected at the mid-point of the first year renal course. A grounded theory approach was used to identify themes in student responses.

Results and Discussion: While there was no significant difference in performance between the two conditions on the initial exams, the post-test administered 8 months later showed a significantly higher score on the collaborative testing questions as compared to exam review questions. This data suggests an improved long-term retention of medical knowledge for collaborative testing without answers provided (Figure 1, Table 2). Thematic analysis of qualitative data from surveys indicated that students engaged in much more discussion in the collaborative condition. However, they expressed the desire of having answers provided and that certainty of correct answers was critical to their learning. Based on survey data, future research would include merging the exam testing strategies by having group testing work through questions and reveal the correct answer with a scratch-off sheet. This new approach could provide insight on how discussion and decision-making plays a role in long-term retention. Finally, this study took place in an integrated curriculum and has relevance for anatomists in many teaching environments.

ABSTRACT #403

A COMPREHENSIVE 16-WEEK MCAT PREPARATORY COURSE IS AN EFFECTIVE STRATEGY TO ENCOURAGE PRE-MEDICAL STUDENTS TO PURSUE OSTEOPATHIC MEDICINE

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Introduction: Comprehensive Medical School Admissions Test (MCAT) preparatory courses promote interest among pre-medical students to pursue a career in osteopathic medicine in underserved areas. Our study attempts to determine whether a comprehensive 16-week course centered on MCAT preparation and exposure to an osteopathic medical school setting at the Burrell College of Osteopathic Medicine (BCOM) will promote interest among pre-medical students towards becoming osteopathic physicians in the rural Southwest.

Methods: Sixty-four undergraduate students from the surrounding Las Cruces, New Mexico region, including both rural and urban areas, preparing for the MCAT. Students were required to have completed medical school pre-requisite courses and have a minimum 3.0 grade point average. Students were required to have 80% attendance of the comprehensive MCAT preparatory course in order to graduate from the course. Following completion of an all-inclusive 16-week course, a survey was conducted among participants to identify effectiveness and outcomes of the course.

Results: As determined by a survey utilizing a Likert scale ranging from one (strongly disagree) to five (strongly agree), participants who completed the course felt more knowledgeable about the true nature of medical school and osteopathic medicine (weighted averages: 4.29 - 4.41) than before the course. Furthermore, compared to attitudes before taking the course, participants were more inclined to attend an osteopathic medical school and, subsequently, practice rural medicine in the southwestern United States increased (weighted averages: 3.90 - 4.20). Participants who completed the course also felt that they were better prepared for taking the MCAT.

Conclusion: Participant knowledge of attitudes towards practicing osteopathic medicine were enhanced following completion of a comprehensive MCAT preparatory course. These study results suggest the possibility that widespread offering of similar courses by osteopathic medical schools throughout the country may improve the outlook of creating a diverse physician workforce that provides healthcare to rural areas.

POSTER COMPETITION AWARDS

Recipients of the BCOM Medical Student Research Day Poster Awards will be determined on the judging criteria listed below. The BCOM Medical Student Research Day Awards include:

- MSRD Best Research Poster Award
  - One overall winner will receive paid travel to present their research at the National Student Research Forum in Galveston, TX.
- Biomedical Research
  - 1st Place will receive a $250 award
- Clinical/OMT Research
  - 1st Place will receive a $250 award
- Population and Public Health Research
  - 1st Place will receive a $250 award
- Medical Education Research
  - 1st Place will receive a $250 award

POSTER JUDGING CRITERIA

The purpose of a poster exhibit is to clearly communicate and convey the significance and major points of the research project to a wide variety of audience members. Posters will be scored out of 40 possible points, and will be judged according to the following criteria:

- Novelty of content
- Significance of work
- Scientific approach
- Level of completion
- Depth of knowledge
- Overall organization
- Clarity of presentation

POSTER COMPETITION JUDGES

Biomedical Research:

Debra E. Bramblett, PhD
Associate Professor and Chair, Department of Biomedical Sciences
Burrell College of Osteopathic Medicine

