

## **Validation of a Novel ADAMTS13 Assay Substrate for Characterization of Patients with Thrombotic Thrombocytopenic Purpura (Oral Presentation)**

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**Background:** Thrombotic thrombocytopenic purpura (TTP) is a life-threatening hematological condition caused by an autoimmune or a genetic deficiency of the metalloprotease ADAMTS13 activity. Patients with TTP present with a pentad of signs: microangiopathic hemolytic anemia, thrombocytopenia, fever, renal dysfunction, and neurological symptoms. ADAMTS13 activity testing is routinely performed to aid in the diagnosis of TTP and distinguishing it from the other thrombotic microangiopathies. Many ADAMTS13 activity assays are available but their sensitivity and applicability are limited. Cattle-FRETS71 (C-71) is a novel, bovine von Willebrand factor (VWF) A2 domain- derived ADAMTS13 fluorogenic substrate which was previously demonstrated to be exceptionally cleaved by diverse species ADAMTS13, including humans. Therefore, the C-71 substrate would be ideal for clinical and research applications; however, it has not been validated with clinically relevant plasma samples. The objective of the current work was to validate the superiority of C-71 substrate over the FRETS-rVWF71 (H-71), a similar substrate but derived from the human VWF A2 domain which is compatible with undiluted plasma and insensitive to colored plasma compounds and proteins such as bilirubin and hemoglobin.

**Methods:** Both C-71 and H-71 ADAMTS13 substrates were prepared and fluorogenically labeled as we described previously. Assay methodology was optimized by adjusting incubation times and reaction plasma volume. Heparinized pooled normal plasma (calibrant) from 35 healthy human donors was previously acquired from BioIVT, and >200 human individual heparinized plasma samples were previously acquired from BioIVT and the ART study protocol (Adjuvant Low Dose Rituximab for Acquired TTP with Severe ADAMTS13 Deficiency; NCT01554514). Select samples were assayed using C-71 and the data compared with previously reported results from H-71 assays.

**Results:** For 87 heparinized plasma samples assayed, C-71 substrate assay precisely and accurately differentiated samples with low (60%). All TTP plasma samples were correctly identified using the C-71 assay as with the H-71 assay. The limit of detection for both assays for ADAMTS13 activity was  $\leq 0.2\%$ . There was an excellent agreement between C-71 and H-71 results ( $R^2 = 0.96$ ) for all 87 samples. In samples with ADAMTS13 activity  $< 10\%$  ( $n=16$ ), the simple linear regression slope ( $R^2=0.28$ ) tilted toward the X-axis (C-71), reflecting the effectiveness of C-71 in detecting the residual ADAMTS13 activity. Due to enhanced proteolysis by ADAMTS13, C-71 assays were faster than H-71 assays (~15 vs 60 minutes assay time) and used less plasma ( $< 50 \mu\text{l}$  vs  $100 \mu\text{l}$ ) without compromising the limit of detection.

**Conclusion:** We have validated the Cattle-VWF71 fluorogenic ADAMTS13 substrate (C-71) and found it to give similar results as the human variant substrate (H-71). However, the C-71 substrate presents additional benefits such as compatibility with diverse species ADAMTS13 and increased detection of residual plasma ADAMTS13 activity. These additional advantages posit C-71 as a powerful tool for diagnosing and monitoring TTP therapies as well as finding use in translational research.

**Keywords:** ADAMTS13, TTP, VWF, Translational Research, Hematology

## **The Impact of Historical Sympatry on Wolf-like Canid Genetics and Ecology in the Southern Great Plains (Oral Presentation)**

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Human persecution of wolf-like canids (Canidae: Canis) in North America has severely impacted their geographic range and diversity. This is notably evident in the Southern Great Plains of the U.S., spanning the states of Oklahoma, Texas, and New Mexico. Prior to the end of the 20<sup>th</sup> century, this region supported the now extinct Great Plains wolf (*C. lupus nubilus*), in addition to the locally extinct gray wolf (*C. lupus*), red wolf (*C. rufus*), and Mexican wolf (*C. lupus baileyi*). Current diversity has been reduced to the coyote (*C. latrans*) and domestic dog (*C. lupus familiaris*), yet effects of wolf presence persist. Wolf-like canids are known to hybridize, and mesopredators such as coyotes likely experienced an expansion in potential food items following wolf extinction. By applying genomic and isotopic analyses to modern and historical wolf-like canid specimens, we can investigate effects of historical sympatry on their genetics and ecology through time. Current genetic methods include mitochondrial and select nuclear DNA sequencing of wolf specimens for taxonomic assignment and haplogroup identification to determine ancestry. Isotopic analyses include radiocarbon (<sup>14</sup>C) dating of historical wolf specimens to obtain chronological ages, and stable isotope analyses of <sup>13</sup>C and <sup>15</sup>N for dietary composition and relative trophic position of all wolves and coyotes. Preliminary mtDNA sequencing of morphologically identified wolves has revealed two gray wolves, two domestic dogs, and three wolf-dog hybrids, suggesting introgression. Radiocarbon dating provided chronological ages of historical specimens ranging from 385 +/- 15 to 125 +/- 15 years before present. Analyses of stable isotope data are currently underway and suggest potential regional and temporal differences among canid populations. Additional specimens will allow for more robust temporal and geographic coverage to assess changes in community structure within the Southern Great Plains through time. It is imperative we investigate the impact of wolf occupation on historical communities to ensure the future success of established wolf recovery programs and to anticipate genetic and ecological shifts due to natural wolf recolonizations.

Keywords: canid, wolf, genetics, isotopes, ecology

## **In vitro model to study colon inflammation using 2,4,6-trinitrobenzenesulfonic acid (Oral Presentation)**

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Background: Statistics today indicate the largest population to suffer from inflammatory bowel disease (IBD) are in adolescents under the age of 18, signifying a need to understand the molecular signaling pathways involved in colon inflammation. We have developed a pre-clinical model of colon inflammation in rats using 2,4,6-trinitrobenzenesulfonic acid to mimic ulcerative colitis, a form of IBD. In doing so we have targeted novel biomarkers like glutaminase (GLS1) to alleviate pain and inflammation. Our studies indicate GLS1, an enzyme that catalyzes the production of glutamine to glutamate, an excitatory neurotransmitter involved in nociceptive pain, plays a crucial role in colon inflammation and visceral pain. TNBS-induced colitis in rats results in epigenetic regulation of GLS1 gene. To better understand the translational gap of this preclinical model, we wanted to simulate this same model in vitro through cell culture. This will allow us to study the downstream signaling pathways effectively.

Aim: In this study, we are mimicking colon inflammation in rat intraepithelial cells (IEC-18) using TNBS to study GLS1 gene regulation through DNA methylation.

Method: IEC-18 cells are grown in DMEM media supplemented with 10% fetal bovine serum.  $5 \times 10^4$  cells are plated in six-well plates. Following 48 hours, these cells are serum starved for another 24 hours followed by treatment with different concentrations of TNBS (without alcohol) for 24 hours. After the treatments, cells are collected, and DNA/RNA are extracted. Isolated DNA is bisulfite converted followed by methylation-specific PCR to study the DNA methylation status of GLS1 gene.

Result and Conclusion: TNBS treatment to IEC-18 cells resulted in hypermethylation of GLS1 gene as observed in preclinical studies suggesting that TNBS-treatment for 24 hours can induce DNA methylation of GLS1 gene. Additionally, we would like to further confirm epigenetic regulation of GLS1 gene resulting in increased GLS1 protein expression. We will also study the pro-inflammatory markers to confirm the inflammation. Finally, we will study the role of demethylating agents like, Azacitidine, on DNA methylation status of GLS1 gene and its expression.

Keywords: Inflammation, Epigenetics, DNA Methylation, Pain

## **Growth series histology in ornithischians Centrosaurus and Maiasaura compared to a perinate theropod Gorgosaurus (Oral Presentation)**

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Fossil vascularization in paleontological histology is frequently visualized in 2D. Traditional histology is inherently consumptive, and 3D aspects of vascularity require interpretation for vessel orientations, diameters, terminations, bifurcations, and plasmatic volume within the bone tissue. With 3D synchrotron scanning, not only is fossil or modern bone left unconsumed, these 3D interpretations can be visualized and quantified. We examined orthogonal vascular histology of growth series in ornithischian dinosaurs Centrosaurus and Maiasaura, including histological investigations into cyclical growth marks both pre-and post-LAGs and/or annuli. Ground thin sections on Maiasaura have already established large resorption cavities and extensive vascular changes within the woven tissue cortex. In a one-year-old juvenile Maiasaura tibia thin section, the osteon vascularity alternates frequently between longitudinal, reticular, and lamellar with sporadic radial canals bisecting these vascular zones. Similar changes in primary osteon canal diameter, bifurcations, and terminations are observed in the humerus of an older Maiasaura humerus visualized in 3D rather than ground section. Imaging also reveals the juvenile Centrosaurus is similar to Maiasaura with large resorption cavities ringing the medullary canal, but rather than spongy remnants of primary tissue, the medullary cavity is filled by elongated trabecular struts. The cortical vascularity is primarily longitudinal with some reticular and lamellar regions closer to the periosteal surface. Imaging reveals that radial canals are sparse, and the outer cortex vascular network is obliquely angled. Juvenile Centrosaurus canal diameters also vary per their vascular pattern. Compared with 3D vascularity in a perinate Gorgosaurus, the ornithischians have similar primary canal densities but more varying direction, suggesting similarly rapid absolute growth despite being older juveniles. Overall, compared to traditional 2D histological counterparts, 3D methods offer insights into large-scale nutrient transport, vascularity changes, remodeling, and growth cycles throughout ontogeny.

Keywords: Histology, growth, theropod, ornithischian, 3D

## **Toward Taming the Chemical Reversibility of Perfluoropyridine through Molecular Design with Applications to Pre- and Postmodifiable Polymer Architectures (Oral Presentation)**

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Polymer functionality greatly determines many of the key properties of these materials, such as glass transition temperature, electrical and thermal conductivity, thermal stability, mechanical strength, and processability. Despite the importance of polymer functionality in determining material properties, the synthesis of functional polymers, with well-defined molecular weights and compositions, can still present a significant challenge, with many of the methods related to pre- or postpolymerization modification lacking synthetic scope, or requiring harsh functionalization conditions or transition-metal coupling reactions to install the desired functionality. Perfluoroaromatic systems are promising for the preparation of novel polymer architectures given that they can be readily functionalized using simple nucleophilic chemistries under very mild basic conditions. While promising, these systems have displayed some drawbacks. Previous work has shown that perfluoroaromatics, such as perfluoropyridine, can demonstrate a high degree of chemical reversibility with heteroatom nucleophiles. If the synthetic potential of these systems is to be realized, then a strategy for the rational design of stable monomers must be developed. Herein, we report the design, synthesis, and characterization of a series of unexplored heteroatom-based ring-opening metathesis polymerization (ROMP)-active monomers containing a reactive perfluoropyridine pendent group, which can be used to readily prepare a wide variety of aryl ether-functionalized polymers, using both pre- and postpolymerization modification strategies. We also establish a direct connection between the dihedral angle of the monomer and its propensity to undergo reversible addition reactions, establishing functional criteria for the design of pre- and postmodifiable systems.

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Keywords: Hydrocarbons, Modification, Monomers, Polymerization, Polymers

## **$\alpha$ 7 nicotinic acetylcholine receptor potentiation downregulates chemotherapy-induced glial overactivation (Oral Presentation)**

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Background: Chemotherapeutic drugs [e.g., oxaliplatin (OXA)] activate glial pro-inflammatory processes, inducing adverse effects in the nervous and immune systems, including behavioral and nociceptive deficits (Brandolini et al., 2019). Targeting glial  $\alpha$ 7 nicotinic acetylcholine receptors ( $\alpha$ 7 nAChRs) might help downregulate neuro-inflammation, inhibit neuropathic pain, and prevent behavioral comorbidities. Thus, this work aims to study i) the unknown molecular mechanisms underlying OXA-induced overactivation in immortal C20 microglia cells and normal human astrocytes (NHA); and ii) the in vitro and in vivo anti-inflammatory properties of PAM-2, a positive allosteric modulator of  $\alpha$ 7 nAChRs.

Methods: A nontoxic OXA dose (10  $\mu$ M, determined by cell viability assays) was used to induce glial cell overactivation after interleukin-1 $\beta$  (IL-1 $\beta$ ) stimulation. This model was used to test anti-inflammatory effects of PAM-2, (-)-nicotine, and their combination, where the content of inflammatory chemo/cytokines (e.g., IL-6, CCL2, CXCL10) and neurotrophic factors (i.e., pro/mature BDNF) in cell media and homogenates was determined by ELISA. PAM-2 (2.4 mg/Kg) [ $\pm$  6 mg/Kg methyllycaconitine (MLA)] was tested in mice injected with OXA (10 mg/Kg) 24 h prior to IL-1 $\beta$  (250 pg/mouse) stimulation. Animals were terminated 12 h later, and brains and spinal cords removed to investigate molecular mechanisms underlying the  $\alpha$ 7 modulation of OXA proinflammatory overactivation. Different targets were selected for RNA expression studies, including the NF-kB pathway (NFKB1, NFKBIA, TLR4) associated with glial activation (Davis et al., 2020), and the organic cation transporter 1 (OCT1), p38 (mitogen-activated protein kinases), mTOR (mammalian target of rapamycin) and ERK2 (Ras-dependent extracellular signal-regulated kinase) involved in OXA induced effects (Buß et al., 2018; Chocry et al., 2017; Lu et al., 2017; Maruta et al., 2019).

Results: OXA increased IL-1 $\beta$ -induced overexpression of inflammatory mediators, supporting the notion that chemotherapy-induced chronic pain is mediated by glial activation. This effect was inhibited by either PAM-2 (5  $\mu$ M) or (-)-nicotine (5  $\mu$ M), where PAM-2 potentiated (-)-nicotine's effects. The  $\alpha$ 7-selective antagonist MLA (1  $\mu$ M) blocked the observed effects, supporting a mechanism involving  $\alpha$ 7 nAChRs. PAM-2 reproduced the same effects in vivo, where it decreases inflammatory mediators in the brain and spinal cord of OXA-treated mice, supporting the idea that  $\alpha$ 7 nAChR potentiation inhibits neuropathic pain by decreasing inflammation. Finally, RNA expression demonstrated that OXA-induced overactivation is NF-kB and OCT1 associated, suggesting that  $\alpha$ 7 nAChR potentiation decreases downstream regulation of these pathways.

Conclusions: The current work supports a role for  $\alpha$ 7 nAChRs in the regulation of glial cells as a therapeutic strategy for alleviating inflammatory and neuropathic pain.

Keywords: Chemotherapy, Neuro-inflammation, Glia, nAChRs, PAMs

## **PAM-2, a positive allosteric modulator of $\alpha 7$ nicotinic acetylcholine receptors, downregulates chemotherapy induced glia overactivation (Oral Presentation)**

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Background: Chemotherapy has adverse effects on the nervous and immune systems, including glia proinflammatory activation and behavioral and nociceptive deficits. Targeting glial  $\alpha 7$  nicotinic acetylcholine receptors ( $\alpha 7$  nAChRs) could help downregulate neuro-inflammation, inhibit neuropathic pain and prevent behavioral comorbidities. Thus, this work aims to i) study the unknown molecular mechanisms underlying chemotherapy (Oxaliplatin: OXA) induce glia overactivation; and ii) test in vitro and in vivo anti-inflammatory properties of  $\alpha 7$  nAChRs positive allosteric modulation.

Methods: First OXA (0-100  $\mu$ M), PAM-2 (0-20  $\mu$ M) and (-)-nicotine (0-100  $\mu$ M) toxicities were evaluated against immortal C20 microglia and normal human astrocytes (NHA) using MTT viability assay. Then, the OXA nontoxic dose (10  $\mu$ M) was tested for inducing glial cells overactivation after interleukin-1 $\beta$  (IL-1 $\beta$ ) stimulation. This model was used to test anti-inflammatory effects of PAM-2, (-)-nicotine, and their combination by using ELISA of inflammatory chemo/cytokines in cell medium and homogenates (e.g., IL6, CCL2, CXCL10, pro/mature BDNF). In vivo, PAM-2 (2.4 mg/Kg) and  $\alpha 7$ -selective antagonist Methyllycaconitine (MLA; 6 mg/Kg) were tested in mice injected by OXA 24h (10 mg/Kg) prior to IL-1 $\beta$  (250 pg) stimulation, 12h later animals were terminated, and brain and spinal cord removed. Further characterization of molecular mechanisms underlying the effects associated with acute OXA model and  $\alpha 7$  modulation were made by using RT-qPCR quantification of RNA expression (NFKB1, NFKBIA, TLR4, OCT1, mTOR, p38, ERK2) in cells and mice samples.

Results: OXA IL-1 $\beta$ -induced overexpression of inflammatory mediators was inhibited by PAM-2 (5  $\mu$ M) in absence of (-)-nicotine (5  $\mu$ M); an effect potentiated when associated with (-)-nicotine. Interestingly, MLA (1  $\mu$ M), blocked the observed activity of PAM-2, (-)-nicotine, and combination, supporting a mechanism involving  $\alpha 7$  nAChRs. PAM-2 reproduced the same effects on in vivo pro-inflamed brain and spinal cord of chemotherapy treated mice. Finally, RNA expression demonstrated that OXA- IL-1 $\beta$  induced overactivation is NF-kB (NFKB1, NFKBIA, TLR4) and organic cation transporter (OCT1) associated, and that  $\alpha 7$  nAChRs positive allosteric modulation reversed their up-regulation.

Conclusions: The current work supports a role for  $\alpha 7$  nAChRs in the regulation of glial cells as a therapeutic strategy for alleviating inflammatory and neuropathic pain.

Keywords: Chemotherapy, neuro-inflammation, Glia, nAChRs, PAMs

## **Protease Substrate Profiling of Proatherogenic Metalloprotease ADAMTS7 Using High-Throughput Peptide Screening (Oral Presentation)**

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**Introduction:** Genome-wide association studies (GWAS) have identified ADAMTS7 (a disintegrin and metalloproteinase with thrombospondin motifs, member 7) as a risk locus for coronary artery disease (CAD). Subsequent studies in animal models and cell cultures showed that ADAMTS7 is pro-atherogenic by promoting smooth muscle cell migration. A loss of function mutation in the ADAMTS7 propeptide (prodomain) was associated with a decreased risk of CAD. However, fundamental understanding of ADAMTS7 structure and function, and mechanistic contributions in CAD remain largely unknown. Therefore, the goal of this study was to characterize ADAMTS7 biosynthesis and proteolytic activity.

**Methods:** ADAMTS7 and its variants were stably expressed and purified. Unbiased screening of ADAMTS7 activity was assessed using hundreds of internally quenched peptides derived from proteolytic cleavage sites (from P4 to P4' position) of human proteins (Protease Substrate Set, JPT Peptide Technologies GmbH). Cleavage of FRETs-quenched peptides was monitored using a microplate reader (ex 350nm, em 480nm).

**Results:** Full-length (FL) and C-terminal truncated ADAMTS7 variants lacking a propeptide were exclusively retained in the cell lysates. However, secretion was restored for all ADAMTS7 variants by the propeptide (prodomain). Secreted ADAMTS7 variants were partially degraded in culture media, evidence of proteolysis. This degradation could not be blocked using broad-spectrum protease inhibitors. However, mutating the ADAMTS7 active site greatly reduced the degradation, suggesting it is caused in part by autoproteolysis. Utilizing N-terminal sequencing, we confirmed that the dominant autolysis event occurs between Ala738 and Leu739 in the Spacer 1 domain. FL-ADAMTS7 and truncated variants exhibited slow rates of cleavage in buffer conditions towards known substrates, cartilage oligomeric matrix protein (COMP), and Thrombospondin-1, perhaps suggesting additional cofactors may be required in vivo. Unbiased protease specificity profiling identified >180 cleaved peptides which were derived from proteins involved in inflammation, blood coagulation, cell adhesion and signaling, homeostasis, and complement pathway.

**Conclusion:** ADAMTS7 propeptide was found indispensable for its biosynthesis and subsequent secretion out of the cell, similar to some other ADAMTS protease family members. Unbiased protease specificity screening identified additional candidate substrates for ADAMTS7 that may contribute to its role as a CAD risk factor. Likewise, recent work from other research groups has reported additional ADAMTS7 substrates not previously identified, supporting a broad substrate specificity hypothesis of the ADAMTS7 enzyme. Future studies will focus on validating new substrates and possible roles in CAD pathophysiology.