Dr. Bramblett is a founding faculty of Burrell College of Osteopathic Medicine and teaches microbiology during the pre-clinical years at Burrell College of Medicine. She has two main avenues of research including 1. development of a loop mediated isothermal amplification assay (LAMP) for the detection of arboviruses and 2. Assessing the colonization of healthcare professionals by antibiotic resistant *Staphylococcus aureus* (MRSA). Dr. Bramblett came to BCOM from Texas Tech Paul L. Foster School of Medicine (PLFSOM) in El Paso, were she was one of the founding faculty (2008-2015) in the Department of Medical Education. She taught the microbiology thread of the highly integrated two-year-long course called the Scientific Principle of Medicine (SPM) and served as the course director for the second year of SPM for four years PLFSOM. While at PLFSOM, she developed a multiplex Q-PCR assay for the detection of several blood born viruses including HTLV1, HTLV2 and CMV. Before taking her position at PLFSOM she was an assistant professor of biology at the University of Saint Thomas in Houston Texas (UST). AT UST, she taught General Biology, Molecular Biology, and Developmental Biology. There, her research focus was the role of basic-helix-loop-helix (bHLH) factors on transcriptional regulation and development of the mouse brain and pancreas. Dr. Bramblett did her postdoctoral training at Baylor College of Medicine in Houston, Texas were she identified and characterized the transcriptional regulator Bhlhb4 and discovered its role in the developing mouse retina and the anterior pretectal nucleus (AtPN) of the mouse brain. Dr. Bramblett earned her PhD at the University of Texas in Austin, where she studied the transcriptional regulation and replication cycle of the Mouse Mammary Tumor virus (MMTV).

Cindy Funk, PhD
Professor of Anatomy, Department of Anatomy & Cell Biology
Burrell College of Osteopathic Medicine

Dr. Funk is an anatomy Professor at Burrell College of Osteopathic Medicine, and previously an Assistant and Associate Professor of Structural Medicine at Rocky Vista University. Dr. Funk earned her PhD in biomedical sciences from Texas A & M University, and pursued additional postdoctoral training at the Scripps Research Institute and the University of Bordeaux. Her scholarly activity pursuits are threefold. First, is a primary focus on the neurobiology of drug and alcohol dependence. Her research aims at discovering potential neurotransmitters involved in mediating alcohol addiction, especially those involved in mediating anxiety-like behaviors during withdrawal. Second, her academic experiences have also led to a passion in pursuing translational anatomical research. To many, the field of anatomy is stagnant and unchanging. For an anatomist, anatomy is dynamic and translational anatomical research is important to keep the field cutting edge. Thirdly, teaching and interacting with students has inspired her to find new ways to engage students with difficult anatomy material. It has become her goal as an anatomical educator to 1) find new ways to engage students in the learning of anatomy and 2) address the issue of well-being and burnout in first year medical students.

Michael Woods, PhD
Assistant Professor of Pathology, Department of Physiology and Pathology
Burrell College of Osteopathic Medicine

Dr. Woods is an Assistant Professor of Pathology at BCOM. Prior to joining BCOM, Dr. Woods worked at Lawrence Livermore National Laboratory in Livermore, California and with the Centers for Disease Control and Prevention, Division of Vector-Borne Infectious Diseases in Fort Collins, Colorado. He has a PhD in Experimental Pathology for the University of Texas Medical Branch in Galveston and a BS in Microbiology from Texas A&M University. His research interests are in the areas of microbial pathogenesis and the ecology of infectious diseases.

Clinical/OMT Research:

LeAnn Jons-Cox, DO
Assistant Dean of Osteopathic Integration, Associate Professor of Osteopathic Manipulative Medicine
Burrell College of Osteopathic Medicine

Dr. Jons-Cox, DO is the Assistant Dean for Osteopathic Integration and Interim Chair of the Osteopathic Manipulative Medicine Department at Burrell College of Osteopathic Medicine. Dr. Jons-Cox earned her DO degree from the Kansas City University of Medicine and Biosciences in Kansas City, Missouri and served an internship at Western Reserve Hospital in Cuyahoga Falls, Ohio. She completed a residency in Osteopathic Manipulative Medicine/Neuromusculoskeletal Medicine at the University of New England in Biddeford, Maine. She was in private practice and treated patients with manual medicine and nutrition prior to entering academic medicine in 2009. Her research has focused on the student as an adult learner and improving student and preceptor engagement in OMM education. Her other interests include physician and student wellbeing, focusing on the aspects of mind, body, and spirit.