**Keywords:** ADAMTS7, CAD, Metalloproteases, GWAS

## **Intraskkeletal Histovariability of *Chelydra serpentina* (Oral Presentation)**

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*Chelydra serpentina* is a large, extant freshwater snapping turtle native to North America. It grows rapidly during the first two years after hatching, then undergoes slow, protracted growth thereafter. Large adults exhibit a reduced plastron which aids in parasagittal terrestrial walking. Here we aim to describe the limb and girdle intraskkeletal histovariability of one wild *Chelydra serpentina* and propose osteohistological correlates that reflect the organism's rapid growth and life history. Medullary remodeling of primary tissue obscures the highest proportional cross sectional area of girdle elements like the ischium, pubis, coracoid, and scapula. Compact coarse cancellous bone (CCCB) is present adjacent to the medullary cavity in stylopodial elements, suggesting that they underwent substantial morphological change during ontogeny. Zeugopodial elements, like radii and fibulae, exhibit the highest relative proportion of primary cortical tissue due to a lower proportional degree of medullary enlargement. Five to six growth marks are present throughout most appendicular elements, and the largely unremodeled zeugopodial elements show a seventh mark deep within the cortex, interpreted as a neonatal hatching line. The innermost primary cortical tissue of stylopodial elements exhibit loosely organized lamellar bone that locally grades into woven bone. The relatively rapid cortical deposition implied by this disorganized tissue is consistent with what is known of *C. serpentina*'s rapid initial posthatching growth. From mid to outer cortex, the tissue gradually transitions to organized lamellar bone with sparse primary osteons, again consistent with *C. serpentina*'s late- ontogeny reduction in growth rate. Regions adjacent to the glenoid and acetabular fossae consistently exhibit notable changes in the orientation and density of Sharpey's Fibers from inner to outer cortex. These changes coincide with the aforementioned period of rapid growth, suggesting that they may reflect a mass-dependent shift from sprawling to semi-erect posture. The outermost regions of all elements consist of nearly avascular lamellar tissue, making it difficult to identify the distinct outer cortical layer (OCL) typically used to interpret end-ontogeny growth cessation. These findings demonstrate that rapid testudine growth and its biomechanical accommodations impart osteohistological correlates that could readily fossilize, allowing for their study over geologic time.

Keywords: *Chelydra* osteohistology

## **Involvement of DNA methylation associated protein, Methyl-CpG-binding protein 2, in the regulation of NGF gene expression during colonic inflammation (Oral Presentation)**

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Background: Inflammatory bowel disease (IBD) is a term used to characterize the conditions like Crohn's disease and ulcerative colitis, which involve inflammation of the digestive tract. The main symptoms include repeated abdominal pain, diarrhea, fatigue, reduced appetite, and weight loss. According to CDC, approximately 3 million Americans were reportedly diagnosed with IBD. Compared to normal adults, patients suffering from IBD are most likely to have certain chronic health conditions, including cancer, arthritis, kidney, and liver diseases. Reasons underlying IBD are still unknown, but several factors such as environmental, diet, microbiome composition and genetics might play an essential role in disease development. Several studies support the critical role of epigenetic modifications in the development of chronic inflammation of the gastrointestinal tract and colorectal cancer, thereby providing essential insights into the molecular basis of IBD. Epigenetic modifications, like DNA methylation, are layers of information that regulate gene activity without changing the DNA sequence. Nerve growth factor (NGF) is a neurotrophic factor that has been linked to several inflammatory and autoimmune diseases. NGF protein levels were found to be increased significantly at the site of inflammation and play a critical role in developing a robust inflammatory response. Also, NGF mRNA and protein expression have been found to be elevated in the inflamed intestinal tissues of patients with chronic ulcerative colitis (UC). However, the epigenetic processes underlying NGF gene regulation remain unknown.

Aim: In this study, we determined the role of DNA methylation-associated protein, Methyl-CpG-binding protein 2 (MeCP2), in regulating NGF gene expression during the inflammatory process.

Method: Colonic inflammation was induced by intracolonic administration of 2,4,6-trinitrobenzene sulfonic acid (TNBS) solution containing a 1:1 dilution mixture of 5% TNBS solution and 50% ethanol in 8-10 weeks old female Sprague-Dawley rats. The colon tissue was extracted after 24 hours of inflammation. Azacitidine (Aza), a hypomethylating agent, was pre- and co-administered with or without TNBS in the colon. RNA and protein expression of NGF and MeCP2 was determined by qualitative, quantitative PCR and immunoblot techniques. Bisulfite converted DNA was used for Methylation-specific PCR (MSP) to analyze the DNA methylation patterns in CpG islands of NGF promoter. Chromatin immunoprecipitation (ChIP) assay was performed to determine MeCP2 binding to NGF gene promoter sequences.

Results & Conclusion: Our findings show elevated NGF protein expression in the colon during TNBS induced colitis due to hypermethylation of CpG dinucleotides in the NGF promoter. MeCP2 was also found to be altered during TNBS-induced colitis. Aza treatment mitigated the NGF hypermethylation and reduced inflammation in these animals suggesting NGF expression can be epigenetically regulated mediated by MeCP2 recruitment.

Keywords: Colitis, Inflammation, Nerve growth factor, Epigenetics, DNA methylation

## **Discovering Substrate for ADAMTS7 - a Metalloprotease Implicated in Coronary Artery Disease (Oral Presentation)**

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Background: ADAMTS7 (A Disintegrin And Metalloprotease with ThromboSpondin repeats 7) is a protein of interest to the medical community for its association with both coronary artery disease (CAD) and arthritis. CAD, the most common heart disease, kills almost 370,000 people per year in the United States alone. ADAMTS7 is an enzyme in the ADAMTS family with broad substrate specificity and several substrates including cartilage oligomeric matrix protein (COMP), Alpha 2-macroglobulin ( $\alpha$ 2M), progranulin (PGRN), Thrombospondin-1, and latent TGF- $\beta$ -binding protein 4 have been proposed. However, assays of ADAMTS7 activity have not been conclusive or shown a substrate that is cleaved efficiently. Upregulators of ADAMTS7 expression include pro-inflammatory cytokines Interleukin-1 $\beta$  and TNF- $\alpha$  via NF- $\kappa$ B. ADAMTS7 expression is downregulated by the anti-inflammatory cytokine TGF- $\beta$ . Mechanisms of action remain unknown for ADAMTS7. Terminal amine isotopic labeling of substrates (TAILS) showed ADAMTS7 cleaves its spacer domain at Glu-729-Val-730 and Glu-732-Ala-733 and is inhibited by the tissue inhibitor of metalloproteinases 4 (TIMP4). ADAMTS7 knockout studies in lowdensity lipoprotein receptor (Ldlr) knockout or apolipoprotein E (ApoE) knockout mice found atherosclerotic plaques in wire injury models less developed than in ADAMTS7 competent mice. Wild type and Ser214Pro variant (rs3825807) ADAMTS7 genotypes were compared in ex vivo human coronary atherosclerotic plaques measured for intima and fibrous cap thickness. The variant had reduced fibrous cap thickness and fibrous cap to intima thickness ratio and less  $\alpha$ -actin in the intima. While the expression of this variant remains stable, much of the protein stays in the cells expressing it rather than being secreted. This variant with reduced ADAMTS7 activity also causes a lack of vascular smooth muscle cell migration in human cell culture. ADAMTS7 appears in plaques mostly as they are being formed. Discovering the substrate(s) of ADAMTS7 may lead to future therapies for patients suffering from CAD. My dissertation project will involve substrate identification and assay development for translational research.

Methods: ADAMTS7 and variants will be transfected into human cell culture and purified from conditioned media via ion exchange chromatography, Strep-tag or His-tag affinity column, and HPLC or FPLC. Co-immunoprecipitation followed by mass spectrometry and yeast 2-hybrid systems will be used to find potential substrates of ADAMTS7. An ADAMTS7 activity assay with FRETs will be created.

Results: We will collect enriched media from cell culture and isolate ADAMTS7. We expect, confirmed by co-immunoprecipitation, mass spectrometry, and yeast 2-hybrid analysis to find one or more substrates for ADAMTS7. We expect to develop FRET (fluorescence resonance energy transfer) -based assays for ADAMTS7 activity.

Conclusions: Based on the expected results, a reliable assay for ADAMTS7 activity will be developed. We anticipate this assay will assist our research in characterizing ADAMTS7 – a protein with potential for prevention or treatment of coronary artery disease and possibly arthritis. The discovery of biological substrates for ADAMTS7 will advance our knowledge of CAD pathophysiology. Profiling of ADAMTS7 activity would help in patient assessment and screening for risk of CAD.

Keywords: ADAMTS7, Coronary Artery Disease, Metalloprotease, Substrate

## **Antibacterial properties of a novel hydrophobic melanin-inspired derivative for gram-positive bacterial pathogens (Oral Presentation)**

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Antibiotic resistance remains a threat as more pathogenic bacteria develop resistance to last line drugs. This creates a need for novel compounds to be developed to combat refractory pathogens. The melanin-inspired compounds (EIPE) possess a core that provides scaffolding for the attachment of various functional groups. The purpose of this study was to determine the potential antibacterial properties of synthetic hydrophilic (EIPE-HCl) and hydrophobic (EIPE-1) melanin-inspired derivatives. A standardized disk agar diffusion bioassay was performed to qualitatively compare the susceptibility and resistance levels of 12 gram-positive and 13 gram-negative bacterial pathogens to the two compounds. The hydrophobic derivative EIPE-1 exhibited a gram-positive spectrum which included two methicillin-resistant *Staphylococcus aureus* (MRSA) strains, while the hydrophilic derivative EIPE-HCl possessed no antibacterial properties. Turbidimetric growth curves were constructed to investigate the EIPE-1 mechanism of action. Bacteriolysis occurred immediately upon treatment for *Staphylococcus epidermidis* SK01 and later at the five-hour mark for *B. subtilis* ATCC 6633, thereby suggesting a membrane-directed modality. Minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) bioassays were employed to quantitatively determine that EIPE-1 exhibited MIC/MBC values below 2.0 µg/mL against all gram-positive bacteria, including two MRSA strains and MIC/MBC values greater than 128 µg/mL against gram-negative bacteria. MIC and MBC values for two strains of the strict anaerobe *Clostridioides difficile* revealed that the EIPE-1 mechanism of action does not involve molecular oxygen. Lastly, the outer membrane permeabilizer compound 48/80 failed to sensitize any of six selected gram-negative organisms to EIPE-1. These data support the notion that a secondary mechanism may function concomitantly with presumed outer membrane exclusionary properties to underly the intrinsic resistance of gram-negative pathogens to EIPE-1.

Keywords: Melanin-inspired compounds, hydrophobic substances, bacterial cell surface, gram-positive envelope, gram-negative envelope, biocide susceptibility

## **Blood BDNF concentrations reflect brain-tissue BDNF levels during early and later adolescence stages (Oral Presentation)**

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Background: Brain-derived neurotrophic factor (BDNF) is involved in synaptic plasticity, neuronal differentiation and survival of neurons. Observations of decreased serum BDNF levels in patients with neuropsychiatric disorders as bipolar disorder and addiction have highlighted the potential of BDNF as a biomarker, but so far there have been no studies directly comparing blood BDNF levels to brain BDNF levels during the adolescent onset. A biomarker is defined as a characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention. BDNF is essential for the survival of neurons in the central as well as in the peripheral nervous system. Brain-derived neurotrophic factor (BDNF) is the most abundant neurotrophins in the brain and is essential for neuronal survival during development and for integration of neurons in the adult brain. BDNF is also expressed in liver, skeletal muscle (Matthews et al.2009) and is pivotal for normal development of the cardiovascular system. In blood, BDNF is mainly stored in thrombocytes, with only a minor free fraction in plasma. Whole-blood, serum and plasma BDNF protein levels can be determined with commercially available ELISA kits; these kits can also reliably be used to measure CSF and brain-tissue levels.

Aim: Therefore, the aim of this study was to examined serum, and brain-tissue BDNF levels during early and late adolescence onset.

Methods: At postnatal day (PND) 28 and 51 brain and serum samples from male rats were collected. BDNF levels were measured with the Rapidpro-matureBDNF ELISA for detecting (precursor) proBDNF and matureBDNF.

Results: proBDNF brain levels and serum concentrations were significantly increased during the late adolescent stage (PND51) when compared to early adolescent (PND38) rats. Remarkably, matureBDNF levels in the brain and serum of older rats was decreased.

Conclusion: our results suggest that BDNF brain levels match circulating levels of BDNF in the peripheric nervous system, this fact reflects a time-dependent expression; in addition, we suggested that BDNF can be considered as a biomarker in healthy adolescent population.

Keywords: BDNF, adolescence, biomarker, brain

## **The role of Brain-derived Neurotrophic Factor in the nucleus accumbens and the periaqueductal gray area during naloxone-precipitated oxycodone withdrawal in adolescent rats (Oral Presentation)**

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Background: Opioid withdrawal is believed to result from adaptations on multiple levels within the nervous system. Functional studies have implicated an essential role for the periaqueductal gray (PAG) and the Nucleus Accumbens (NAc) in expressing many signs and symptoms of opioid withdrawal. Still, the cellular and molecular mechanisms are not fully understood. The dorsolateral portion of the PAG holds neurons that expressed Brain-derived Neurotrophic Factor (BDNF), and it has been demonstrated that stress-response increases BDNF release from the PAG, suggesting this system is implicated in the PAG in reward and stress response.

Aim: to determine the expression level in proBDNF and MatureBDNF within the PAG and NAc after oxycodone dependence and oxycodone-naloxone-precipitated withdrawal in adolescent rats

Methods: On a postnatal day 38, Oxycodone dependence was initiated using a passive injection model, in which adolescent rats were injected subcutaneously with oxycodone (3 mg/kg) every 12 h for 5 d. Chronic oxycodone administration facilitated tolerance and physical dependence, demonstrated by withdrawal symptoms. On the 6th day of administration, rats received a naloxone injection (1 mg/kg), precipitating withdrawal. Brains were collected for BDNF immunoassay analyses.

Results: Rats within the oxycodone-dependent group exhibited increased drug-seeking behaviors, decreased coordination. Oxycodone withdrawal increases proBDNF levels in the NAc and PAG and reduces levels of matureBDNF in those areas.

Conclusion: These findings may suggest a compensatory effort by the reward pathway in the brain to restore BDNF levels to those present.

Keywords: Adolescents, Oxycodone withdrawal, Nucleus Accumbens, Periaqueductal gray area, Brain-derived neurotrophic factor

## **Are patient-reported outcomes completely reported in randomized controlled trials on colostomy and ileostomy interventions? (Oral Presentation)**

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**Objectives:** Our primary aim was to assess patient-reported outcome (PRO) adherence among colostomy- and ileostomy-related clinical trials (CTs) to the International Society for Quality of Life Research (ISOQOL) reporting guidelines.

**Design:** This cross-sectional analysis used MEDLINE and Embase to identify colostomy- and ileostomy-related CTs that also evaluated patient-reported outcomes. Data were extracted for study characteristics and ISOQOL checklist adherence. Concordance was assessed for all studies and was achieved if the PRO measure included items that were (1) meaningful and relevant to the hypothesized variable (face validity), from which (2) a score could be generated and (3) was appropriately reported. Risk of bias was assessed via RobotReviewer.

**Results:** Our study returned 786 articles and our final sample included 62 CTs after screening. Among the 62 CTs, 31 (31/62; 50%) achieved two-thirds completeness of ISOQOL guidelines. Furthermore, 43 (43/62; 69.4%) CTs met concordance. Among the included studies, those which stated the PRO as a primary or secondary endpoint were 11.1% more complete in their reporting ( $t = 2.11, p = 0.039$ ).

**Conclusions:** Our findings demonstrate CTs on colostomy and ileostomy interventions have greater ISOQOL reporting completeness when a PRO measure is specified as a primary or secondary outcome. Such specifications may increase the completeness of reporting on CTs evaluating colostomies and ileostomies. Given the increase of PRO inclusion in CTs, we advocate for the standardization of PRO reporting as findings from CTs may ultimately influence subsequent trials or clinical practice guidelines and the use of validated reporting guidelines such as ISOQOL.

**Keywords:** quality of life, patient-reported outcomes, ostomy

## **The Use of #BlackInTheIvory on Twitter for Public Awareness of Macro and Microaggressions Among Black Academics Within Higher Education (Poster Presentation)**

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**Background:** The movement #BlackInTheIvory gave Black academics an opportunity to connect through a social media platform that allowed them to share common experiences in the pursuit of higher education. Through the analysis of twitter posts, using the hashtag #BlackInTheIvory, this study investigates the main themes identified among Black scholars in academia and their shared experiences with teaching, mentoring, collegiality, identity, service, and racism.

**Methods:** Using the Twitter API, we isolated all publicly available tweets, which can include text, images, and links to websites, posted with the hashtag #BlackInTheIvory on the Twitter website ([www.twitter.com](http://www.twitter.com)) from the inception of the hashtag in June 2020 to the end of December 2020. In order to evaluate the tweets, we categorized the tweets inductively. Based on the content of the posts, we identified 6 themes: Teaching, Mentoring, Collegiality, Identity, Service, and Racism.

**Results:** Our search yielded a total of 12,538 original posts, that include tweets between inception in June 2020 to December 2020 from profiles that have been made public (excluding modified tweets and duplicate tweets). We selected and analyzed the top retweeted 2500 tweets, which is 20% (2500/12538) of the total number of downloaded tweets. The greatest percentage of posts were about Teaching (881; 35%), followed by Service (441; 18%) and Racism (414; 17%). The remaining tweets were categorized as Collegiality (388; 15%), Identity (210; 8%), and Mentoring (166; 7%) of the total number of tweets from June-December 2020.

**Conclusion:** The experiences, perspectives, and narrative among the Black diaspora within #blackintheivory are not uniform. The commonality exist within the structural systemic racism which impacts Black academics within the ivory tower. Racist students and over-taxed Black faculty serve as a key component to the unpleasant experience, as a result rising black scholars are under mentored.

**Keywords:** BlackInTheIvory, minority tax, Twitter, HBCU, Rooney rule

## **Evaluating Reporting of Patient-Reported Outcomes in Peptic Ulcer Disease: A Meta-Epidemiological Study of Randomized Controlled Trials (Poster Presentation)**

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**Introduction:** Peptic ulcer disease (PUD) can have a significantly detrimental effect on quality of life (QoL). Patient reported outcomes (PROs) are valuable tools for clinical decision-making. This study aimed to assess existing literature for completeness of PRO reporting across randomized controlled trials(RCTs) evaluating PUD.

**Methods:** This was a meta-epidemiological, cross-sectional study which assessed completeness of reporting among RCTs addressing management of PUD. We conducted a literature search using MEDLINE, Embase, and the Cochrane Register of Controlled Trials (CENTRAL) to identify RCTs witha PRO as a primary or secondary outcome. These RCTs were assessed for completion of reporting according to the PRO adaptation of Consolidated Standards of Reporting Trials (CONSORT) checklist. RCTs were also assessed for Risk of Bias (RoB) using the Cochrane RoB 2.0 tool.

**Results:** Masked, duplicate screening of 829 results from our search string yielded a study sample of 35 RCTs. The average completeness of reporting was 32.90% according to the CONSORT-PRO adaptation. Twenty-one (of 35; 60%) of the RCTs were assessed as having ‘high risk’ of bias and nine (of 35; 25.71%) were assessed as having ‘some concerns’ for risk of bias. Bivariate regression found completeness of reporting to be positively associated with increased PRO follow-up duration, larger sample size, and studies which report conflicts of interest.

**Discussion:** RCTs examining the treatment and prevention of PUD with PROs as an outcome measure have deficient reporting and ‘high risk’ of bias according to the CONSORT-PRO and Cochrane RoB guidelines.

**Keywords:** Peptic Ulcer Disease, Patient-Reported Outcomes, Quality of Life, Meta-Epidemiology

## **Reporting of patient-reported outcomes in RCTs focused on tinnitus: a meta-epidemiological study (Poster Presentation)**

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**Objectives:** The inclusion of patient reported outcomes (PROs) in randomized controlled trials (RCTs) supplements treatment efficacy outcomes with patient perspectives. Therefore, the aim of this study was to evaluate reporting completeness of PROs in RCTs pertaining to tinnitus, using the Consolidated Standards of Reporting Trials (CONSORT-PRO) adaptation.

**Methods:** We performed a search of MEDLINE, Embase, and Cochrane Central Register of Controlled Trials (CENTRAL) for published RCTs related to tinnitus with at least one PRO measure from 2006- 2020. Two investigators screened RCTs for inclusion. Using the CONSORT-PRO adaptation in an independent, masked fashion, investigators then evaluated all included RCTs. Similarly, all RCTs were evaluated using the Cochrane Collaboration Risk of Bias 2.0 tool. To assess relationships between trial characteristics and completeness of reporting, bivariate regression analyses were used.

**Results:** From 878 publications, 37 RCTs met inclusion criteria. The mean CONSORT-PRO completeness of reporting across RCTs was 51.17% (SD=20.82). Evaluation of our secondary outcome — assessment of study characteristics — demonstrated significantly higher completeness of reporting when (1) the CONSORT guideline was mentioned within the RCT ( $p=.01$ ), (2) trials had ‘some concerns’ for bias ( $p=.001$ ), and (3) trials had ‘low’ risk of bias ( $p=.001$ ).

**Conclusion:** Our study found that there was subpar CONSORT-PRO adherence within tinnitus RCTs. Due to the variance in symptom severity in tinnitus and the importance of PROs to clinical practice, we recommend journals include instructions to authors to use the CONSORT-PRO guideline before the publication of RCTs.

**Keywords:** Patient Reported Outcomes, CONSORT-PRO, Tinnitus, Quality of life, Quality of reporting

## **Analysis of the Evidence Underpinning the American Academy Orthopaedic Surgery Pediatrics Clinical Practice Guidelines (Poster Presentation)**

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Background: Randomized control trials (RCTs) serve as evidentiary support for recommendations underpinning clinical practice guidelines (CPGs) with the goal of optimizing patient care. A knowledge gap exists within scientific literature when evaluating the methodological quality and reporting of RCTs. This is especially notable within the American Academy of Orthopaedic Surgery (AAOS) CPGs. We aim to evaluate the methodological quality and reporting, as well as, analyze risk of bias of RCTs underlying recommendations within AAOS Pediatric CPGs.

Study Design: We located all AAOS Pediatric CPGs using OrthoGuidelines.org. Each CPG was evaluated for RCTs cited within the references. Descriptive statistics were recorded and multiple regressions were used to account for whether publication year, intervention type, funding, conflict of interest statement and risk of bias accounted for variance in CONSORT scores. A Mann-Whitney analysis was completed to compare CONSORT studies published before and after 2010.

Results: Mean CONSORT adherence was 69.8% of the 23 RCTs evaluated. Items of the lowest CONSORT adherence included items 10, 23, and 24 while items 2a, 13a, and 18 showed the highest adherence. Ten RCTs (43.5%) had “low” risk of bias while 5 RCTs (21.7%) were of “some concerns,” and 8 RCTs (34.8%) received a “high” designation for risk of bias. There were no statistically significant associations in the bivariate regression analysis. The Mann-Whitney analysis revealed no significant difference between studies published before and after 2010.

Conclusions: Our results suggest that CONSORT adherence within the RCTs of the AAOS Pediatric CPGs is suboptimal—relying on evidence that, in some cases, is more than 20 years old. Many of the RCTs cited as supporting evidence have increased risk of bias. Altogether, these CPGs may need to be updated or expanded to include more recent evidence relevant to pediatric orthopedic surgery.

Keywords: CONSORT, clinical practice guideline, quality

## **Evaluating Reporting of Patient-Reported Outcomes in Surgical Management of Female Stress Incontinence (Poster Presentation)**

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Background: Stress urinary incontinence (SUI) significantly reduces a woman's quality of life (QoL). Use of patient-reported outcomes (PROs) is increasing in randomized control trials RCTs and standardization is paramount. We aim to evaluate completeness of reporting of RCTs for surgical management of SUI in females based on an adaptation of the Consolidated Standards of Reporting Trials statement with PRO extension (CONSORT-PRO).

Study Design: A literature search was conducted and returns were screened using Rayyan. After title and abstract screening, a full-text screen was conducted for final inclusions. All RCTs meeting inclusion criteria were evaluated using an adaptation of the CONSORT-PRO extension checklist and the Cochrane Collaboration risk of bias assessment tool (RoB). Completion percentages of CONSORT-PRO were calculated and a bivariate regression evaluated associations between trial characteristics and CONSORT-PRO adaptation completeness.

Results: After full-text screening, 43 RCTs were included for data extraction and analysis. Mean completion percentage of the CONSORT-PRO adaptation was 50.53% (SD=15.63). A total of 38 (of 43; 88.37%) RCTs received a RoB 2.0 rating of 'some concern'. RCTs with follow-up longer than 3 months had higher CONSORT-PRO adaptation completion of statistical significance: 3-6 months (P=0.049), 6-12 months (P=0.009), greater than 12 months (P=0.021). Reporting a conflict of interest (P<0.001) and reporting no conflict of interest (P=0.048) also had statistically significant results with higher reporting completeness when compared to studies without a conflict of interest statement.

Conclusions: PROs are used as measures to understand a patient's experience with a condition. Our results suggest CONSORT-PRO adaptation reporting completeness of RCTs about surgical management of SUI in women is suboptimal. Improving reporting completeness through adherence to the CONSORT-PRO extension checklist can better inform clinical decision making and lead to improved QoL.

Level of Evidence: N/A

Keywords: patient-reported outcomes, urinary incontinence, quality of life

## **The Degradation of Beta Actin in Aging Blood and Semen Stains (Poster Presentation)**

*Elizabeth Beaton, BS Robert Allen, PhD, Jun Fu, PhD Elizabeth Beaton, BS, Graduate Student;*

Piecing together a crime scene is one of the most significant components of any forensic investigation and estimating the age of biological stains at a scene can be crucial to the case. Several studies have demonstrated a correlation between the degradation kinetics for mRNA transcripts present in dried body fluid stains aged for varying amounts of time. The relationship between the age of a sample and the state of degradation of many transcripts can be exploited to estimate the age of an unknown crime scene stain. In this laboratory, preliminary work has demonstrated that the 5' and 3' ends of many mRNA transcripts degrade at different rates during aging of body fluid stains. The purpose of this study is to map the degradation of the entire ACTB transcript (~1800 nucleotides long) in dried blood and semen stains and to determine if variances in degradation sensitivity are uniformly distributed along the length of the molecule. We will also evaluate the kinetics of ACTB mRNA degradation in dried blood and semen stains to determine whether there are any tissue-specific differences in transcript degradation. To date, we have designed qPCR primers that span the whole length of the ACTB transcript to direct the amplification of ~ 100 base pair qPCR amplicons. We have identified the amplification efficiencies for our collection of primers and are now ready to begin the study of ACTB degradation in stains stored for increasing periods of time. The findings of this study will contribute to the knowledge that will be needed to apply this technology to estimate the age of biological evidence recovered from a crime scene.

Keywords: RNA degradation, age estimation, blood stains, semen stains, forensic investigation

## **Exploratory Analysis of Estrogen-Mediated Gene Expression in Central Leptin Signaling Pathways (Poster Presentation)**

*Katie Burch, BS; Dusti Sloan, PhD, Kathleen Curtis, PhD Katie Burch, BS, Graduate Student;*

**Introduction & Objective:** As of 2020, 67% of Americans are overweight or obese. Particularly concerning is the greater incidence of obesity in post-menopausal women. Previous studies have shown that estrogen decreases food intake and body weight; however, it is not yet clear the method by which estrogen affects central pathways that regulate feeding. To address this, we used a microarray to compare estrogen-mediated changes in gene expression within the leptin signaling pathway. This pathway contains brain areas known to be involved in food intake including: the arcuate nucleus of the hypothalamus (ARC), the paraventricular nucleus of the hypothalamus (PVN), and nucleus of the solitary tract (NTS).

**Methods:** Adult female rats were bilaterally ovariectomized and treated with either oil or estrogen injections. After termination, RNA was collected from the ARC, PVN, and NTS. Isolated RNA was sent to Thermo Fisher Scientific for microarray analysis. Results were analyzed using Transcriptome Analysis Console software.

**Results:** In the brain areas investigated, we found that estrogen influenced gene expression for multiple neurotransmitters, neuroreceptors, and signaling molecules involved in the leptin signaling pathway.

**Conclusion:** The changes in body and uterine weights confirmed the effects of estrogen. The ARC, PVN, and NTS displayed a variety of genes regulated by estrogen, confirming that estrogen mediates gene expression within the leptin signaling pathway. This demonstrates a potential mechanism by which estrogen affects central pathways to decrease food intake and body weight.

**Keywords:** Leptin, estrogen, gene expression, obesity, central pathways

## **A Longitudinal Analysis of Gender Disparities in the National Cancer Institute Study Section A (Poster Presentation)**

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Science and academic research should be leading the charge in promoting diversity, equity, and inclusion. However, evidence suggests that wide disparities exist by gender, geography, and race. A study by Volerman et al. (2021) showed that men hold a higher percentage of chair and reviewer positions in NIH panels, and institutes with higher total funding were less likely to have women as reviewers. The purpose of this study is to investigate gender and geographic differences in NIH study section panel members for the National Cancer Institute Study Section A. Rosters for the National Cancer Institute NIH study section panel A for all meetings from 2011, 2016, and 2021 were retrieved. The study section member names, affiliations, academic degrees, city, and state were also extracted. We used a pilot tested google form for data extraction. Gender was determined using genderize.io as well as the available information on the internet. A 60% probability was required to assign an appropriate gender to a particular member. In comparison to 2011, the data shows a significant increase in women representation in years 2016 and 2021. Our results suggest that the NIH has done a better job of selecting more women to serve on their study section panels in recent years.

Keywords: NIH, gender disparities, funding, cancer

## **A Cultural Pathway to Osteopathic Medical School: The Native American Pre-Admissions Workshop (Poster Presentation)**

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Background: Native Americans (NAs) experience significant health disparities compared to the general US population. Medical education has a key role to play in addressing these inequities; however, it is currently falling short. Providers lack sufficient knowledge of NA heritage, cultures, perspectives, and social determinants of health. Under-representation begins in the medical education pathway, with only 0.3% of residents and merely 0.15% of faculty serving the 2.9% of identifying NAs. Because NA health professionals are more likely to serve the NA community, training more NAs has the potential to address current workforce challenges in Indian Country. However, there is a void in literature specific to the recruitment, training, and development of NA providers in the US workforce. This likely contributes to the limited success of US medical schools to train NA physicians. Therefore, our primary objective is to increase awareness of osteopathic medicine, including introduction of osteopathic practice and philosophy, among NAs interested in pursuing a career in medicine. Our secondary objective is to provide prospective NA applicants exposure to the knowledge, skills, behaviors, and attitudes necessary for successful matriculation to osteopathic medical school.

Methods: Due to COVID-19, the NAPA Workshops (Spring 2021 and Fall 2021) were held virtually via the telecommunications platform Zoom. This allowed nationwide participation for learning about the partnership between OSU-COM and the Cherokee Nation, Osteopathic Manipulative Medicine, clinical skills, admissions acumen, current student perspectives, and how the principles of Osteopathic Medicine parallel traditional NA beliefs and practices. For example, the osteopathic tenets address the body as a unit, with the person representing a combination of body, mind, and spirit. These same principles embody wellness and healing beliefs for many NAs.

Results: When surveyed at the time of the inaugural NAPA Workshop, 56% of participants reported plans to apply to medical school within the next year, 33% within the next two to three years, 7% were unsure of their timeline, and 4% had already applied. In total, after the 2021 Spring and 2021 Fall NAPA Workshops, a total of forty-one students (twenty-seven in Spring, fourteen in Fall) had attended, nine students (one in 2020-2021 cycle, eight in 2021-2022 cycle) had completed applications, and two students (zero in 2020-2021 cycle, two in 2021-2022 cycle) had been admitted to the OSUCOM.

Conclusion: Building on Oklahoma State University College of Osteopathic Medicine's (OSUCOM) existing pathway programs focused on underrepresented groups, including Native Explorers, Native OKStars, Operation Orange, and the Minority Association of Pre-Medical Students (MAPS) Conference, the Native American Students of Osteopathic Medicine (NASOM) organization created the Native American Pre-Admission (NAPA) Workshop. The Student-led NAPA Workshop has resulted in an additional, culturally sensitive pathway for increased recruitment of NA medical students, the most underrepresented group in medicine, furthering OSUCOM's mission to recruit, train, and retain physicians serving rural and tribal communities.

Keywords: Native American, Medical Education, Osteopathic Physicians

## **Effect of sex steroids on renal protein excretion in mice (Poster Presentation)**

*Nicole Cueli, BS, Liming Fan, MS, Al Rouch, PhD Nicole Cueli, BS, Medical Student;*

**Background:** Normally, the renal excretion of protein (or proteinuria) is absent or very small. Ingesting high-protein diets can elevate proteinuria and in the long term, increase the work on the kidney by increasing glomerular filtration and higher energy requirement to handle the protein. Sex differences in renal function are well known and thus, differences in proteinuria may exist. The purpose of this study was to determine if sex differences exist in proteinuria in mice consuming high protein diet and investigate the potential roles of the sex steroids 17beta-estrogen (E2) and testosterone.

**Methods:** Healthy 3-4-week-old male and female intact and gonadectomized mice were used. Mice were placed in individual metabolic cages where the urine of each mouse could be collected and measured for protein concentration. Mice consumed a 40% casein protein diet for 25 days (normal protein = 20% protein). Some gonadectomized female mice received exogenous E2 and gonadectomized male mice received exogenous testosterone. Proteinuria was measured via dipstick measurement and protein excretion (mg/day) i.e., urine flow rate (ml/day) x urine protein concentration(mg/day).

**Results:** Intact male mice had significantly higher proteinuria compared to intact female mice (5-10 mg/day vs 25-30 mg/day,  $p < 0.001$ ). Gonadectomized male and female mice had very low proteinuria (3- 5 mg/day). Gonadectomized testosterone-treated male mice had high proteinuria not different from the intact male mice. Gonadectomized E2-treated female mice had similar proteinuria compared to intact female mice and slightly though not significantly higher than gonadectomized placebo-treated female mice.

**Conclusion:** The results of this study suggest that the male sex steroid induces high proteinuria in mice consuming high protein levels. The female sex steroid plays no role or only a minor role in proteinuria under these experimental conditions. Our results suggest that androgens may account for the higher incidence of kidney disease in males compared to age-matched pre-menopausal females.

**Keywords:** Protein diet, protein excretion, kidney

## **Archaea in Mammalian Gut Microbiomes (Poster Presentation)**

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Background: Archaea are the most enigmatic domain of the three domains of life. Archaea are unique in that they share some characteristics with bacteria and others with eukaryotes while they are also distinct from these two domains. Most archaea are extremophiles that are found in highly acidic, high salt, or high-temperature environments. However, recent microbiome research has revealed that these prokaryotes are also a part of the gut microbiota, albeit their functional roles in gut health or disease are unclear. Archaea could be keystone species in the gut that engage in important syntrophic relationships with other gut microbes. The recent proposal of archaeal strains as a new class of probiotics (archaeobiotics) could be of interest for improving gut pathophysiology and overall human health. The main aim of this study is to mine extant microbiome data sets in our laboratory for the presence of archaeal sequences.

Method: Metagenomic data sets from mammalian microbiome studies (e.g., mouse, rat, prairie voles) based on 16S rRNA amplicon or whole-genome shotgun sequencing approaches are screened for archaeal sequences. Taxonomic profiling workflows in the Qiagen CLC Genomics Workbench and other bioinformatics software such as MetaPhlan are used to elucidate the relative abundances of these enigmatic microorganisms.

Results: Archaeal sequences have been found in DNA isolated from digesta and feces at relatively low abundances. Most sequence variants are derived from methanogens, a subgroup of archaea, while we also found indications for the presence of halophilic archaea.

Conclusion: Our experiments demonstrate that archaeal sequences, specifically from methanogens and halophiles, are found in our mammalian gut microbiome data sets. Future studies will include confirmation of archaeal presence using quantitative PCR (qPCR) and, if possible, in vitro culture. Predictions on the functional roles of archaea in the gut will also be conducted to help characterize the impact of these microorganisms on gut health.

Keywords: Archaea, Microbiota, Microbiome, Metagenome, Intestine.

## **The accuracy of the lever sign test in a diagnostic exam of an acute anterior cruciate ligament (ACL) injury: A critically appraised topic (Poster Presentation)**

*Michael Daniels, BS, ,Lorah Heald, BS, Aric Warren, PhD, LAT, ATC, CSCS, CES Michael Daniels, BS,*

Context: The lever sign has been developed and researched, within the last ten years, as an alternative physical examination of the anterior cruciate ligament (ACL). The simplicity and practicality of the test has increased its presence within ACL clinical assessment literature. Multiple studies investigating the lever sign have shown significant sensitivity in diagnosing ACL tears. However, the patient population in the majority of these studies are those reporting with chronic knee injuries. Therefore, there is limited research showing the effectiveness of the lever sign in acute evaluations. This critically appraised topic explores the potential for the lever sign to be significantly effective in diagnosing acute ACL tears within the general population.

Clinical Question: What is the accuracy of the lever sign test compared to the Lachman's, pivot shift, and anterior drawer tests for the physical examination of acute ruptures to the anterior cruciate ligament (ACL) in the general population?

Summary of Key Findings: The literature yielded three cohort studies evaluating acute anterior cruciate ligament (ACL) ruptures using the lever sign test within the general population. Two of the three studies analyzed the sensitivity of the lever sign, Lachman, and anterior drawer test in emergency department acute ACL injuries. One of the three studies compared the accuracy of the lever sign to the Lachman, anterior drawer and pivot shift clinical assessment of ACL. There were high sensitivity findings of the lever sign in all three cohort studies; however, one cohort study found the Lachman test to be more sensitive and accurate.

Clinical Bottom Line: There is moderate evidence to support high sensitivity of the lever sign as a diagnostic test; however, there is limited research to support the accuracy of the lever sign in acute evaluations of the anterior cruciate ligament (ACL).

Strength of Recommendation: Grade B evidence does exist to show the effectiveness of the lever sign in identifying ACL ruptures during acute evaluations of the general population.

Keywords: lever sign, anterior cruciate ligament, acute injury

## **Morphine potentiates glucocorticoid receptor translocation in neuronal cells (Poster Presentation)**

*Subas Das, PhD, Sabita Roy, PhD Subas Das, PhD, Faculty;*

Background: The hypothalamic-pituitary-adrenal (HPA) axis plays a central role in regulating signaling by glucocorticoid receptor which is expressed in almost all cells. Adrenocorticotropin hormone (ACTH) and  $\beta$ -endorphin both of which are derived through processing of pro-opiomelanocortin(POMC) pro-hormone are secreted from anterior pituitary under stressed conditions. ACTH released into circulation regulates the release of glucocorticoids from adrenal gland. Glucocorticoids cause profound suppression of functional activity of HPA axis as negative feedback control. The endogenous opioids acting primarily at mu opioid receptor inhibit activity of HPA axis and thus release ACTH and  $\beta$ -endorphin from anterior pituitary. Furthermore, there are enough reports to support that glucocorticoids regulate mu opioid receptor expression through GRE binding specially in mouse where it has already been shown that promoter region of mouse mu opioid receptor not delta or kappa opioid receptor contains a glucocorticoid-response element (GRE). The glucocorticoid receptor is a member of steroid-hormone receptor family of proteins. It binds to glucocorticoids with high affinity. In inactive state, the GR complexes with chaperones like heat shock proteins 70 (Hsp70) and 90 (Hsp90) and immunophilins and their co-chaperones making GR more accessible to ligand binding. After ligand binding the GR is activated and chaperones and co-chaperones are reshuffled with GR to be translocated to nucleus where the GR homodimerize and binds to GRE in promoter region. The resulting complex recruits either co-activator or co-repressor proteins that modify the structure of chromatin thereby facilitating or inhibiting assembly of the basal transcription machinery and the initiation of transcription by RNA polymerase II.

Aim: Acute and chronic morphine treatments have been shown to result in marked induction of Hsp70 messenger RNA expression. At the same time Hsp70 is also an integral part of GR assembly in inactive and active state. We are therefore hypothesizing that mu opioid receptor crosstalk with glucocorticoid receptor, and this interaction is in part, mediated by Hsp70 acting as adaptor protein.

Method: Murine N2A cells were either stably transfected with HA-tagged mu opioid receptor and/or HSP70. These cells were treated with morphine sulphate (1 $\mu$ M) for 5 hours followed by treatment with different concentrations of corticosterone (GC) for 30 minutes. We confirmed their crosstalk by immunoprecipitation and co-immunoprecipitation experiments. Further, nuclear translocation of glucocorticoid receptor was monitored in immunoblots.

Results and Discussion: Morphine treatment resulted in increased expression of Hsp70. Pull-down assays showed the interaction between mu opioid receptor and glucocorticoid receptor. These two proteins also interacted with Hsp70; a chaperone protein known to interact with glucocorticoid receptor. Morphine treatment potentiated glucocorticoid receptor translocation to the nucleus which was further potentiated by Hsp70 overexpression. These results confirm the crosstalk between MOR and GR. For future studies, we would study this interaction in immune cells like J774 (alveolar macrophages) and CRL2019 cells (peritoneal macrophages).