Adrienne Kania, DO, FAAO, NMM/OMM
Associate Professor of Osteopathic Manipulative Medicine
Burrell College of Osteopathic Medicine

Dr. Kania Graduated from Michigan State University, College of Osteopathic Medicine in 1987, did a rotating internship and then an Internal Medicine residency, finishing her post-graduate studies in 1991. She moved from Michigan to colorful Colorado and practiced internal medicine in Colorado Springs and Cripple Creek. In 2008, she began teaching Osteopathic Manual Medicine (OMM) at Rocky Vista University, College of Osteopathic Medicine in Parker, CO. She joined BCOM in 2016 continuing to teach OMM. In March of this year, she was conferred a Fellow in the American Academy of Osteopathy with her thesis on "The Effect of Manipulation of the Kidney on Blood Pressure."

Population/Public Health Research:

Joseph N. Benoit, PhD
Assistant Dean for Research, Professor of Physiology, Department of Physiology & Pathology
Burrell College of Osteopathic Medicine

Joseph N. Benoit, Ph.D. is Assistant Dean for Research and Professor of Physiology & Pathology at the Burrell College of Osteopathic Medicine, Las Cruces, NM. His career as an academic spans more than thirty-years, and has involved working at all levels ranging from the professoriate, where he has held faculty appointments at five medical schools, to graduate school dean with campus wide authority (University of North

Dakota) to president of a Benedictine liberal arts college (Mount Marty College). His background as a systems physiologist, coupled with experience in academic administration, provide him with a unique perspective of university and college administration. His early career was very traditional with research interests focused on bench science related to vascular smooth muscle control and lymphatic physiology. In recent years, he has devoted his efforts to new and emerging medical schools where his work involves curriculum design, building research infrastructure, faculty development, and teaching. Dr. Benoit has published more than 200 papers, abstracts and book chapters and has been invited to speak on his scholarly work in the U.S., Canada, Japan, China, Europe, and Australia.

Joanne Ray, DO
Assistant Professor of Family and Community Medicine
Burrell College of Osteopathic Medicine

Joanne M. Ray, D.O., FAAP, is a local pediatrician who teaches in the Osteopathic Clinical Skills and Reasoning and Pediatrics courses at BCOM. She received her pre-med degree from New Mexico State University and is a graduate of the College of Osteopathic Medicine of the Pacific (now Western Health Sciences University) in Pomona, Calif. She completed her pediatrics residency at the University of New Mexico Hospital in Albuquerque. She joined the faculty at BCOM in 2016 after practicing pediatrics in Carlsbad, New Mexico, for five years and the past 15 years here in Las Cruces. Before attending medical school and becoming a physician, she was a newspaper journalist in Portales (after earning a degree in journalism from Eastern New Mexico University) and a freelance writer and photographer in Las Cruces. While in practice, Dr. Ray especially enjoyed the role a pediatrician plays in assuring the good health of her patients, especially babies and toddlers. She's found that nurturing small patients has translated easily to nurturing first- and second-year medical students (her "baby doctors" and "toddler doctors") at BCOM.

Medical Education Research:

Michael Morehead, EdD
Associate Dean
Evaluation, Learning, and Outcome
Burrell College of Osteopathic Medicine

Dr. Michael Morehead is a retired educator formally the Dean for the College of Education at New Mexico State University. Dr. Morehead served in the dean's office in the college since 1992 and was responsible for academic programs and students. He was Dean of Education from 2008 till 2015 when he retired from NMSU

Originally from St. Louis, Mo., Morehead has a bachelor's in education, a master's in educational administration and a doctorate in educational administration from the University of Missouri in Columbia. Prior to joining the NMSU College of Education in 1992, he worked in administrative roles at Northern Arizona University and Emporia State University. He has been an educator since 1971, including teaching at the middle- and high-school level and serving as an administrator in secondary schools. He presently works at the Burrell College of Osteopathic Medicine. Dr. Morehead was inducted into the New Mexico Coalition of Educational Leaders Hall of Fame in 2015. He is the only "non-public school" recipient of this recognition.