Keywords: Morphine, mu opioid receptor, glucocorticoid receptor, Hsp70

**Difference in All-Cause Mortality Between Unemployed and Employed Black Men. Analysis Using the National Health and Nutrition Examination Survey (NHANES) III (Poster Presentation)**

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The Black-White racial employment disparity and its link to mortality have demonstrated the health benefits obtained from employment. Further, racial/ethnic mortality disparities existing among men with different employment status have been previously documented. The purpose of this study was to examine the differences among employed and unemployed Black men in relation to health status and all-cause mortality. Data for the study was obtained from the National Health and Nutrition Examination Survey (NHANES) III 1988–1994 linked to the NHANES III Linked Mortality File. Cox proportional hazard models were specified to examine the association between health behaviors and mortality in Black men by employment status. All analyses were performed using SAS v 9.4 (Research Triangle Park, NC). P values <.05 were considered statistically significant and all tests were two-sided. The findings from this study suggest that unemployed Black men are more likely to have fair/poor health status and statistically significant differences in all-cause mortality are present between employed (Hazard Ratio [HR] 1.60, 95% CI [1.33, 1.92]) and unemployed Black men. These results highlight the impact of employment on diminished life expectancy among unemployed Black men and underscore the need to address employment inequalities to reduce the mortality disparities among Black men.

Keywords: mortality, employment, unemployment, Black, men

## **Analysis of Systematic Reviews in Clinical Practice Guidelines for Head and Neck Cancer (Poster Presentation)**

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**Objective:** Clinical practice guidelines (CPGs) are essential to clinical decision making as their recommendations are supported by published literature. Systematic reviews are considered the highest quality of evidence used to underpin these guidelines. However, research to support these recommendations may lack compliance to quality reporting among systematic reviews (SRs). Here, we aim to evaluate the quality of SRs underpinning CPG recommendations for the management of head and neck cancer (HNC).

**Methods:** Using PubMed, we searched for CPGs pertinent to the management of head and neck cancer published between January 2017 and May 2021. Relevant guidelines were analyzed for all SRs. Cited SRs in CPGs were evaluated using A Measurement Tool to Assess Systematic Reviews-2 (AMSTAR2) and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) instruments. Study characteristics were extracted in a masked triplicate fashion.

**Results:** A total of 16 CPGs and 142 unique SRs were included in our study. PRISMA completion ranged from 67.15%-87.65% across CPGs with a mean of 76.41% (SD=16.9). AMSTAR-2 completion ranged from 34.38%-84.38% across CPGs with a mean of 67.55% (SD=20.9) among all SRs. The lowest rated items included funding sources and publication bias. Higher score was achieved in SR done by Cochrane group and it was only 2.11% (3/142) of all SR's quoted in CPG.

**Conclusion:** Adherence to AMSTAR-2 and PRISMA items exhibits a variation among SRs cited in CPGs for the management of HNC. Reporting funding sources, investigating publication bias, and implementing.

**Keywords:** Head and neck cancer, clinical practice guidelines, systematic reviews, PRISMA, AMSTAR-2, meta-analysis

## **Reporting Quality and Adherence to the CONSORT Checklist of Randomized Controlled Trials Underpinning the American Academy of Orthopaedic Surgeons Upper Extremity Clinical Practice Guidelines (Poster Presentation)**

*Bryan Dunford, BS, Rigel Bacani, BA, BS, J. Michael Anderson, BS, Jake Checketts, DO, Jared Scott, DO, Trevor Torgerson, BS, Micah Hartwell, PhD, Matt Vassar, PhD Bryan Dunford, BS,*

Background: Decision making in orthopaedics is strongly influenced by evidence-based medicine in the form of clinical practice guidelines (CPGs). Orthopaedic CPGs use randomized control trials (RCTs) to underpin recommendations that are made. It is imperative that the RCTs included in these CPGs have sufficient reporting quality and transparency to ensure the guidelines are based on the best evidence. To evaluate the quality of the studies, we used the 2010 CONSORT (Consolidated Standards Of Reporting Trials) statement checklist to score RCT adherence.

Methods: Four American Academy of Orthopaedic Surgeons Upper Extremity CPGs were selected and screened for RCTs. We extracted and scored 164 RCTs using a google form in a blinded, duplicate fashion. Disagreements between investigators were resolved for accuracy. Scores were given as a percentage out of 31 items, with a score of >75% signifying adequate adherence to CONSORT guidelines. Descriptive statistics were calculated for CONSORT scores.

Results: The mean adherence score of RCTs for all 4 CPGs was 67.3%. Items that had low adherence across guidelines were related to reporting of trial description, randomization methodology and descriptions of generalizability. Items that scored highly across guidelines were reporting of outcomes, statistical methods, and background and rationale.

Conclusion: There has been improvement in the quality of reporting since the CONSORT statement was published in 2010. Despite this improvement, there is variability among published RCTs and their adherence to the checklist.

Keywords: CONSORT, evidence-based medicine, randomized controlled trials, clinical practice guidelines, AAOS upper extremity

## **Hypoglycemic events comparing weight based and non-weight based insulin dosing for diabetic ketoacidosis (Poster Presentation)**

*Zachary Dunn, PharmD, Rebecca Sheehan, Josh Burton, DO, Kelly Murray, PharmD Zachary Dunn, PharmD, Resident;*

**Purpose:** Diabetic ketoacidosis (DKA) is a hyperglycemic emergency that utilizes fluid resuscitation and insulin as mainstays of therapy. Insulin's roles include decreasing blood glucose and halting the production of ketones. Current guidelines recommend weight-based doses of insulin drip regimens to manage DKA. However, some providers in the emergency department use doses that are lower than the recommended weight-based dose of insulin to avoid untoward adverse reactions such as hypoglycemia. The purpose of this study is to compare and assess if there are differences in the risk of hypoglycemia based on the insulin drip that was initiated in the emergency department.

**Methods:** We aim to assess if there is a difference in hypoglycemic events based on the drip rate regimen initiated in the emergency department. This institutional review board approved retrospective cohort chart review will identify patients with an ICD-10 code for DKA between October 1, 2020 and August 30, 2021. Patients will be included if they have a diagnosis code for DKA and an insulin drip was initiated in the emergency department. Patients will be excluded if they left against medical advice, an insulin drip rate was not started in the emergency department, or if they were directly admitted to the hospital from an outlying facility. We will use data from Oklahoma State University Medical Center and separate patients based on their insulin drip rates into weight based and non-weight based groups. The primary endpoint is the number of hypoglycemic events that occurred while on an insulin drip. Hypoglycemic events will be defined as a blood glucose less than 70 mg/dL. Secondary endpoints will assess time frames that patients were on a non-weight based or weight based insulin drip and hypokalemic events. Two-sample t-tests and chi-square tests will be utilized to address baseline demographics. For continuous variables, parametric tests will be used to examine differences. Alpha will be set at 0.05 and beta will be set at 0.2.

**Results:** Results are currently being finalized. Preliminary data includes 175 encounters. Of those, 26 are excluded, 25 included and 124 are pending review. Data collection and analysis are to be completed by January 31, 2022.

**Conclusion:** To be completed upon analysis of results.

**Keywords:** Diabetic ketoacidosis, insulin, diabetes

## **The Effects of Oral-Contraceptive Use on Aerobic Performance In Active College Aged Women (Poster Presentation)**

*Jenni Dupree, BS, Caitlyn Smith BS, Jennifer Volberding PhD, LAT, ATC Jenni Dupree, BS, Graduate Student;*

Clinical Scenario: The growing number of 18-25 year old female athletes utilizing oral contraceptive pills (OCP) calls for further investigation of how these hormonal changes may impact performance. College age women taking oral contraceptives may participate in exercise or organized sport requiring peak physical and cognitive performance. Thus, in order to prevent injury, research as to how OCP affect performance is necessary.

Clinical Question: Does the use of OCP reduce aerobic performance in physically active college age females compared to eumenorrheic women of similar performance level? Summary of Key Findings: Two of the four included studies reported that aerobic performance was decreased in those taking OCP, while the other two demonstrated no significant difference.

Clinical Bottom Line: No conclusions can be made at this time as to whether OCP use reduces aerobic performance in college aged physically active women. Further research with larger cohorts is necessary to form a consensus.

Strength of Recommendation: Grade B evidence suggests more research is needed to determine if OCP use reduces aerobic performance in active college age females compared to eumenorrheic women.

Keywords: hormonal contraceptives, active female, performance, VO<sub>2</sub>, aerobic exercise

## **A cross sectional analysis of the impact of a language barrier in the osteoarthritic Latina population (Poster Presentation)**

*Avery Dutcher, BS, Harisha Chinthalapally BS, Micah Hartwell, PhD, Benjamin Greiner, DO Avery Dutcher, BS, Medical Student;*

**Background:** Osteoarthritis (OA) is a very prominent musculoskeletal disorder that affects approximately 303 million people worldwide. Numerous studies have shown language barriers interfere with the ability of Spanish speakers to communicate their pain symptoms to non-Spanish speaking physicians. The challenge that language barriers present to the Latina population in regard to the diagnosis and treatment of osteoarthritis remain largely unknown.

**Hypothesis:** We hypothesize that the presence of a language barrier will negatively affect the diagnosis and treatment of osteoarthritis, leading to worse health outcomes for the Latina population.

**Methods:** We analyzed data from the CDC's Behavioral Risk Screening and Surveillance System, combining the 2017-2020 cycles using sampling weights provided by BRFSS, adjusted for multiple cycles. Determination of English- or Spanish-speaking groups was based on the language of the survey submitted with 20,659 and 18,559 in each group respectively (n=39,218). We calculated population estimates for arthritis diagnosis, physical limitations, and mean joint pain among language groups and by age (40+ and 65+), and determined associations via odds ratios.

**Results:** Rates of arthritis diagnosis between groups were similar for both age groups; however, we found that Spanish speaking Latinas 65+ were statistically more likely to report being limited by pain. Further, Spanish speaking Latinas in both age groups reported higher pain scores than the English-speaking group ( $p < .001$ ).

**Conclusions:** Results from this study show that while there were no significant differences in rates of diagnosis, Spanish-speaking Latinas were more likely to be limited by joint pain and report higher pain scores. Given potential language barriers and potentially later diagnosis, emphasizing the holistic nature of osteopathic medicine should strive to provide equitable treatment and support for Spanish-speaking women. When language barriers exist, incorporating translators in medical settings may improve outcomes.

**Keywords:** Osteoarthritis, Language Barrier, Latinas

## **Effects of high salt diet on renal sodium handling and blood pressure in male and female mice (Poster Presentation)**

*Avery Dutcher, BS, Liming Fan, MS, Al Rouch, PhD Avery Dutcher, BS, Medical Student;*

**Introduction:** The association between elevated dietary salt consumption and high blood pressure is well known. Hypertension carries elevated risk for stroke, cardiovascular disease, liver disease, and nervous disorders. Interestingly, sex differences in many areas of pathophysiology. Pre-menopausal women have shown to be protected against hypertension and renal diseases compared to age-matched men. It is reasonable to expect that how the kidney handles sodium in presence of high-salt consumption plays a key role in sex differences. The purpose of this study was to determine sex differences in the renal handling of sodium in mice consuming a high-salt diet. We also investigated the effects of high-salt consumption on blood pressure in these mice.

**Methods:** Intact male and female mice (n=6/group) consumed a high-salt (4%, HarlanTeklad) diet for 30 days. Mice were placed individually in metabolic cages where urine could be collected for volume and measurement of Na<sup>+</sup> concentration. Urinary Na<sup>+</sup> excretion (NAE, mg/day) was determined from daily measurements of urine sodium concentration and urine volume. Sodium intake (Nai, mg/day) was determined from daily food intake of 4% salt diet ad libitum. Blood pressure was measured daily via the tail-cuff method. Expression of key sodium transport proteins in the kidney was measured via real-time quantitative PCR.

**Results:** From the data accumulated during the 30-day period of high salt consumption, female mice showed a significantly lower average of the output-to-input Na<sup>+</sup> ratio (NAE/Nai) compared to male mice ( $53.3 \pm 2.7$  vs  $68.1 \pm 1.8$ , respectively,  $p < 0.0001$ ). Female mice showed lower mean blood pressure (MBP, mmHg) compared to male mice over the 30-day period ( $78.4 \pm 1.0$  vs  $84.9 \pm 1.2$  respectively,  $< 0.0005$ ). Molecular expression of the key sodium transporter Na<sup>+</sup>-2Cl<sup>-</sup>-K<sup>+</sup> (NKCC) in the thick ascending limb was over 5-fold higher in the female kidney.

**Conclusion:** Interestingly, results from this study demonstrated that female mice retained more ingested sodium compared to male mice while on a high-salt diet. Moreover, female mice had lower MBP compared to male mice while on a high-salt diet. We suspect that sex steroids are playing important roles in the renal handling of sodium and in the control of blood pressure. This study suggests that females are protected from deleterious effects of high-salt consumption.

**Keywords:** Salt, Blood Pressure, Sex differences

## **The investigation of acetate sensitivity within shf1 Chlamydomonas mutants (Poster Presentation)**

*Avery Dutcher, BS, Maite Miller, BS, Nedra Wilson, PhD, Dilani Herath, PhD Avery Dutcher, BS, Medical Student;*

**Background:** Cilia and flagella are essential for human health. Defects in the assembly and function of these organelles are associated with a collection of disorders called ciliopathies. Studies have suggested that regulation of ciliary size is associated with external environmental factors. Although TOR signaling pathway has recently been implicated as playing a pivotal role in linking the cellular environment with determination of cell and organelle size, additional biological pathways involved in this process remain largely unknown.

**Methods:** Both wild-type and shf1 cells were grown in M media with continuous aeration and under light-dark cycle to an equal cell density. 20 mM acetate was added, and cells were removed in 30-minute intervals. Cells were then fixed with an equal volume of 1% glutaraldehyde. Cells were examined by phase contrast microscopy and electron microscopy. Flagellar lengths and cell body area of wild-type and shf1 mutants was determined.

**Results:** Short flagellar (shf) mutants of Chlamydomonas assemble flagella that are half the length of wild-type cells. Consistent with the observation that ciliary length and cell size are interconnected, shf1 cell volume is increased compared to wild-type cells. Interestingly, shf1 mutants are a flagellate when grown in the presence of acetate. To learn more about the acetate sensitivity, we examined the ultrastructure of shf1 mutants following the addition of acetate. Microscopic analysis revealed notable deformities in the flagellar ultrastructure. When viewing the ultrastructure of wild-type versus shf1 mutants in the presence of acetate, it was noted that flagella was shorter in shf1 mutants. When looking at the shf1 in acetate under cross section abnormal morphology was noted. The cross section no longer demonstrates round structures, as seen with wild-type, but instead bleb-like structures were seen coming off the flagella, and the flagella was square shaped. "Rodlike" structures were also abnormal and were located between the microtubule doublets and the flagellar membrane. The basal body and the transition zone microtubules appear to be unaffected by the acetate.

**Conclusion:** Although shf1 assembles short flagella, their cell bodies are approximately twice the size of wild-type cells. This suggests that regulation of flagellar length and cell body size are coupled together. As originally reported, inclusion of acetate in growth media results in the disassembly of shf1 flagella.

Ultrastructural analysis demonstrates a dramatic change to the morphology of shf1 flagella upon acetate treatment. It is intriguing to speculate that the "rodlike" structures present between the axonemes, and the flagellar membrane are axonemal fragments. Currently, we are examining the composition of these "rods" to determine their biochemical components.

**Keywords:** Short Flagella Mutants, Acetate Sensitivity, Chlamydomonas

## **Person-Centered Language & Major Depressive Disorder with Peripartum Onset: A cross-sectional study (Poster Presentation)**

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**Introduction:** The American College of Obstetrics and Gynecology recommends screening women for Major Depressive Disorder with Perinatal Onset (MDD-PPO) at least once during the perinatal period. However, under-diagnosis, inadequate referral mechanisms, and lack of treatment capacity can result in untreated Major Depressive Disorder with Peripartum Onset (MDD-PPO). A potential strategy for overcoming systemic barriers preventing the screening and treatment for MDD-PPO includes implementing person-centered language (PCL). Therefore, our primary objective is to quantify adherence to PCL guidelines among the peer-reviewed articles pertaining to MDD-PPO.

**Methods:** This cross-sectional analysis included a systematic search of PubMed for MDD-PPO-related articles from January 1, 2014, to March 7, 2021. Journals with at least 20 MDD-PPO-related articles with human subjects were included. Search returns were then randomized, and 500 articles were examined for inclusion of pre-specified, non-PCL terminology.

**Results:** From the screening, 178 articles were included and searched for non-PCL terminology. We found that 50.56% (90/178) publications were PCL adherent. The most commonly used non-PCL labels were “depressed,” found in 30.3% (54/178) of articles, followed by “suffer” found in 19.10% (34/178), “psycho/psychotic” found in 10.11% (18/178), and “blue” found in 8.99% (16/178) of the included articles.

**Conclusions:** Our study found that nearly half of the scientific literature on MDD-PPO was not adherent to PCL guidelines. PCL is viewed positively by patients, may lead to better patient-provider relationships, and is recommended by the AMA and APA. Thus, PCL should be adhered to by authors of MDD-PPO research. By implementing PCL requirements, journals will aid in reducing stigma; therefore, assisting to overcome barriers in screening and treatment for women with MDD-PPO.

**Keywords:** Person-Centered Language, Major Depressive Disorder with Peripartum Onset; Medical Literature; Stigmatizing Language

**Associations of Intimate Partner Violence and Maternal Comorbidities: A cross-sectional analysis  
(Poster Presentation)**

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Background: Intimate-partner violence (IPV) is the act of inflicting physical, sexual, and/or emotional assault with coercive control and is a traumatic experience, the repercussions from which can be exacerbated in pregnant women. While screening for IPV during pregnancy is recommended regardless of risk, identifying clinical factors commonly associated with IPV during pregnancy may improve screening rates. Thus, our primary objective was to examine associations between IPV and maternal comorbidities.

Methods: We conducted a cross-sectional analysis of the Pregnancy Risk Assessment Monitoring System (PRAMS) Phase 8 spanning 2016 through 2019. Bivariate and multivariable logistic regression was used to calculate adjusted odds ratios (AORs) to determine associations between IPV and diabetes, hypertension, depression, asthma, PCOS, anxiety, and thyroid disease. Confidence intervals were reported at 95%.

Results: Over 40% of women experiencing IPV reported a history of depression or anxiety. The odds of experiencing IPV were higher among women with depression (AOR: 3.27; CI: 2.88 - 3.71), hypertension (AOR: 1.49; CI: 1.26 - 1.77), asthma (AOR: 1.22; CI: 1.03 - 1.46), or anxiety (OR: 3.85; CI: 3.43 - 4.33), but were lower in women with thyroid disorders (AOR: 0.49; CI: 0.28-0.84).

Conclusion: Our study identified an increased likelihood of IPV among pregnant women with certain comorbidities. Knowing clinically relevant associations of IPV in pregnant women may increase screening sensitivity among clinicians and in turn, increase the likelihood of receiving supportive care among individuals experiencing IPV.

Keywords: PRAMS, Intimate Partner Violence; Maternal health; Comorbidities

## **Estimating a Rural-Urban PCP Workload Disparity: Caring for Smokers (Poster Presentation)**

*Marjorie Erdmann, M., Zhuqi Miao, PhD, Ipe Paramel, MHA, William Paiva, PhD Marjorie Erdmann, MS,*

**Background:** Smokers are concentrated in rural America. CDC reports 28.5% of rural Americans smoke versus 25.1% of urban Americans. The workload impact of those additional smokers in a rural primary care practice has not been investigated. We hypothesize that workload difference associated with caring for rural smokers will be greater than the 3.4% suggested by the smoking rate difference. We will calculate primary care physician workload differences based on number of rural versus urban smoker comorbidities. Defining physician workload by number of comorbidities being managed is novel. Given that payers are associating disease management metrics to payment, calculating primary care workload by comorbidities managed is salient and illuminates real-world primary care workload differences.

**Methods:** We hold constant the number of patients in a typical primary care panel (2500) to estimate the volume of smoker's in a rural practice (28.5% of 2500 = 712.5) and in an urban practice (25.1% of 2500 = 627.5). We use the Cerner Health Facts Data Base to determine rates of comorbidities among patients designated as smokers from 1/1/2010 to 9/18/2017 (n = 7,757,949; rural = 1,337,423, urban = 6,420,526). We estimate smoker-related comorbidities using the rates of rural and urban patients with 1, 2, 3 or 4+\* comorbidities and multiply the rate by rural/urban smoker volume. For example, of the 712.5 patients in a rural practice 14.73% of them have 3 comorbidities, resulting in 314.85 comorbidities ( $712.5 * .1473 * 3 = 314.85$ ). We total all estimated number of comorbidities and compare rural and urban.

**Results:** Using 2500 patients in a patient panel, we estimate that rural primary care physicians care for 85 more smokers than urban counterparts. Due to higher comorbidity rates of those smokers, it is estimated that rural primary care physicians manage 319.54 more comorbidities (2,367.07 rural smoker comorbidities, 2,047.53 urban smoker comorbidities), constituting a 15.6% comorbidity management workload increase associated with caring for smokers.

**Conclusions:** The 3.5% rural-urban smoking rate difference falls short of telling the story of how smokers impact physician workload differently in rural and urban practices. We estimate that the smoker associated physician workload (comorbidity management) in a rural primary care practice is 16% greater than urban practice. This demonstrates a sizeable workload disparity between rural and urban primary care physicians. We encourage the review of other patient populations to better understand rural primary care workload inflation.

\*Patients with more than 4 comorbidities were aggregated to the 4 condition. Even if they had more comorbidities only 4 were calculated per patient. Therefore, comorbidity rate differences may be greater or less than reported. Since rural patients are sicker, the assumption is that comorbidity management differences are likely underreported in this study.

**Keywords:** smokers, rural primary care, workload

## **An Evaluation of Gender and Geographical Representation in Study Section Members of the National Institute on Aging (Poster Presentation)**

*Zachary Ernst, BS, Merhawit Ghebrehiwet, BS, Matt Vassar, PhD Zachary Ernst, BS*

**Background:** On the subject of research, receiving funding is a vital step. The groups that dictate funding-distribution are worth examining. Evidence has shown gender inequalities regarding representation in research and receiving grant funding. We intended to assess gender and geographical disparities in the Basic Neuroscience of Aging Study Section of the National Institute on Aging (NIA), a division of National Institutes of Health (NIH).

**Methods:** To begin our longitudinal analysis, we pilot-tested a Google Form for data collection. We determined the recorded data should include the following: meeting month and year, study section member name, degree, rank, institution, state, gender, and membership type (permanent, temporary, or Chair). We further divided the states into four geographical regions: West, Midwest, South, and Northeast.

We extracted data from the publicly available NIH roster index and focused on the years 2011, 2016, and 2021. 2011 and 2016 included three meetings each year, while 2021 included one. For gender designation of male or female, we used Genderize.io and web-based profile searches. We eliminated duplicate members to ensure an individual was not overrepresented for the specified year.

**Results:** By reviewing one division of the NIH (the NIA), a small sample size of 93 participants were documented across the years 2011, 2016, and 2021. Additionally, with only one roster meeting for the year 2021, the total sample size was further reduced. Data from 2011 and 2016 for gender representation revealed 36% (13/23) and 47% (21/45) of reviewers being female, respectively. In 2021, females represented half (6/12) of the roster. After assessing geographical representation by region, the Midwest was represented the least out of the three studied years. The South and West were represented the most in 2011 with 12 members each. Lastly, the South continued to hold the most seats for 2016 and 2021.

**Conclusion:** Albeit small, data suggest that the NIH has improved gender representation over the previous ten years. However, geographical representation can improve in the Midwest region. It is vital that representation for both gender and geography be closely monitored to ensure research has equal opportunities for funding throughout the United States.

**Keywords:** Funding, Inequalities, Representation, Disparities, Longitudinal

## **Cross sectional analysis of gender and geographic representation in case study TWD-A (Poster Presentation)**

*Kade Ezell, BS, Chase Lee, BS Kade Ezell, BS, Medical Student;*

**Background:** The scientific community should be at the forefront of diversity, equity, and inclusion. However, research suggests that there are wide disparities regarding gender and geography (Lariviere et al. 2013). The National Institutes of Health uses taxpayer money to review and determine who and what projects to fund. We are studying the representation of two subsets of researchers funded by the National Institutes of Health: gender and geography. Therefore, the purpose of this study was to investigate the disparities in gender and geography in the TWD-A case study from the National Institutes of Health.

**Methods:** Our team obtained the rosters for the TWD-A National Institutes of Health study section panels for all meetings held in 2016 and 2021 from the institution's website. We intended to evaluate data from 2011 but there was no meeting roster available. We extracted the study section members' names, degrees, city, and state of residence; we then used a pilot test to google formfor data extraction. Gender was determined through website searches of their respective institutions and if it could not be determined through that mechanism, we used genderize.io to determine gender. A probability value of 0.6 or higher was accepted for gender determination.

**Results:** Initially, female and male representation was nearly equal and eventually became equal by the final year. In 2016 there were 29 total participants in the meetings with 16 (55%) males, and 13 (45%) females. In 2021, there were 28 participants with 14 (50%) males and 14 (50%) females present. We also investigated representation across four regions: West, Midwest, Northeast, and South. In 2016, 16 states were represented; the West and Northeast regions had the highest representation with 8 (30%) participants. The South was less represented with 7 (26%) participants and the Midwest even more so with 4 (15%) participants. Regional participation increased in 2021 with a total of 19 states being represented. We found that the Midwest and West had the most representatives with 7 (27%) participants each while the South and Northeast had 6 (23%) participants each.

**Conclusions:** Our findings suggest that the NIH has improved gender representation within theTWD-A case study. We also found that while geographical representation improved over time, many states remain underrepresented.

**Keywords:** Funding, Gender, Geography, Disparities, NIH

## **Influence of health care provider recommendation on HPV vaccination among collegestudents (Poster Presentation)**

*Tracy Freudenthaler, PhD, MPH, Adrianna Elbon, BS, Krista Schumacher, PhD Krista Schumacher, PhD,*

Background: Human papillomavirus (HPV) is the most common sexually transmitted infection in the U.S. Several HPV strains are linked to various types of cancers, including nearly all cases of cervical cancer, and rates of HPV-associated cancers have increased since 1999. Nationally, HPV vaccination rates are well below the Healthy People 2020 goal of 80% and even lower in Oklahoma, where cervical cancer incidence and mortality exceed national rates. Although children are targeted for HPV vaccination, it is approved for administration up to age 26.

Unvaccinated college-aged students making health decisions are ideal for HPV vaccine recommendation. However, despite literature that indicates a health care provider's recommendation increases vaccine uptake, the content of these conversations remains unclear. The purpose of this study was to assess the relationship between vaccination status and provider recommendation, identify themes in messaging, and assess provider influence on the vaccine decision.

Methods: In fall 2020, we surveyed 254 undergraduate college students in Oklahoma about HPV knowledge, perceived HPV risk, and vaccination status. For this study, quantitative items related to HPV vaccine status and provider recommendation. Two open-ended items asked respondents to recall provider messages about vaccination and to describe how messaging influenced their vaccination decision. We used a chi-square test and odds ratio to investigate the relationship between provider recommendation and vaccination status and examine the strength of the association. Inductive open coding was used to manually code qualitative responses for vaccinated respondents who received a provider recommendation. Coding was used to create categorical variables for messaging content (e.g., HPV causes cancer, HPV is dangerous) and provider influence (e.g., large, some, or no influence). We used frequencies to identify salient themes and influence.

Results: Vaccination status was significantly associated with provider recommendation, with the odds of being vaccinated 2.54 times greater for those with a recommendation. Just under half of vaccinated respondents with a recommendation received information beyond a simple recommendation, and 42% reported providers largely influenced their vaccination decision. Of the messaging categories, the most common related to cancer prevention (36%), followed by use of written materials (13%) and statements that the vaccine is beneficial (13%) and reduces risk of HPV infection (11%).

Conclusions: Provider communication that conveys favorable opinions of HPV vaccination combined with education about risks associated with infection (e.g., cancer) may positively sway vaccine decisions. Yet, variability among messages raises concerns about consistency of provider communication. For example, a few respondents noted providers framed messages as harmful to females only, suggesting they did not discuss risks for males. Others indicated their provider did not discuss what HPV is or its risks, and simply recommended the shot. Some respondents stated communication was directed toward their parents only. College students are prime candidates for catch-up vaccination. Supportive recommendations from their health care providers, particularly those at student health clinics, may positively influence vaccine uptake among an age group nearing their last chance for protection against HPV.

Keywords: human papillomavirus (HPV) vaccination, provider recommendation, provider messaging, college students

## **Person-Centered Language in Abortion Research (Poster Presentation)**

*Morgan Garrett, BS, Karley Washburn, BS, Claudia Fisch, MS, Kristen McPherson MPH, Aleze Krumholz, MD, Caroline Markey, MD, Micah Hartwell, PhD Morgan Garrett, BS,*

**Background:** Abortion-related stigma is a significant barrier in preventing individuals from seeking necessary healthcare. Person-centered language within medical literature has the potential to help minimize stigma and thus, could have positive downstream effects on patient outcomes and access to care. By being intentional with language, abortion-related stigma may be decreased within literature and among the medical community.

**Objectives:** Our primary objective was to investigate adherence to person-centered language (PCL) in pregnancy termination-related publications.

**Methods:** This cross-sectional study searched Pubmed for abortion-related medical literature published from January 1, 2018 to March 7, 2021. Articles were then randomized and searched by two investigators using a list of predetermined, stigmatizing terms.

**Results:** Of the 232 included articles, only 18.97% (44/232) were PCL adherent. Over half of the articles (127/232) included the term “service” in relation to an abortion procedure and was the most commonly used stigmatizing label. Other common labels included were “abortion provider”, “baby”, and “client”.

**Conclusions:** The majority of abortion-related articles did not adhere to PCL guidelines or the recommendations set forth by the Internal Planned Parenthood Federation’s “How To Talk About Abortion” guide. Access to a safe and legal abortion is of critical importance in reproductive healthcare. As a highly stigmatized medical procedure, the research community’s intentional use of PCL can help break down the perpetuation of this stigma.

**Keywords:** abortion, women's health, stigma, patient-centered care, person-centered language, discrimination

## **The intersection of methamphetamine overdoses and violent crime in the United States and Oklahoma (Poster Presentation)**

*Ashton Gatewood, MPH, Lauren Runde, MS, Micah Hartwell, PhD, Natasha Bray, DO; Ron Thrasher, PhD, Jason Beaman, DO Ashton Gatewood, MPH, Medical Student;*

**Background:** Systemic violence is associated with drug markets and is an outcome of traditionally aggressive patterns of interactions within the system of drug distribution and use. Increasing methamphetamine availability and use is a societal problem due to the association with violence. One longitudinal birth cohort study found that persons using methamphetamine had a 1.6 increased odds of violence perpetration, including intimate partner violence. Current data associating methamphetamine use and violent crimes, independently, with rural communities requires a more in-depth analysis. Thus, our primary objective was to quantify and classify the relationship between methamphetamine use and violent crime and map the intersection across the US at the county level.

**Methods:** Using the data extracted from Federal Bureau of Investigation's National Incident Based Reporting System (NIBRS), CDC's Wide-ranging Online Data for Epidemiological Research (WONDER), and the Oklahoma State's Court Network (OSCN) we estimated the ratio among crude rates of methamphetamine related deaths and violent crimes per 1,000 people at the county level. Drug-related violent crimes include rape and sexual assault, robbery, physical assault, and murder that occur with drug use. Heat Maps were created in R 3.6.1 to display the data and identify areas of concern. Regression analysis and correlation coefficients were used to determine the relationship between methamphetamine overdoses and violent crimes adjusted for upstream factors of unemployment and urbanicity.

**Results:** Using NIBRS (national) crime statistics and overdose deaths from WONDER in 2019, we found a statistically significant positive relationship between methamphetamine overdoses and violent crimes (Coeff = 4.64, SE: 0.58,  $P < 0.001$ ) when controlling for unemployment (-41.68, 5.83,  $< 0.001$ ) and urbanicity (-105.00, 19.42,  $< 0.001$ ), which had an inverse relationship. Using OSCN data for the state of Oklahoma, total violent crime was not significantly associated with methamphetamine overdose deaths, however, association was found with criminal filings of methamphetamine possession (0.64, 0.07,  $< 0.001$ ), unemployment (60.39, 9.51,  $< 0.001$ ) and urbanicity (70.51, 21.84,  $0.001$ ).

**Conclusion:** In this study, our data analysis builds upon the existing literature by revealing a positive relationship between methamphetamine use and violent crime. Furthermore, demographic data including employment status and urbanicity provides a more in-depth understanding of the sociogeographical variation in methamphetamine use and violent crime. Identifying the communities most affected by the adverse associations of methamphetamine has potential for wide-ranging effects, from improving awareness within the medical community and guiding public health initiatives to prioritizing funding. In a largely rural, low-income, and healthcare provider limited state, such as Oklahoma, gaining the combined understanding of critical issues with their geographical impact could empower positive change in the most critically impacted communities.

**Keywords:** Methamphetamine, Violent Crimes, Oklahoma

## **Native American Students Perspectives on a Tribally Affiliated College of Osteopathic Medicine (Poster Presentation)**

*Ashton Gatewood, MPH, Rachel Terry, BS, Natasha Bray, DO, Micah Hartwell, PhD Ashton Gatewood, MPH,*

**Background:** As the first tribally affiliated medical school, Oklahoma State University College of Osteopathic Medicine at Cherokee Nation (OSUCOM-CN) presents a landmark opportunity for Native American (NA) students. Little research has been conducted regarding NA students' sense of belonging in university settings and no research investigates this in the medical school environment. Students' sense of belonging is linked to positive academic outcomes, including higher grades, higher engagement, self-confidence, and acceptance. In addition to sense of belonging, documenting NA medical students' perspective of culture, relationships, or closeness with their own tribe, and what it means to them to be medical students in the inaugural class of a tribally affiliated college of medicine is important. Thus, our objective is to evaluate NA students' sense of belonging at OSUCOM-CN through a sense of belonging survey, interviews, and essay responses through this mixed-methods study.

**Methods:** A social constructivist approach using qualitative methods was adopted to gain an understanding of medical students' perspectives on sense of belonging in the inaugural class at OSUCOM-CN. Data were gathered via mixed methods using a sense of belonging survey, semi-structured interviews, and essay prompts. Participants were recruited from a sampling of all medical students in the inaugural class at OSUCOM-CN identifying as tribally enrolled or of tribal descendance alone or in combination with other race(s). Sense of belonging surveys and short-answer essays were collected via electronic and paper-copy. Interviews were audio-recorded and transcribed. (Rev, Austin, TX) Thematic analysis was conducted using Braun and Clarke's six-phase framework. MAXQDA software was used for data categorization and management. MH generated inductive codes with themes identified from the coded data. AG and RT reviewed transcripts individually and coded the data; after which, dissolving discrepancies until 100% inter-reviewer reliability was met.

**Results:** Seven medical students meeting eligibility for participation criteria enrolled in this study. Data were categorized into four main themes: 1.) Psychosocial and Personal Identity: identity, personality, affiliation, or mental or physical health that affect students' learning, engagement, and attainment, particularly stereotyping, stigma, and historical trauma. 2.) Native Culture and Heritage: family origin, heritage, participation in tribal ceremonies, oppression, stigma with specific notation of past, present, or historical oppression against engagement. 3.) Community Perception: tribe or community's change in pride or stigma over time in general or related to medicine. 4.) Tribal Affiliation: affiliation with first tribally affiliated college of medicine (TA-COM) related to the campus, faculty, other medical students, community, and the importance of being tribally affiliated.

**Conclusion:** This is the first study exploring NA medical students' perspectives on sense of belonging in a tribally affiliated medical school. NA medical students in this study reported a sense of belonging related to their NA heritage, expressed the importance of bridging past and present cultural involvement, and discussed positive changes in personal and community perception of NA culture and medicine. All students placed personal and community-level importance on tribal affiliation for their sense of belonging and ability for success in becoming NA osteopathic physicians.

**Keywords:** Native American, Medical Education, Cherokee Nation

## **Fee-waived virtual 5K races allow increase participation compared to in-person races during COVID-19 (Poster Presentation)**

*Gisella Gaytan, BA, Alexis B. Jones, PhD Gisella Gaytan, BA,*

**Background:** Children's participation in physical exercise has numerous benefits and is well-studied. While there are many significant barriers to participation in exercise in young people, one that has arisen lately is the COVID-19 pandemic. The Cherokee Nation developed the "WINGS" program "to promote and give awareness to regular physical activity, health education, and nutrition for a healthier lifestyle." One of the benefits of this program is fee waivers for participation in selected 5K races, which were transitioned to virtual races during the pandemic. The purpose of this study was to investigate whether race participation differed in children (17 years and under) who were given fee-waivers to virtual races compared to those who signed up for normal in-person races.

**Methods:** Seven fee-waived races and seven non-fee-waived races were selected, matched as occurring during the same month. The selected races took place during 2021 in different areas of Oklahoma. Male and female participation in the age group of 17 years and under was analyzed. Data from selected races was retrieved from public databases containing specific event information (oksportsandfitness.com; tatur.org; <http://www.onlineraceresults.com>).

**Results:** Of the seven WINGS 5k virtual fee-waived races, it was found that 273 males and 296 females (17 and under) participated in the 5k races. Whereas in the seven in-person 5k non-fee-waived races, it was found that 77 males and 51 females (17 and under) participated in the 5k races. Of the seven WINGS 5k virtual fee-waived races there was a total of 569 males and females (17 and under). Of the seven in-person 5k non-fee-waived races there was a total of 128 males and females (17 and under). Participation rates of the 5k virtual fee-waived races were greater than the participation rates of the in-person non-fee-waived races.

**Conclusion:** The WINGS program, even when offering its races in a virtual format, is able to increase participation in 5K events for children 17 years and under compared to in-person 5K races held in the same month in a similar location where the fee is not waived. This program allows children to continue exercising during the pandemic and reduce the barrier to exercise caused by COVID-19.

**Keywords:** 5K, exercise, public health, youth, barriers

## **Review of single blood culture draws from hospitalized children resulting in contamination (Poster Presentation)**

*David George DO, Baylee Arreola DO, Eevar B Rossavik DO, Roger P Barton MD David George DO, Resident;*

**Background:** Blood cultures are a vital diagnostic tool in evaluating acutely ill pediatric patients with concerns for infection. Obtaining blood cultures in pediatric populations varies from the defined guidelines used in adults - notably the use of obtaining one blood culture per pediatric patient versus two blood cultures in adults. Some have argued that a single culture per patient (rather than two) increases hospital costs and length of stay due to the possibility of contaminated single cultures that may result in unnecessary antibiotic administration. This is a particular concern in the pediatric population especially with regards to antibiotic stewardship.

**Methods:** An Institutional Research Ethics Board (IREB) approved retrospective chart review was performed at our local Children's Hospital to analyze blood cultures' rates of contamination. Blood cultures were obtained by single draws from pediatric patients from 10/1/2020 to 1/30/2021. Data was reviewed from blood cultures obtained from patients in the general pediatric hospital service, neonatal intensive care unit (NICU), pediatric intensive care unit (PICU), and pediatric emergency department. Results were compared for when a culture was obtained, when positive growth was recorded, and the final identification of organisms. Results were analyzed based on when a culture was obtained; if antibiotics were started at the time of the draw or changed based on culture identification. Based on organism identification, contamination rates were also obtained.

**Results:** Within our time period of nearly four months between fall and winter, 695 blood cultures were obtained within our Children's Hospital. 60 blood cultures resulted in bacterial growth. Of the total blood cultures obtained, only five (0.72%) were found to be contaminated. All patients with positive cultures had been empirically treated with antibiotics. Patient therapy was adjusted appropriately due to culture results. When cultures resulted in positive growth Contaminant species included coagulase negative Staphylococcus and Micrococcus species.

**Conclusion:** Based on our retrospective chart review of single blood cultures from our pediatric population, only 0.72% of all the cultures were noted to be contaminated. The majority of blood cultures obtained resulted in no growth. Based on this chart review, one can argue that obtaining single blood cultures instead of multiple did not result in a significant amount of contamination that would have resulted in unnecessary antibiotic administration within our pediatric population. Given these findings, further studies examining the utility of using single blood culture draws versus multiple in hospitalized patients and analysis of department specific utilization of blood cultures would be of value.

**Keywords:** Blood Culture, Bacteremia, Pediatrics, Sepsis

## **Designing 3D Printed Braces for Imaging the Carolina Anole (*Anolis carolinensis*) Dewlap Musculature Using DiceCT (Poster Presentation)**

*Jacob George, BS, Ian Browne, PhD, Paul Gignac, PhD, Alexander Claxton, PhD, Haley O'Brien, PhD Jacob George, BS, Graduate Student;*

The form---function relationships of small and gracile features that contribute to multi---tissue phenotypes can be difficult to document due to their delicate nature. For our study we sought to analyze the structure and function of the anole dewlap, a cervical flap protruded via interaction of the hyoid bones, musculature, and integumentary tissues (supported by the second ceratobranchial bones). Previous research has implicated the *Musculus branchiohyoideus* and the *M. ceratohyoideus* in dewlap extension; however recent literature on this interaction is lacking in spite of novel 3D imaging techniques. We used diffusible iodine--- based contrast---enhanced computed tomography (diceCT) to analyze the delicate muscles of the Carolina Anole (*Anolis carolinensis*) dewlap. We sought to observe the dewlap in both relaxed and extended positions to better understand the actions of different hyoid muscles in dewlap protrusion. We attempted multiple methods for diceCT staining the extended dewlaps: pulling the dewlap into the extended position with forceps, various store---bought holding clips, as well as designing de novo clips and support structures for in house 3D printing. We also manipulated the specimens by either maintaining or removing the integumentary fold of the dewlap, to observe which condition allowed for full extension of the second ceratobranchials. The ultimate design was a 3D printed brace belt that supported a strand of 3D printer filament, reinforced using surgical suture, with the skin of the dewlap removed to allow for maximum second ceratobranchial extension. The added support of the torso helped to keep the apparatus in place. This design enabled stabilization of the hyoid bones in the dewlap's extended position, with the filament material composition allowing for the iodine staining and micro---CT scanning of the specimens in the desired, extended position.