David Rodenbaugh, PhD
Associate Professor and Chair, Department of Physiology and Pathology
Burrell College of Osteopathic Medicine

Dr. Rodenbaugh has the unique experience of being a founding faculty person at both an osteopathic and allopathic medical school. He has been heavily involved with curricular development, assessment and educational research throughout his academic career. His diverse experiences also include working at an undergraduate school; performing outreach for K-12 STEM projects for local and national events; and serving on a school board for a new charter school geared towards STEM education in a Detroit Metro Hispanic community. He is a first-generation college graduate that grew up in the rust belt. He earned his Bachelor of Science in Biology from Westminster College, a small liberal arts college in rural northwestern Pennsylvania. After graduation, he spent a year involved in AmeriCorps: National Civilian Community Corps where he performed service work on a variety of projects related to the environment, education, public safety, and unmet human needs. Eventually, he relocated to Detroit and earned a Ph.D. in Cardiovascular Physiology from Wayne State University School of Medicine. His post-doctoral training was at the University of Michigan. His interests in Physiology education led him from bench research to his first faculty appointment at Minnesota State University Moorhead. Throughout all these research and educational experiences, he was engaged in regional and national groups including: the Fargo/Moorhead Economic Development Corporation, groups such as Project Kaleidoscope (PKAL), the Team-based Learning Collaborative, the American Physiological Society, Michigan Physiological Society, and the American Society for Biochemistry and Molecular Biology. His role within each of these organizations often centered on education and undergraduate research. Ultimately, BCOM's mission attracted him to New Mexico. Knowing how overwhelming the perceived barriers are for higher education for first-generation students, Dr. Rodenbaugh's goal is to pay it forward by building programs and mentoring other first-generation college students.

Christa Vaudrey, MA Ed
Director of Academic Support Services
Burrell College of Osteopathic Medicine

Christa Vaudrey is an Education Specialist and Director of Academic Support Services at Burrell College of Osteopathic Medicine where she has worked with students, faculty and staff since 2016. Ms. Vaudrey has degrees in Education and Educational Leadership earned from New Mexico State University. In addition, she participated in the Darden/Curry Partnership for Leaders in Education and the UVA School Turnaround Program at the University of Virginia dedicated to establishing the school system conditions that set the stage for change and to building transformative leadership capacity to achieve that change. Her educational areas of emphasis include data analysis that leads to instructional and learning improvement, evaluation, observation and feedback, and supervision and leadership. Throughout her career, Ms. Vaudrey has been an educator, principal, specialist and director dedicated to the improvement of learning from both the educator perspective as well as the student perspective.

POSTER JUDGING RUBRIC

Student Poster Presentation Rubric: 2018 BCOM Medical Student Research Day

Instructions: Critique presentations using the rubric below. Similar to a peer-review process, we will be sharing these scores and written comments with the student so they can have some feedback on their project/presentation skills.

Judge's Name: _____

Student's Name: _____ **Poster Number:** _____

Presentation Title: _____

1. **Introduction Significance and Background of Work** (0-10 points) _____
   a) An explanation of the topic that demonstrates a certain depth of knowledge
   B) Rationalizes practical and scholarly significance of project.
   C) Synthesizes across studies, including seminal and quality studies.

2. **Methods / Scientific Approach** (0-5 points) _____
   a) Research question is clear, precise, and provides needed detail about the study.
   b) Description of tools used to collect data and how and why they were used
   c) Indication of what is unique or novel about the experimental design
   d) Statistical calculations used to analyze results as appropriate.

3. **Results** (0-5) _____
   a) Data clearly presented in appropriate tables with titles, figures with legends and labels

5. **Conclusion and/or Recommendations** (0-5 points) _____
   a) Summarizes key points and findings
   b) Notes ambiguities or limitations in the current study.
   c) Project points to potential areas for further study.