Keywords: diceCT, *Anolis*, dewlap, 3D-printing

## **Early Detection of Hansen's Disease in the Pediatric Population (Poster Presentation)**

*Jessica George, DO, Terri Reed, DO, Tess Hanner, DO, Jonathan Ledet, MD, Archana Balamohan, MD  
Jessica George, DO;*

Thought to be a disease only prevalent in third world countries, Hansen's disease still prevails within the United States. Since 2015, there were 178 new cases of Hansen's disease in the US, with the youngest patient 7 years of age. The largest proportion of cases are noted to be Asian or South Pacific Islander, as with our patient today.

In this case report, Patient was a 16-year-old female admitted for fever and rash. Patient had waxing and waning symptoms for 2 years. Prior to 2 years, patient was living on the island of Chuuk. Upon admission, patient was febrile on presentation. Labs were concerning for elevated WBC, CRP, and ESR. On presentation, patient had multiple skin lesions of different morphology. Patient was noted to have flesh-colored papules on chin, in addition to erythematous patches of nodules on all four extremities. Patient was started on Vancomycin and Ceftriaxone. Pediatric Infectious Disease was consulted who had initial concerns of Hansen's disease and recommended biopsies of the lesions. Dermatology was consulted who performed biopsies of right forearm and left lower leg with pathology results confirming *Mycobacterium Leprae*. Patient was then established with the National Hansen's Disease Foundation and started on series of blister medication packages. With close follow up with outpatient pediatric clinic, patient showed improvement of rash after starting her medication regimen. In conclusion, Hansen's disease is still prevalent in many parts of the country. It is important to consider in a differential diagnosis especially if patient has certain risk factors, unexplainable rash, and prolonged fever.

Keywords: Hansen's Disease, Leprosy, Pediatric

## **Effects of gram-negative bacterial outer membrane permeabilization on *Serratia marcescens* gene expression (Poster Presentation)**

*Halla Hamdan, BS; Sue Katz Amburn, PhD; Franklin R. Champlin, PhD Halla Hamdan, BS,*

Our laboratory has focused on the effects of outer membrane permeabilizer compound 48/80 on the intrinsic resistance mechanisms of gram-negative bacteria to hydrophobic antibacterial agents such as the biocide triclosan. To study gene expression changes potentiated by compound 48/80 in *Serratia marcescens*, previously obtained RNAseq data were further analyzed. Original analysis of RNAseq data indicated that, among the genes upregulated, three are known to play roles in the outer membrane when damaged by other antimicrobial agents. The objective of the present study was to clarify the bacterial response to treatment, with the ultimate goal of establishing a proposed mechanism of action for compound 48/80-induced outer membrane permeability. Previous work indicated that *S. marcescens* is one of the few species of bacteria intrinsically resistant to triclosan, and that compound 48/80 induces transient sensitization.

RNAseq analyses revealed a 50-fold increase in expression of *slyB*, *phoP*, and *phoQ* subsequent to compound 48/80 administration and qPCR primers were created in order to further investigate their regulation. A more recent analysis of RNAseq data was obtained using the Pathosystems Resources Integration Center (Patric) analysis tool (<https://www.patricbrc.org>), as well as a newly re-annotated genome. These data allowed for fine tuning of the earlier analysis to provide more detailed information on the upregulated genes. The Patric analysis tool allowed for the in-depth observation of genomic expression levels.

Fragments per Million Mapped Reads allowed for selection of appropriate qPCR housekeeping genes. Patric analysis reconfirmed the upregulation of the aforementioned genes. RNAseq results were reanalyzed to prepare for a qPCR-based expression time-course and to identify appropriate housekeeping gene candidates. qPCR primers for *slyB*, *phoQ*, *phoP* and housekeeping genes will be tested and calibrated to allow the observation of expression changes over time.

Keywords: Compound 48/80, *Serratia marcescens*, outer membrane, PCR primers

## **The Correlation Between Gluteus Medius Strength and Lower Back Pain in Middle Age Adults: A Critically Appraised Topic (Poster Presentation)**

*Lorah Heald, BS, Jenni Dupree, BS, Matthew O'Brien, PhD, LAT, ATC, PES, CES Lorah Heald, BS,*

**Background:** Low back pain is one of the most common complaints of middle-aged individuals. Low back pain tends to be the result of a more sedentary lifestyle and even for those who are active, normal biomechanics can often neglect activation of the gluteus medius muscle. Therefore, it is important to determine appropriate means of preventing this lower back pain with the thought that there is a correlation between the gluteus medius and lower back pain.

**Methods:** Cooper et al. looked at manual muscle tests of the GMed, TFL, and GMax in correlation to patient reported low back pain. Jeoung et al. looked at lumbar stabilizing muscles plus strengthening the muscles of the gluteus using biofeedback response on patient reported low back pain. Penny et al. looked at manual muscle tests and SLS to determine weakness and correlation between weakness and patient reported low back pain.

**Clinical Question:** Are gluteus medius strengthening programs effective in decreasing low back pain in adults?

**Results:** One study investigated symptoms including gluteus medius weakness and tenderness in people with chronic low back pain, one studied the difference between lumbar strengthening exercises and the gluteus group with the lumbar strengthening exercises in relation to chronic low back pain, and one studied to identify the relation between strength of the gluteus medius to low back pain.

**Conclusion:** There is moderate evidence to support the efficacy of strengthening the gluteus medius to improve low back pain in individuals 30-50 years of age.

**Strength of Recommendation:** Level B evidence exists according to Grading of Recommendations Assessment, Development and Evaluation (GRADE), that intervention to the gluteus medius and hip abductors can decrease low back pain in middle-aged individuals.

**Keywords:** Gluteus medius, low back pain, strength, weakness

## **Analysis of Medical Student Sleep Metrics using Wrist Actigraphy (Poster Presentation)**

*Conner Howard, BS, Ryan McIntire, BS, Jennifer Volberding, PhD, LAT, ATC Conner Howard, BS*

**Introduction:** Sufficient sleep is important for optimal cognitive performance, as well as physical and mental health. Due to the demanding curriculum, medical students are a vulnerable population to sleep related fatigue and associated poor health outcomes. The adverse health that accompanies poor sleep is concerning as the sleep habits students develop in medical school may continue into their profession. Noting the importance of sleep and the cognitive consequences of insufficient sleep, we chose to objectively measure sleep metrics in medical students using wrist actigraphy over a 2-week period.

**Methods:** 30 medical students wore a Fatigue Science ReditBand for 14 days during the Fall 2021 semester. Sleep metrics analyzed include Average Effectiveness (0-100 scale that accurately predicts cognitive alertness), Sleep Quantity (hours), Sleep Quality (1-10 scale based on physiologic measurements), and SAFTE ReditScore Zones (equivalent to Blood Alcohol Content (BAC) impairment and slowed reaction time). Means and standard deviations were calculated for each class (first-year = 9, second-year = 9, third-year = 8, fourth-year = 4).

**Results:** Second-year students demonstrated the highest Average Effectiveness ( $88.78/100 \pm 5.19$ ) and Sleep Quality ( $7.00/10 \pm 1.41$ ) scores and spent the most time in the “very low risk” ReditScore Zone ( $48.08\% \pm 33.68$ ; reaction time slowed by 0-5%) compared to other classes. First-year students obtained the highest Sleep Quantity ( $6.76$  hours  $\pm 1.29$ ) yet spent approximately half of their time during the 14-days with reaction time decreased by 18-34%. Third-year students had the lowest Average Effectiveness score ( $86.63/10 \pm 10.16$ ) and Sleep Quantity ( $6.26$  hours  $\pm 1.24$ ), while the fourth-year students had the worst Sleep Quality ( $6.25/10 \pm 1.71$ ). Additionally, third and fourth-year students spent the most time in high risk ReditScore Zones, with reaction time slowed by 34-55%. Overall, Sleep Quantity was less than 7 hours per night in each class, Sleep Quality was not greater than 7/10 in any class, and no class spent at least half their time in the highest SAFTE ReditScore Zone (“very low risk”).

**Conclusion:** Results indicate that medical students are not obtaining the recommended hours of sleep per night. This may be due to sacrificing sleep for medical school-related demands, such as preparation for upcoming exams and clinical obligations. Second-year students demonstrated the best sleep metrics, possibly due to familiarity with the academic curriculum of medical school. Furthermore, third and fourth-year students showed the worst sleep metrics, likely due to clinical rotations, residency applications, and residency interview preparation.

**Keywords:** Medical Student Sleep

## **Otolaryngology Journal Data-sharing Policies: Adherence to the FAIR principles (Poster Presentation)**

*Austin L. Johnson, BS, Craig M. Cooper, BS, Trevor Torgerson, BS, Max Bouvette, Nitin Rangu, Tim Morley, BS, Lacy Brame, DO, J. Michael Anderson, BS, Matt Vassar, PhD*

Background: Sharing data plays an essential role to advance scientific understanding. Here, we aim to identify commonalities or differences in data-sharing policies endorsed by otolaryngology journals, and to assess adherence to the FAIR (findable, accessible, interoperable, reusable) principles.

Methods: Data sharing policies were searched among the top 10 otolaryngology journals, based off of the Google h5-index. Preliminary data extraction followed the gold standard for data management — the FAIR principles for scientific data management and stewardship. Data were extracted in a duplicate, masked, and independent fashion.

Results: Of the 10 sampled journal data-sharing policies, The Laryngoscope adhered most to the FAIR principles (6/10; 60%). The Laryngoscope and International Forum of Allergy & Rhinology adhered to all “Findability” items of the FAIR principles. Eight of 10 policies (80%) designated that metadata should have globally unique and persistent identifiers and 5 (5/10; 50%) policies outline that data should be described with rich metadata. Seven (7/10; 70%) and 9 (9/10; 90%) policies respectively specified that metadata should clearly include the identifier of the data they describe and that metadata should be indexed in a searchable resource. Zero policies outlined that metadata should be retrievable by a standardized communication protocol and remain accessible even when the data is no longer available. All policies stated that metadata should be presented in broadly applicable language for knowledge representation, but only 1 policy (1/10; 10%) specified use of vocabularies that follow the FAIR principles. Five policies (5/10; 50%) stated that metadata should include qualified references to other metadata, and 4 policies (4/10; 40%) outlined that metadata should be richly described with a plurality of accurate and relevant attributes.

Conclusion: Otolaryngology journals have varying data sharing policies, and adherence to the FAIR principles appears to be low. Further advancement in otolaryngology research requires transparency to allow results to be reproduced, confirmed, and debated.

Keywords: Data-sharing, reproducibility, FAIR principles

## **Gender Offender: A Chronologic Evaluation of Gender Bias and Geographical Overrepresentation in the National Institute of Health Diabetes, Digestive, and Kidney Disease Committee Sessions (Poster Presentation)**

*Deseree Jones, BS, Haley Howard, BS, Matt Vassar, PhD Deseree Jones, BS, Medical Student;*

Gender inequality notoriously pervades the scientific and medical communities. This irony is cemented by the fact that scientists—those on the forefront of new thought and exploration who should be the most open to social change and improvement—operate in an enterprise riddled with inequalities. For example, Gender Disparity in Grants and Awards at the National Institute of Health, a study by Beenish Safdar, et al, found that while the number of women graduating doctoral programs is increasing, their percentage of grant obtainment still trails behind that of men. Furthermore, a 2016 article by Wayne P. Wahls found that of the ten states overfunded by the National Institute of Health (NIH), eight were Northern. While there are many issues to address, our study focuses on geographical and gender inequity in the NIH Diabetes, Digestive, and Kidney Disease (DDK-B) grant allotment committee. Our team cataloged the 2011, 2016, and 2021 meeting rosters for the Diabetes, Endocrinology, and Metabolic Diseases Group B NIH subcommittee. Study authors used a pilot-tested Google form to collect the name, degree, academic rank, committee membership, affiliate institution, home state, and gender for each member. Gender was determined by website searches of institutions. If that step yielded no definitive results, genderize.io was used to determine gender. A probability of 0.6 was required to assign a 'male' or 'female' value to a committee member. We found that in 2011, 2016, and 2021, NIH DDK-B committee members affiliated with institutions in the south consistently made up the majority of the committee (~30%). In regards to gender, in 2011, women (n=28, 46%) were represented equally to men (n=33, 54%). However in 2016 and 2021, female representation dropped to only one-third of committee members (n =17, 38% and n = 28, 35%, respectively). Our study revealed that there are geographic and gender disparities in committee member representation. Unlike Wahls's observations, we found members from Southern institutions repeatedly outnumbered those from other regions in the United States. Inequalities concerning gender were even more evident and aligned with our expectations. Gender ratios in 2011 were nearly equal, but interestingly, in 2016 and 2021, the gender gap widened significantly. Our research suggests that these inequalities may mirror the broader inequalities in research. By acknowledging these inconsistencies, we can work to make research funding and scientific advancement more diverse.

Keywords: NIH, funding, grants, gender, diabetes

## **A Longitudinal Analysis of Gender and Geographical Representation in the NIH Developmental Biology Study Section (Poster Presentation)**

*Garrett Jones, BS, Josh Autaubo, BS, Matt Vassar, PhD Garrett Jones, BS, Medical Student;*

It is well documented that women are underrepresented in the scientific community. According to the National Academies of Sciences, Engineering, and Medicine, women do not pursue careers in science due to the barriers they face in matters such as funding and resources. Additionally, Guan Y, et al. found that most published papers in the United States originate from a handful of metropolitan areas; illustrating that in addition to gender disparities in the field, there are also geographic disparities. To ensure discoveries that serve humanity broadly, the scientific community should be at the forefront of diversity and inclusion. To evaluate the current diversity of the scientific community, this present study analyzed the NIH Developmental Biology Study Section rosters for the years 2011, 2016 and 2021. Each year the various NIH Study Sections have three meetings to review research grant applications. Study authors used a pilot tested Google Form for data extraction that included: NIH study section, member name, member position, type of membership, member institution, member state, and gender. Gender was determined through institutional profiles of the members, or in the absence of a profile, by utilizing genderize.io - requiring a probability of 0.6 before reporting gender. In 2011 there were 24 (67%) males and 12 (33%) females. In 2016, there were 21 (68%) males and 10 (32%) females. In 2021, there were 11 (55%) males and 9 (45%) females. With regards to geography, in 2011, most members were from the Northeast (n=12, 33%) and South (n=12, 33%), followed by the Midwest (n=7, 19%) and West (N=5, 14%). In 2016, most members were from the Northeast (n=13, 42%) followed by the Midwest (n=7, 23%), the West (n=6, 19%) and lastly the South (n=5, 16%). Finally in 2021, most members were from the Northeast (n=7, 35%) followed by the South (n=6, 30%), the West (n=4, 20%) and the Midwest (n=3, 15%). Our results showed consistently more male than female members in each of the three years analyzed and highlighted the Northeast as an overrepresented region of residence for section members. This data also shows that the NIH consistently amplifies gender and geographical disparities, specifically, in the Developmental Biology Study Section.

Keywords: NIH, Grants, Gender, Geographic

## **Incomplete Reporting of Patient-Reported Outcomes in Multiple Sclerosis: A Meta-Epidemiological Study of Randomized Controlled Trials (Poster Presentation)**

*Taimoor Khan, BS, Mahnoor Khalid, MS, Bryan Dunford, BS, Tiffany Nguyen, BS, Audrey Wise, BA, BS, Benjamin Heigle, BS, Samuel Shepard, BS, Micah Kee, BS, Cody Hillman, BS, Ryan Ottwell, DO, Micah Hartwell, PhD, Matt Vassar, PhD., Taimoor Khan, BS, Medical Student;*

Background: Multiple Sclerosis significantly affects quality of life, which is often measured by patient-reported outcomes. The incorporation of patient-reported outcomes within clinical trials supplements the efficacy of outcomes in order to provide a patient's perspective for clinicians. Our objective was to evaluate current literature for completeness of reporting of PROs in randomized controlled trials (RCTs) for the management of MS.

Methods: We used MEDLINE, Embase, and Cochrane Central Register of Controlled Trials to search for RCT publications investigating the management of MS. After duplicate screening via Rayyan, RCTs fitting our inclusion criteria were abstracted employing the Consolidated Standards of Reporting Trials - Patient-Reported Outcome (CONSORT-PRO) adaptation and the Cochrane Collaboration Risk of Bias (RoB) 2.0 tool. Mean percent completion of an adaptation of CONSORT-PRO was calculated to address completeness of reporting. In addition, bivariate regression models were used to evaluate relationships between trial characteristics and completeness of reporting.

Results: Our search returned 3,966 results and 92 RCTs were included for data abstraction and analysis. We found an overall completion of 48.68% (SD=19.03). Sixty-five (of 92; 70.65%) of the RCTs were evaluated as having 'high' RoB. There were significant associations between completeness of reporting and the following: mention of CONSORT within published RCTs ( $t=2.55$ ,  $p=.013$ ), length of PRO follow-up ( $t=2.9$ ,  $p=.005$ ;  $t=2.14$ ,  $p=.035$ ), and sample size ( $t=3.12$ ,  $p=.002$ ). No other significant associations were found.

Conclusion: Our study found incomplete adherence to the CONSORT-PRO adaptation among RCTs pertaining to MS. Of the most underreported items, the failure to report a hypothesis and define an approach to missing data threaten the validity of the evidence acquired from RCTs. Furthermore, PROs provide an opportunity to supplement trial outcomes with the patient's perspective. Thus, trialists of future RCTs may improve PRO reporting with increased adherence to the CONSORT-PRO adaptation.

Keywords: Completeness of reporting, CONSORT-PRO, patient-reported outcome, Multiple Sclerosis, quality of life, randomised controlled trials

## **Morphine Withdrawal-Induced Immunosuppression Modulates DNA Methylation in IEC18 cells (Poster Presentation)**

*Brittney-Hien Le, BS, Christy Eslinger, BS, Subhas Das, PhD Brittney-Hien Le, BS, Medical Student;*

Morphine cessation is known to cause immunosuppression in chronic opioid users. Individuals are more susceptible to pathogenic infections during withdrawal, due to the depletion of circulating lymphocytes, macrophages, and cytokines. Morphine withdrawal can also alter the degree of methylation in DNA. Methylation of DNA is a heritable phenomena that does not change the sequence of the genome but can cause genes to be transcriptionally suppressed or enhanced. These changes in gene expression makes individuals more predisposed to acquiring a variety of pathologies. A known transcriptional enhancer of hypermethylated DNA segments is MeCP2. MeCP2 is a protein that binds methylated-CpG regions of DNA, resulting in downstream upregulation of immune determinant genes. An increase in MeCP2, indicates an upregulated immune response due to its association with activating signaling pathways such as NF-KB. Additionally, DNA methylation landscape is also altered in inflammatory bowel diseases, especially in ulcerative colitis. This study was undertaken to evaluate morphine withdrawal-induced DNA methylation modulations in rat intraepithelial cells-18 (IEC18). IEC18 cells were treated in a placebo withdrawal and morphine withdrawal. DNA and RNA was then extracted and evaluated for methylation through bisulfate conversion. Expression of MeCP2e1, GLS, and MOR in placebo and morphine withdrawn cells were assessed through PCR and gel electrophoresis. It was discovered that morphine withdrawal-induced immunosuppression altered the methylation of the genes tested. Indicating that there is permanent DNA change occurring with opioid withdrawal immunosuppression.

Keywords: Immunosuppression, Methylation, Morphine-withdrawal

## **Consistency of new research with a 2006 Sleep Medicine practice parameter for young children (Poster Presentation)**

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Background: Clinical practice guidelines are systematic reviews and synthesis of the scientific literature for specific diagnoses and treatment modalities. They provide important guidance to practitioners and patients. However, if a practice guideline is not updated regularly, then readers may not be aware of changes and newer developments in best practices. We identified a practice guideline that had not been updated since 2006, the American Academy of Sleep Medicine's Practice Parameters for Behavioral Treatment of Bedtime Problems and Night Wakings in Infants and Young Children. To determine whether the clinical trials and published research since 2006 remain consistent or conflict, we completed a systematic review.

Methods: We constructed research questions based on the guideline recommendations using the Participants, Intervention, Comparator, Outcome (PICO) format, developed search strings based on these questions, and searched ClinicalTrials.gov, the World Health Organization's International Clinical Trials Registry Platform, and PubMed. Studies were screened for eligibility and exclusion criteria based on completion date and relevance. Retained studies were evaluated based on study type and design, stage of completion, and which recommendation they addressed.

Results: After the screening process, 36 studies were retained for review. Of these, 28 were completed with published results, including 19 randomized controlled trials, 8 non-randomized intervention studies, and 1 case report. The majority of studies addressed more than 1 recommendation of interest and supported the use of behavioral interventions.

Conclusions: Research over the past 15 years continues to support the general effectiveness of behavioral techniques. However, published research and registered clinical studies have not aligned with research gaps that were identified in the 2006 guidelines. To further advance knowledge for clinical care of infants and young children with bedtime and night-waking problems, future research should target the previously identified research gaps as opposed to continuing to replicate well-established practices.

Keywords: systematic review, pediatrics, sleep

## **Discovery of Critical Virulence Factors of *Fusobacterium nucleatum* in Promoting of Oral Squamous Cell Carcinoma (Poster Presentation)**

*Serene B. Y. Lim, MS, I-Hsiu Huang, PhD Serene B. Y. Lim, MS,*

*Fusobacterium nucleatum*, a known Gram-negative oral commensal in human, has been shown recently to contribute to the initiation and progression of colorectal cancer (CRC) and oral squamous cell carcinoma (OSCC). The existence of *F. nucleatum* in abovementioned cancers has led to poor prognosis, and its abundance has shown to increase gradually from stage I to IV. In general, there are roughly 53,000 new oral cancer cases in the US every year and the prevalence among men and women is about 1.7% and 0.7%. However, understanding about the mechanism of *F. nucleatum*-induced oral cancer has not been well established. In this study, we aim to identify the key regulators of *F. nucleatum* which play pivotal roles in direct and indirect interactions with OSCC to promote the aggressiveness and invasiveness of the disease.

Experiments will first be demonstrated by using oral squamous cell carcinoma cell line, SCC-15, to observe the interactions with *F. nucleatum* wild type, ATCC 23726 and ATCC 25586, and cell surface adhesin mutant strains, RadD, Fap2 and galk. As some of the cell surface receptors in *F. nucleatum* have been proved to participate in the CRC progression, therefore, HCT 116, a colorectal carcinoma cell line will be included as a positive control as well. Meantime, more in-house *F. nucleatum* mutant strains will be created and involved in this study. Clinical *F. nucleatum* strains which were previously isolated from OSCC and non-OSCC patients' saliva in Taiwan will also be included in the analysis.

Our preliminary data reproduced some of the initial critical observation published previously. By treating HCT 116 cells with bacterial supernatant, *F. nucleatum* wild type strains have promoted both the cell proliferation and migration of HCT 116 while *F. nucleatum* cell surface adhesin mutant strains lost those abilities. The same approaches with the addition of invasion and adhesion assays will be applied on SCC15 to observe the outcomes and further analyze the major factors of the effects. SCC-15 will also be challenged by bacterial cell suspension to determine the mechanism of direct bacterial-host interactions. Our *F. nucleatum* clinical strains have been screened through by using whole cell suspension and previous data has shown that the *F. nucleatum* isolates which were extracted from OSCC patients displayed increased invasiveness than the non-OSCC group. Detailed investigation on the differences, for examples the abundance or variety of cell surface receptors, and secretion proteins between the two groups of bacteria will be conducted in the future.

By uncovering the detailed mechanism behind *F. nucleatum*-dependent OSCC progression, we hope to provide important knowledge towards the development of novel OSCC prevention and treatment strategies.

Keywords: *Fusobacterium nucleatum*, Oral Squamous Cell Carcinoma (OSCC)

## **Detection of RNA Methylation Patterns of Forensically Relevant Transcripts in Dried Bloodstains (Poster Presentation)**

*Chaelynn Lohr, BS, Jun Fu, PhD, Robert Allen, PhD Chaelynn Lohr, BS,*

RNA degradation kinetics can be used to estimate the age of a biological sample found at a crime scene. RNA sequencing of transcripts from various tissue types shows that degradation occurs faster at the 5' end than the 3' end. This discovery led to the development of the 5'-3' assay, which quantifies and compares each end of a transcript in a single reaction to estimate sample age. This assay has been validated on dried bloodstains, however why the 5' end of the transcript degrades faster than the 3' end remains unknown. As this phenomenon is being observed in dried samples, we hypothesize that chemical hydrolysis reactions are responsible for breaking the RNA molecule and thus chemical modifications of the 5' or 3' ends of the RNA molecule may affect the degradation rate. A literature exists that suggests that methylation of RNA molecules can alter the kinetics of RNA degradation through affecting transcript stability and also possibly dependent on the RNA binding proteins (RBPs) present. We aim to investigate the methylation patterns of transcripts in dried bloodstains using RNA enrichment and liquid chromatography tandem mass spectrometry (LC-MS/MS). We developed a novel RNA enrichment technique that utilizes 120bp DNA probes designed to hybridize to the 5' or 3' ends of a transcript for selected target enrichment. The enriched product will then be hydrolyzed into nucleotides for analysis via LC-MS/MS. Preliminary results show that this approach can enrich for our selected target over 150,000-fold. We anticipate observing differences in RNA methylation patterns between the 5' and 3' ends of our selected transcripts, potentially explaining the differential degradation rates of the 5' and 3' ends of RNA molecules.

Keywords: RNA Degradation, RNA Methylation, qPCR

## **Longitudinal Analysis of Gender and Geographical Representation for Environmental Health Sciences Study Section of the National Institute of Health (Poster Presentation)**

*Kimberly Magana, MEd, Mauri Lester, BA, Matt Vassar, PhD Kimberly Magana, MEd, Medical Student;*

Data collected over a period of three different years indicates the National Institute of Health (NIH) has not demonstrated gender bias in selecting Environmental Health Science study section members, but hasin regard to geographic location. There were multiple states given no representation while other states were represented by multiple committee members. Therefore, the purpose of this study was to assess the relative biases placed on study section members of the NIH in regards to the Environmental Health Sciences.

The rosters for the Environmental Health Sciences NIH study section were collected by our team for each meeting held in 2016, 2011, and 2021. Our team compared the following from each section member: name, affiliation, degree, city, and state. University websites were our primary source for identifying the gender of each member. If gender was unable to be determined based on the institute's page, genderized.io was utilized for verification based on a probability of 0.6 or greater in order to assign a particular gender to a study member. A pilot-tested Google form wasthe platform of choice for collecting data while Google Sheets was our source for organizing and analyzing the data. If members served at more than one meetingper year, duplicates were eradicated to ensure our data represented the committee based on the year overall. We first analyzed the number of males and next the number of females. We then broke down geography by region and again by state.

For the EHS study section, women were represented in greater proportionsto men. In 2011, 41 participants were female (56%) and 32 participants were male (44%). In 2016, 34 participants were female (55%) and 28 participants were male (45%). In 2021, 34 participants were female (54%) and 29 participants were male (46%). Geographically, the majority of the members were from the South in 2011 and 2016 (30% and 34%, respectively), and from the Midwest in 2021 (32%). Over time, the Northeast was represented the least with 22% member representation in 2011, 20% in 2016, and 17% in 2021. The highest number of members from a single state in 2011 was California (7). In 2016 and 2021, New York had the highest number of members(6 and 7, respectively). In 2011, 18 states had no representation, in 2016, 22 states had no representation, and in 2021, 16 states had no representation.

Our results suggest that the NIH has done a good job at selecting females to serve on the EHSstudy section over time. Our results also suggest that the NIH has not significantly improved their selection of members geographically, as the Northeast was underrepresented each year. Additionally, while the South or Midwest represented the majority of members, the states with the single highest representation were in the West or Northeast. Within all regions, some states were not represented, while other states were overrepresented.

Keywords: Environmental, Gender, Geography, Bias

## **Analysis of Gender Representation and Geographical Region of the Communication Disorder Review Committee (Poster Presentation)**

*Trevor Magee, BS, Matthew Chancellor, BS, Caleb Peters, BS, Matt Vassar, PhD Trevor Magee, BS, Medical Student;*

Science is at the forefront of diversity, equity, and inclusion yet wide disparities continue to exist in the field today. Science is a field where different backgrounds, experiences, and expertise are critical for progression to persist. Studies on this topic have been done in recent years. One such study, Silva et. al. (2020), examines gender differences in NIH grant funding inneurological surgery finding that 79.4% of all NIH grants were awarded to males in the field.

Science, a field with women deeply interlocked in its history and future, has shown a historic exclusion of women in its funding. Grants and funding have also been shown to be concentrated in certain regions of the country such as those harboring universities historically known to have prestige. Therefore, the basis of this study was to find gender and regional disparities among members of a specific committee that reviews and selects grant recipients. Our team retrieved the roster for the NIH Communication Disorder Review Committee (CDRC) study panel for the years 2011, 2016, and 2021. We collected study section member names, professional affiliation, academic degrees, and state residency. Study authors used a pilot-tested google form for data extraction. Gender was determined using genderized.io, a simple application programming interface (requiring a probability of >.6), or by google search of the study section member. Once collected, the individuals were sorted by their gender and geographical region. Over time, women were represented in study sections at an increasing rate. In 2011, there were 56 (60%) males and 38 (40%) females. In 2016, there were 35 (51%) males and 34 (49%) females. In 2021, there were 36 (49%) males and 38 (51%) females. We observed a detectable upward trend of female participation over time. Regarding geography, the region of the country least represented in 2011 was the West (n=15, 23%), while the Northeast was the most represented (n=25, 28%). In 2016, a majority of study section members were from the Midwest (n=19, 29%) followed by the South and Northeast (n=16, 24%). In 2021, the majority of members were also from the Midwest (n=24, 34%), with the smallest contribution being from the West (n=13, 19%). The most underrepresented region of the country in the years we examined was the West (average = 21%). Data shows that historically there has been a discrepancy in the ratio of male to female involvement in the scientific community. Having diversity among the science community is beneficial for reducing bias. Our results show from 2011 to 2021, there has been an increase in the percentage of females on the CDRC, from 40% in 2011 to 51% in 2021. This data suggests an upward trend in female involvement. Further, our data display a possible geographical disparity in the scientific community.

Keywords: Funding, NIH, gender, grants, region

## **What's inside that tiny head? Braincase osteology of ancient mammal relative *Cotylorhynchus* (Poster Presentation)**

*Lianna Marilao, BS, Daniel Barta, PhD*

*Lianna Marilao, BS, Graduate Student;*

Synapsids are a group of amniotes that first appeared approximately 300 million years ago and include ancient mammal relatives and the living mammals present today. Non-mammalian synapsid neurobiology is relatively understudied compared to other amniote fossil groups like dinosaurs because non-mammalian endocasts are not completely accurate estimates for brain shape. Non-mammalian synapsids do not display the complete braincase ossification that is seen in mammals, and the anterior braincase is often not preserved making it difficult to completely reconstruct the entire endocast. However, the posterior braincase including the otic capsule is still possible to reconstruct. Out of the few non-mammalian synapsid endocasts that have been made, very few have been done for the early diverging group of pelycosaur. Here, we'll be reconstructing the posterior braincase and a virtual endocast of *Cotylorhynchus romeri*, an early pelycosaur from approximately 280 million years ago that is well known for its disproportionately small head compared to its large body.

A complete skull of *Cotylorhynchus* from the Sam Noble Museum was computed tomography (CT) scanned. Using the CT-scans, we created three dimensional reconstructions by manually segmenting out the braincase in Avizo Lite. CT-scans and virtual reconstructions allow us to describe the internal structures of the skull without damaging the fossil specimen. As a prelude to reconstructing an endocast, we provide a preliminary anatomical description of the braincase osteology to add new morphological information to previous descriptions written before CT technologies were widely available and establish the relationship of bones to corresponding brain regions.

The occipital regions for caseids have been described to have a distinctive broad and flat shape that slopes posteriorly, based on previous descriptions of *Cotylorhynchus* and of a smaller genus, *Casea*, and this specimen supports that. Another similarity is that the foramen magnum has a triangular shape that flares out ventrally. One difference is that the supraoccipital in this specimen is relatively large and fuses with the lateral exoccipitals while the supraoccipital in *Casea* is smaller and does not fuse with the exoccipitals. This may be a size and/or maturity-related difference. The floor of the braincase is formed by a short basioccipital that makes up the ventral border of the foramen magnum and by the parabasisphenoid. The basioccipital and parabasisphenoid contact each other via a suture and are unfused. The parabasisphenoid has a long cultriform process that extends anteriorly between the pterygoids and contains teeth, a feature also found for *Casea*.

Through reconstructing the braincase of *Cotylorhynchus*, we will estimate the morphology of its lost soft tissues to gain insight into aspects of its paleobiology such as balance, audition, social behaviors, and communications. We will clarify aspects of pelycosaur braincase anatomy and add to the little that is known about their endocasts, providing foundational data for investigating the evolution of nonmammalian synapsid and mammalian neuroanatomy.

Keywords: paleontology, endocast, synapsid, brain, skull

## **Culturomics approach to identify halophiles in edible salts (Poster Presentation)**

*Sydney Marouk, BS, Ratnakar Deole, PhD Sydney Marouk, BS, Medical Student;*

Salts have been used in the food industry not only for flavoring of foods but also in food preservation. Refrigeration and vacuum sealing of food products have decreased the need for salt preservation. However, salt is still extensively utilized as a preservative. Salt's ability as a preservative is because of its ability to reduce the growth of pathogens and other microorganisms that can result in spoilage of food products or illness. It does this by limiting the amount of unbound water available to be used by microbes and their chemical reactions. However, salt can also be the source of living microorganisms called halophiles that may affect human health especially the gut microbiome. In this project, to determine the microbial communities of edible salts, an investigation was done using a culturomics approach. Four commercially used edible salts were purchased at the food store and dissolved in a solution and plated onto Difco marine agar and broth medium. Edible coarse sea salt showed growth of a halophile. This halophilic organism was purified using plating techniques and further identified using biochemical tests and 16S ribosomal RNA sequencing.

Keywords: Salt, halophiles, culturomics

## **Characterization of a bacteriocin that targets *Clostridioides difficile* (Poster Presentation)**

*Joseph McCreary, BS, I-Hsui Huang, PhD Joseph McCreary, BS, Graduate Student;*

*Clostridioides difficile* is a bacterium of concern for anyone undergoing antibiotic treatment. *C. difficile* can resist most antibiotics and is currently only treated with Metronidazole and Vancomycin. Both antibiotics are non-specific to *C. difficile* and have the side effect of killing the normal microbiome of the gut. This microbiome helps to keep the body resistant to *C. difficile* infections. The lack of specific treatment options perpetuates the problem of infection and can lead to relapses of disease. *Clostridium butyricum*, a non-pathogenic probiotic, has been shown to produce a highly specific antimicrobial product called a bacteriocin that targets *C. difficile*. Previously, the gene encoding for the *C. butyricum* bacteriocin (CBMB) was cloned into *E. coli* and purified as recombinant protein. The recombinant CBMB was shown to exhibit potent activities multiple strains of *C. difficile*. In my project, I continue the characterization of CBMB by performing disk agar diffusion assays, growth curve analysis showing the antimicrobial effect of CBMB on *C. difficile*. In silico analysis using the new AI system AlphaFold 2 was performed to predict the 3-dimension structure of CBMB. Based on this analysis, we also designed peptide fragments derived from the different regions of CBMB to determine the site of catalysis. Furthermore, we are also working on determining the minimal residues required for CBMB to still retain antimicrobial activity. The ultimate goal of my project is to generate potentially novel alternative treatment of *C. difficile* infections.

Keywords: *Clostridioides difficile*, Bacteriocin, Treatment

## **Patient-Reported Outcomes of Firefighters Using Seven Health and Ability Questionnaires (Poster Presentation)**

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Ryan McIntire, BS, Medical Student;*

**Background:** Firefighting is among one of the most dangerous professions and requires exceptional physical fitness and focus while working. Patient-reported outcomes are a commonly used method to evaluate subjective health information and may be used by fire departments to identify the health status of firefighters and provide insight to promote their health. Our study is a novel analysis of firefighters self-reported health to potentially identify deficiencies and opportunities for health improvement.

**Methods:** Firefighters were evaluated using seven different self-reported health surveys to assess various physical capabilities and quality of life. The questionnaires were delivered via online format and administered once to provide a snapshot of a suburban Oklahoma fire department.

**Results:** Using the Disablement in the Physically Active Scale, 14 of the 35 firefighters answered “slight, moderate, or severe” for the pain and motion variables. Only two of the firefighters indicated no stiffness or soreness after activity on the Nirschl Phase Rating Scale. The firefighters mean rating for “energy/fatigue” via the RAND-36 was 54.14 out of 100.

**Discussion:** Firefighters generally had pain, impaired motion, and soreness as frequently reported symptoms, indicating areas in which interventions may be helpful. Incorporation of periodic health surveys into firefighter schedules can highlight present health issues, as well as intervention effectiveness by means of subjective health status reporting. By combining the health surveys with aerobic and core strength exercises, fire departments may be able to monitor and improve firefighter health.

**Keywords:** Patient-reported outcomes, Firefighter research, Health surveys

## **Person-Centered Language in HIV Research: A Cross-Sectional Examination of Stigmatizing Terminology in Medical Literature (Poster Presentation)**

*Kristen McPherson, MPH, Arjun K. Reddy, BA, Nicholas B. Sajjadi, BS, Kyle Deboy, BS, Swapnil Gajjar, BS, Madhuri Lad, DO, Micah Hartwell, PhD Kristen McPherson, MPH, Medical Student;*

**Objective:** We sought to quantify the use of person-centered language in research journals that publish high volumes of HIV-related manuscripts. **Design:** In this cross-sectional study, we searched PubMed for HIV-related articles published between 1/1/2017 and 3/7/2021. After journal reduction and article randomization, title and abstract screening was conducted among 500 studies in a masked, duplicate fashion.

**Methods:** Studies that were included were systematically searched for prespecified, stigmatizing terms, partial terms, and phrases. Prevalence rates of non-person-centered terminology were totaled, and the total number of articles adherent to person-centered language guidelines were reported. Fisher Exact tests were used to determine associations between PCL adherence and article funding source, type of article and research, among others.

**Results:** Among 239 studies included, 21.34% (51) of HIV-related publications in this cross-sectional analysis were found to be PCL adherent. Stigmatizing labels such as “HIV- or AIDS- infected-” and “HIV- or AIDS-” person or patient were used most frequently, with the former appearing in 57.32% of articles and the latter appearing in 30.54% of articles.

**Conclusion:** Despite numerous guidelines and requirements for the use of person-centered language in research, our findings suggest that an alarming number of HIV-related articles are not following these guidelines. This is concerning because this labeling likely contributes to the persistence of stigma in HIV-centered care. The intentional use of person-centered language in medical research has the potential to minimize the use of stigmatizing language amongst medical professionals, in medical education, in medical records, and patient encounters, and thus reduce stigma.

**Keywords:** HIV, stigma; patient-centered care, person-centered language, discrimination

## **The Influence of COVID-19 on Contraception: a Cross-Sectional Analysis of Disrupted Clinical Trials (Poster Presentation)**

*Kristen McPherson, MPH, Liza-Ann Whitaker, BS, Nicholas Sajjadi, BS, Jemeca Price, MD, Micah Hartwell, PhD Kristen McPherson, MPH, Medical Student;*

**Background:** The COVID-19 pandemic exacerbated barriers to contraceptive services and disrupted the progression of ongoing clinical trials (CTs) in several fields of medicine<sup>1–4</sup>, including contraceptive care. Further, sponsors have restricted CTs due to funding uncertainty. The impact of the pandemic has not yet been quantified in research related to contraception-related trials, thus our aim was to identify trials that were prematurely discontinued.

**Methods:** We searched ClinicalTrials.gov to identify contraception-related trials, and where applicable, reasons for discontinuation. We extracted the number of participants per trial, funding source, and trial location. We assessed associations between reasons for discontinuation (COVID-19 vs. other reasons) and 1) trial size via Mann-Whitney U test, funding source, and location via Fishers exact.

**Results:** Of the 107 contraceptive-related studies, 12 (11.21%) were discontinued between January 1, 2020, and June 30, 2021. There were a total of 4,614 individuals enrolled in discontinued trials, with a median enrollment of 18 (IQR: 5 - 276). Two trials explicitly stated COVID-19 as a reason for termination, four reported sponsor-requested termination, two reported recruitment issues, one reported funding issues, two studies did not report a reason and one principal investigator left.

**Conclusions:** For the 415 women enrolled in contraception-related CTs that were discontinued explicitly due to COVID-19, access to contraception may have been impaired or discontinued. Given that COVID-19 could be an underlying reason or contributing factor to why the remaining studies were terminated, it is also possible that more women's contraceptive care was disrupted due to the effects of the pandemic. This is worrisome because discontinuation of contraception can have many negative effects, the most significant of which is unintended pregnancy and its resulting possible ramifications.

**Keywords:** Contraception, COVID-19, Clinical Trials

## **The evaluation of reporting of Patient-Reported Outcomes in MDD: a meta-epidemiological study of clinical trials (Poster Presentation)**

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**Background:** Major depressive disorder (MDD) is a multifaceted disease that profoundly affects quality of life. Patient reported outcomes (PROs) are used in randomized controlled trials (RCTs) to better understand patient perspectives on interventions. Therefore, we sought to assess the completeness of reporting PROs in RCTs addressing MDD.