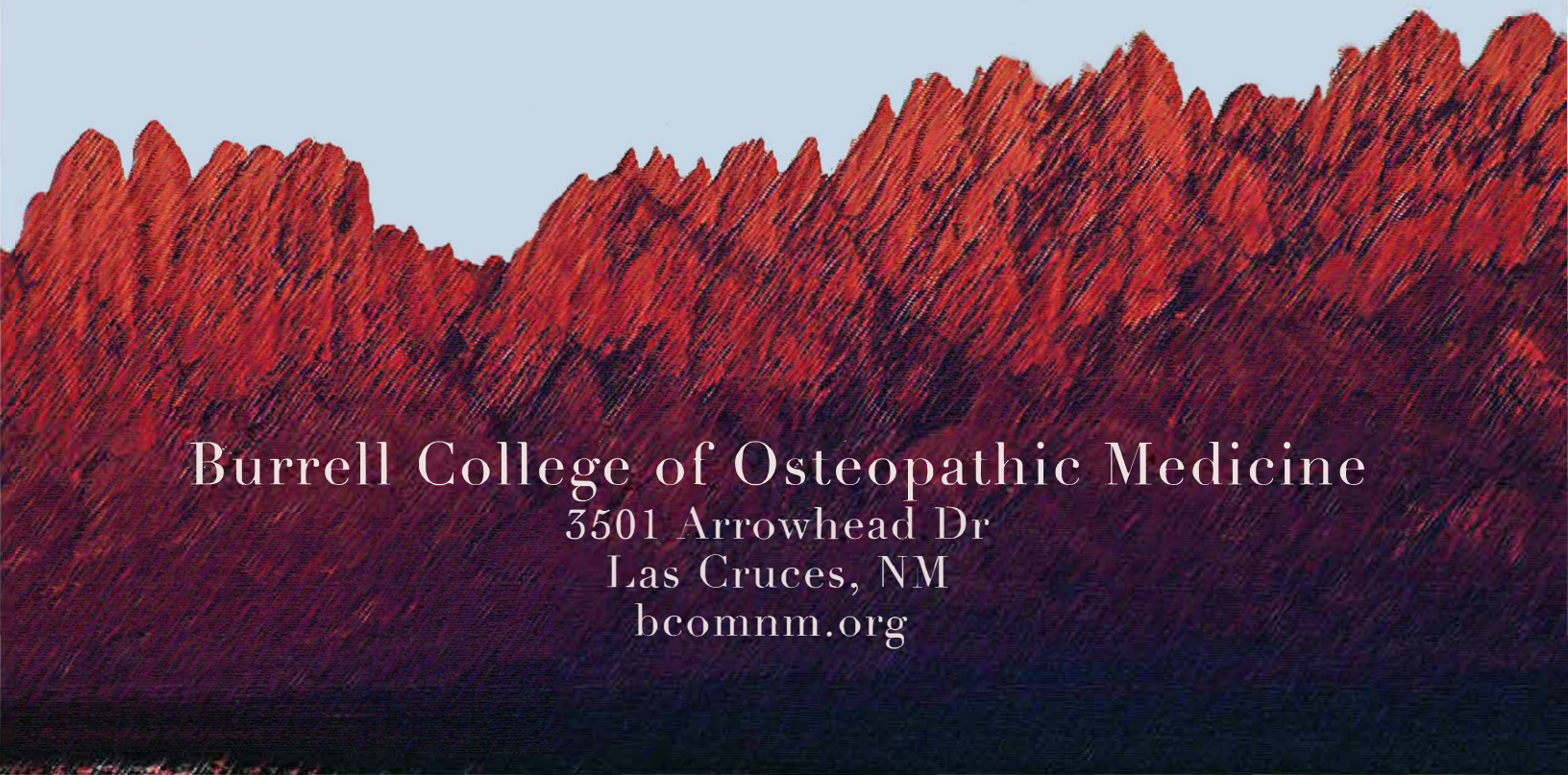
6. **Student Presentation** (0-5 points) _____
   b) Student presents in an organized way referring to figures/poster as appropriate
   b) Student clearly describes the purpose, methods and outcomes of project
   c) Student answers questions with ease and poise.

7. **Poster Quality** (0-5 points) _____
   Poster is organized, readable, aesthetically pleasing, and novel.
   a) Poster flows well from start to finish
   b) All of the elements of the poster are present

8. **Appropriate Citations and References Listed** (0-5 points) _____

TOTAL POINTS (40 Max): _____

Thank you for attending BCOM's
1st Annual Medical Student
Research Day



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