**Methods:** We identified RCTs evaluating MDD containing a PRO measure published between 2016-2020 from MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials. Inclusion of studies was performed in duplicate. The completion of reporting of RCTs was assessed using the Consolidated Standards of Reporting Trials (CONSORT-PRO) adaptation.

**Results:** Bivariate regression analyses were used to evaluate reporting completeness and trial characteristics. A total of 49 RCTs were included in our analysis, with a mean CONSORT-PRO completion score of 56.7% (SD=17.3). Our findings show a significant association with completeness of reporting and the following: secondary PRO trials were less completely reported as compared to primary PRO trials ( $t=-3.19$ ,  $p=.003$ ); studies with a follow-up period between six months and year were more completely reported as compared to three months or less (6 months to a year,  $t=2.34$ ,  $p=.024$ ); and increased trial sample size was associated with more completeness of reporting ( $t=3.17$ ,  $p=.003$ ). As compared to brain stimulation, the intervention types classified as combination, other, and psychotherapy had greater completeness of reporting (combination,  $t=2.35$ ,  $p=.024$ ; other,  $t=3.13$ ,  $p=.003$ ; psychotherapy,  $t=3.41$ ,  $p=.001$ ). There were no other significant findings.

**Conclusion:** Our study found the completeness of PRO reporting to be inconsistent in RCTs regarding MDD. Moreover, we advocate for the need to establish a core outcome set relevant to the management of adults diagnosed with MDD and facilitate training on the application of PRO data.

**Keywords:** Patient-Reported Outcomes; CONSORT-PRO; Major Depressive Disorder; Completeness of reporting; Risk of bias

## **Cross-Sectional Analysis of Gender and Region Differentiation amongst a Scientific Review Committee (Poster Presentation)**

*Jay Modi, BS, Kyle Fitzgerald, BS, Matt Vassar, PhD Jay Modi, BS, Medical Student;*

Throughout the global-scientific network, equality and diversity should be upheld to the highest degree. However, evidence over our history has shown that wide disparities between demographics exist, particularly within scientific research. For example, Junming Huang, et al. (2020) uncovered the facts that women of the science, technology, engineering, and mathematics (STEM) field show a much shorter scientific publishing career length and have higher drop-out rates compared to men, even with female and male publishers being comparable and nearly equal in number. We feel that the scientific research community should work diligently to establish a sense of inclusion in all aspects of the field, including those applying for federal funding for his or her respective research. Therefore, the purpose of our study was to investigate gender and geographic disparities for panel members that assess grant candidates in the Biomedical Informatics, Library and Data Sciences Review Committee (BLR) within the National Institutes Health (NIH). Our team collected the rosters for the BLR study section panel for all meetings held in March, June, and November of 2011, 2016, and 2021. The study section member names, affiliations, academic degrees, and city and state data were extracted through a pilot-tested Google form by the study authors. Gender difference was recorded through an internet-based profile finding of the member's affiliated institution, and if not found, through the genderize.io website—needing a probability greater than 0.6 before gender could be documented. All data were then transmitted onto a Google Excel sheet for categorization amongst the panels for each year. Within the 2011 BLR roster, there were 20 males (54%) and 17 females (46%). For 2016, there were 20 males (61%) and 13 females (39%). Lastly, for 2021, there were 31 males (59%) and 22 females (41%). There appeared to be a trend shown of males being the predominant gender within all three years, but no pattern in terms of continuous increase or decrease. In regard to geographical disparities, the majority of members in 2011 were of the South region (n=9, 31%), while the Midwest was least represented (n=6, 21%). For 2016, the Northeast and South held the most representation (n=7, 29%), while the West had the least number of members (n=4, 17%). In 2021, most members were from the South (n=16, 36%), with the West and Midwest representing the lowest number (n=7, 16%). Within all three years, our findings showed that the South was emphasized in having the most representation of BLR panel members. These results expressed that there still continues to be a gap in equal representation of both gender and regional background amongst the BLR-NIH study section. Overall, this data suggests that the NIH continues to appoint a greater ratio of males than females, along with a larger representation of those from the South, as Scientific Review Committee members for proper allocation of federal funding.

Keywords: Funding, Gender Bias, Regional Background

## **Analyzing the phenotypic characteristics of environmental *C. difficile* isolates (Poster Presentation)**

*Gianna Moulis, BS, I-Hsiu Huang, PhD Gianna Moulis, BS.,*

*Clostridioides difficile* (*C. difficile*) is an anaerobic, spore-forming bacterium. Antibiotic use, hospitalization, advanced age, a compromised immune system, and previous infection puts individuals at an increased risk for *C. difficile* infection (CDI). *C. difficile* is one of the most common causes of hospital-acquired antibiotic associated diarrhea and there are both toxigenic and non-toxigenic *C. difficile* strains. Previously our lab isolated multiple *C. difficile* strains from several wastewater treatment plants in Taiwan. Ribotyping and antibiotic resistance profiling were performed for all 97 individual isolates. In total, 24 different ribotypes were represented. In this study, we wish to investigate the phenotypic characteristics of these isolates in order to determine if there are any differences between the different ribotypes. Colony morphology revealed wide diversity among the isolates tested. We also characterized the ability of these isolates to exhibit swimming motility and gliding motility. Lastly, we will analyze the spore forming abilities of these *C. difficile* isolates. The results generated from this project will provide for the first time a comprehensive characterization of water-borne *C. difficile* in Taiwan.

Keywords: *clostridioides difficile* microbiology

## **$\beta$ -Funtrexamine protects against lipopolysaccharide-induced neuroinflammation and behavioral impairment (Poster Presentation)**

*Stephanie Myers, BS, Daniel J. Buck, BS, Kelly McCracken, MS, J. Thomas Curtis, PhD, Randall L. Davis, PhD Stephanie Myers, BS.,*

**Background:** One of the commonalities present in a multitude of neurological disorders is inflammation. For this reason, targeting inflammation has emerged as a viable option for the potential treatment of neurological disorders. Previous work indicated that beta-funtrexamine ( $\beta$ -FNA), a selective mu-opioid receptor (MOR) antagonist, not only inhibited inflammatory signaling in vitro in human astroglial cells but also inhibited lipopolysaccharide (LPS)-induced neuroinflammation and sickness-like behavior in mice when administered post-LPS immediately.

**Methods:** The present study explores the extent to which  $\beta$ -FNA is protective when treatment occurs 10 hours after LPS administration. Male and female C57BL/6J mice were administered LPS (0.83 mg/kg, i.p.) followed by treatment with  $\beta$ -FNA (50 mg/kg, i.p.) immediately or 10h post-LPS. Sickness-like and anxiety-like behavior was assessed using a 10-min open-field test and a 5-min elevated plus-maze test followed by the collection of the whole brain, hippocampus, frontal cortex, cerebellum/brain stem, and plasma. Levels of inflammatory chemokines/cytokines (interferon  $\gamma$ -induced protein, CXCL10; monocyte chemoattractant protein 1, CCL2; interleukin-6, IL-6; interleukin-1 $\beta$ , IL-1 $\beta$ , and Tumor Necrosis Factor Alpha, TNF- $\alpha$ ) in tissues were measured using an enzyme-linked immunosorbent assay.

**Results:** Two-way analysis of variance revealed that at 24 hours, LPS increased chemokines and cytokines, and  $\beta$ -FNA treatment was protective depending on the dosing schedule and had region-specific effects.  $\beta$ -FNA inhibited levels of CXCL10 in the hippocampus, frontal cortex, cerebellum/brain stem, and plasma, and more so in males. CCL2 had differential effects between males and females in the frontal cortex, cerebellum/brain stem, and plasma.  $\beta$ -FNA treatment also varied in IL-6, IL-1 $\beta$ , and TNF- $\alpha$  in a region-specific and sex-specific manner. Sickness-like behavior and anxiety-like behavior also differentiated between males and females.

**Conclusions:** This study indicates that LPS-induced neuroinflammation was differentially affected by  $\beta$ -FNA treatment across different brain regions. This shows that the treatment might have a regional effect more than a global one. Sex differences between males and females showed differential effects in the timing of treatment, tissue, and in some cases, even in their response to the LPS-induced stimulation. Further examination of  $\beta$ -FNA's anti-inflammatory and neuroprotective actions is still necessary.

**Keywords:** neuroinflammation, chemokine, cytokine, Opioid, Anti-inflammatory

## **Effect of Outer Membrane Permeabilization on Intrinsic Resistance to EIPE-1 in Selected Gramnegative Bacteria (Poster Presentation)**

*Katherine Nehmzow, AS, Daniel Reed, BS, Toby Nelson, PhD, Gabriel Cook, PhD, Franklin R. Champlin, PhD Katherine Nehmzow, AS, Undergraduate Student.,*

**Background:** This laboratory has shown that the hydrophobic, melanin-inspired compound EIPE-1 possesses antibacterial properties for aerobic and facultatively anaerobic gram-positive bacteria, while gram-negative bacteria are intrinsically resistant. The intact gram-negative outer membrane is typically impermeable to hydrophobic substances due to the asymmetric localization of lipopolysaccharide in the outer leaflet. Therefore, we hypothesize that the intrinsic resistance of gram-negative bacteria to EIPE-1 is due to the presence of an intact outer membrane that is impermeable to hydrophobic molecules.

**Methods:** A disk agar diffusion bioassay was used to determine if a strictly anaerobic gram-positive organism is susceptible to EIPE-1, and sensitization to EIPE-1 by compound 48/80, an outer membrane permeabilizer, was employed to determine if EIPE-1 and compound 48/80 synergistically inhibit bacteria growth.

**Results:** *C. difficile* 630 and 20291 has slight susceptibility to EIPE-1 at 50 µg, demonstrating that EIPE-1 has some antibacterial properties on an obligate anaerobe. There was no synergistic relationship seen between EIPE-1 and the outer membrane permeabilizer compound 48/80 with regard to sensitization of the three gram-negative test bacteria.

**Conclusion:** These data confirm that EIPE-1 possesses a gram-positive antibacterialspectrum and extends our work to include at least one strictly anaerobic organism. Despite the hydrophobic nature of EIPE-1, this work also supports the notion that the exclusionary properties of the outer membranes of the gramnegative bacteria examined are not solely responsible for their intrinsic resistance to EIPE-1. The presence of multi- drug efflux pumps and/or enzymes which covalently modify EIPE-1 are suspected.

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**Keywords:** EIPE-1, intrinsic, resistance, gram-negative, bacteria

## **Longitudinal changes to NIH Scientific Review Groups' composition to address gender- and region-based disparities (Poster Presentation)**

*Ryan Newhardt, BS, Kaylin Ray, BS, Matt Vassar, PhD Ryan Newhardt, BS, Medical Student;*

Historically, participation in Scientific Research Groups, which are responsible for delegating federal funding for biomedical research (e.g. NIH R01 grants), has shown disproportionate gender and geographic biases. Overrepresentation by men and citizens from urban centers has led to inequitable prioritization of research aims and project funding. Recently, public sentiment has had some success with identifying and addressing social disparities in academic environments. A longitudinal study was conducted to examine the disproportionate gender and geographic biases, specifically within the NIH Arthritis and Skeletal and Skin Diseases (AMS) meetings held in 2011, 2016, and 2021. Using a pilot-tested Google Form, authors extracted the following information from NIH Scientific Review Group (SRG) Rosters: specific institution of health, year of meeting, month of meeting, participant's name, post-graduate degree(s), home institution, state of residence, academic position/rank, membership status, and gender. Gender was determined through web searches of the affiliated institution(s); if gender could not be determined via web search, the website genderize.io was used by entering the individual's forename to make the conclusion. A probability of 0.6 was required to determine the gender of the study section member. In earlier study sections women were less represented compared to men. In 2011, 67% (n=54) of members represented were men, while 33% (n=26) were women; 2016 had 56% (n=48) of members as men and 44% (n=37) as women; 2021 plateaued with 50% (n=52) of both men and women being represented equally. Regarding geographical representation, percentages remained much more stagnant for each region over the years. In 2011, the Northeast had the most members represented at 29% (n=23); the Midwest and Southeast both equaled 25% (n=20); the West was 17% (n=14), followed by the Southwest at 4% (n=3). In 2016, the Northeast saw an increase in represented members at 31% (n=26); the percentage representing Southeast also increased to 29% (n=25); the Midwest was at 19% (n=16); the West was at 18% (n=15); the Southwest remained low at 3% (n=3) representation.

Lastly, 2021 results showed that the Northeast remained most represented at 41% (n=42); the Southeast was represented at 19% (n=20); both the West and Midwest were represented at 18% (n=19); the Southwest remained in the lowest represented region at 4% (n=4). Additionally, comparing the top quintile of states receiving NIH funding to the bottom four quintile demonstrated a lower rate of inclusion of women over time in states receiving low NIH funding compared to their first quintile counterparts. Ultimately, our results suggest that NIH has done a better job over time to select women to serve on NIH AMS study sections.

**Key Words:** Gender, Funding, Grants, NIH AMS section, Pilot-Tested

## **Completeness of reporting of patient-reported outcomes in randomized controlled trials focused on peripheral nerve blocks: a meta-epidemiological study (Poster Presentation)**

*Tiffany Nguyen, BS, Bryan Dunford, BS, Taimoor Khan, BS, Mahnoor Khalid, MS, Cody Hillman, BS, Samuel Shepard, BS, Micah Kee, BS, Will Roberts, DO, Ashlyn Terrell, DO, Landon Stallings, DO Ryan Ottwell, DO, Micah Hartwell, PhD Matt Vassar, PhD*

Background: Patient-reported outcomes (PROs) are health outcome measures reported directly from patients that experienced a specific medical treatment. These PROs are used to help researchers and clinicians appraise the efficacy of said treatment. We investigated medical treatments specific to peripheral nerve blocks (PNBs) by questioning the completeness of reporting of randomized controlled trials (RCTs) with PROs related to PNBs as well as the association between reporting completeness and trial characteristics.

Methods: We used MEDLINE, Embase, and Cochrane Central Register of Controlled Trials (CENTRAL) to search for RCT publications investigating PNBs. RCTs were screened, and those that met inclusion criteria were extracted using the Consolidated Standards of Reporting Trials - Patient-Reported Outcome (CONSORT-PRO) extension adaptation and the Cochrane Collaboration Risk of Bias (RoB 2.0) tool. Adherence to the CONSORT-PRO guidelines was calculated as well as a linear bivariate regressions analysis to assess the relationship between reporting completeness and trial characteristics.

Results: Sixty five RCTs met inclusion criteria and were extracted and analyzed. We found an overall completion percentage of 46.80% (SD=17.36). There was a significant difference ( $p=0.035$ ) that was found in completeness of reporting between RCTs with PROs established as a primary outcome (49.27%, SD=16.58) versus a secondary outcome (38.57%, SD=17.92). Another significant finding was that the length of PRO follow-up between 6+ months to 1 year was 16.24% more complete when compared to 3 months or less ( $p=0.006$ ). No other significant differences were found within our analysis.

Conclusion: We found that incomplete reporting was common among PROs within our included RCTs investigating PNBs. PROs allow clinicians to better understand patients' experiences regarding the interventions that they receive. Applying these patient reported measures into clinical practices allows enhanced overall healthcare. Thus, increased adherence to the CONSORT-PRO statement is encouraged to improve PRO reporting.

## **Appropriateness of Direct Oral Anticoagulant (DOAC) prescribing for New-onset Venous Thromboembolism and Non-valvular Atrial Fibrillation (Poster Presentation)**

*Issac Nichols, PharmD, Lyndsey Ryan, PharmD, Leah Rappsilber, PharmD, Jessica Gwartney, PharmD, BCPS Issac Nichols, PharmD, Resident;*

**Purpose:** To evaluate the appropriateness of apixaban and rivaroxaban prescribing for patients diagnosed with new acute pulmonary embolisms (PE), deep venous thrombosis (DVT), or non-valvular atrial fibrillation (NVAF).

**Methods:** This study has been reviewed and approved by the institutional review board (IRB) as a multidisciplinary quality improvement initiative aiming to evaluate the rate and appropriateness of the prescribing of two direct oral anticoagulants (DOACs), apixaban and rivaroxaban in the diagnosis of PEs, DVTs, and new-onset NVAF at the Oklahoma State University Medical Center(OSUMC). Further assessment will be done for recurrence of PE, DVT, or clinical bleeds after starting therapy. The study will be conducted through retrospective chart review from the dates of January 1, 2021 – April 30, 2021. Inclusion criteria for the study consists of patients 18 years or older; documented new diagnosis of NVAF, PE, or DVT; and prescribed one of the two DOAC agents (apixaban or rivaroxaban) while at the OSU medical center. Any patient under the age of 18, pregnant, or without new diagnosis of DVT, PE, or NVAF will be excluded from data collection. The primary demographic data being collected includes: patient age, gender, race, height, weight, BMI, indication for use, medication regimen, and drug-drug interactions. Secondary endpoints to be assessed include: readmissions within 30 days due to a new PE/DVT or bleeding event, mean time for any necessary dose adjustments, and mean time to switch from alternative anticoagulation medications.

**Results:** Patients evaluated in the atrial fibrillation group showed incorrect prescribing overall with 7/38 (18.42%). Patients in the VTE group had an even lower rate of incorrect prescribing with 5/41 (12.2%). Apixaban had a lower rate of inappropriate prescribing compared to rivaroxaban (8/68 (11.76%) vs. 4/11 (36.36%)). Secondary endpoint analysis showed only 2 bleeding events occurring in the NVAF group (1 apixaban and 1 rivaroxaban) and 1 bleeding event in the VTE group (apixaban). Analysis of time to dose adjustment showed an average of 0 hours for apixaban for NVAF and 69.97 hours for rivaroxaban. Analysis of time to transition from an alternative anticoagulant ranged from 1-4 days. Transition time in the NVAF group was 4.29 and 3.07 days for apixaban and rivaroxaban, and transition time in the VTE group was 1.31 and 4.21 days for apixaban and rivaroxaban, respectively. Primary reasons for incorrect prescribing included: overdosing due to indication (apixaban (1)/rivaroxaban (1)), overdosing due to apixaban criteria (2), under-dosing due to indication (apixaban 2), under-dosing due to apixaban criteria (2), overdosing due to CrCl (rivaroxaban 3), and drug-drug contraindication (apixaban and phenytoin).

**Conclusions:** The primary issues regarding prescribing of these agents seem to be centered around matching specific dosing with indication as well as taking into account the separate criteria associated with apixaban dosing for NVAF. Overall, prescribing at OSU medical center is below the rate seen in other studies, but I think implementing further education and a check system in the EHR will help prevent errors.

**Keywords:** Inappropriate Prescribing DOAC VTE

## **The effectiveness of corrective exercises to improve posture in patients with upper cross syndrome and scapula dyskinesis: A Critically Appraised Topic (Poster Presentation)**

*Hana Ogino, BS, JSPO-AT, Michael Daniel BS, PES, Jennifer L. Volberding PhD, LAT, ATC Hana Ogino, BS, JSPO-AT, Graduate Student;*

Clinical Scenario: Upper Cross Syndrome (UCS) is an abnormal posture defined by a muscular imbalance pattern in the neck, torso, and scapula muscles that commonly results in scapular dyskinesis. The National Academy of Sports Medicine (NASM) and Comprehensive Corrective Exercise Program (CCEP) address the cause of imbalances and incorrect movement patterns that lead to problems with posture, balance, and systemic coordination then modifies the imbalances that improves overall exercise quality. This Critically Appraised Topic (CAT) served to review the current evidence regarding whether corrective exercises can be used to address UCS and scapular dyskinesis thereby providing clinicians with more options to address the condition.

Focused Clinical Question: Does corrective exercise improve scapula dyskinesis and upper cross syndrome by modifying the musculoskeletal disorders of scapula and alignment of their upper body?

Summary of Key Findings: Three studies investigated the effectiveness of corrective exercises to improve posture in patients with upper cross syndrome and scapula dyskinesis. Clinical Bottom Line: Based on the results of the studies included in this critically appraised topic, there is moderate evidence to support the use of corrective exercises for improving UCS and scapular movement patterns in adults.

Strength of Recommendation: Upon review of the three studies, there is Level B evidence that exists that CCEP or NASM exercises program could potentially improve postural alignment, muscle activation, and movement pattern of scapula.

Keywords: Upper Cross Syndrome, scapular dyskinesis, Corrective Exercise, postural alignment

## **Reality Television and its Effect on Public Awareness of Polycystic Ovary Syndrome (Poster Presentation)**

*Gunner Parent, BS, Liza-Ann Whitaker, BS, Reece M. Anderson, MPH, Caroline Markey, MD, Micah Hartwell, PhD Gunner Parent, BS, Medical Student;*

**Background:** Multiple studies have shown the effectiveness of television as an outlet for increasing awareness and interest in health issues. Reality television shows may be particularly effective as health conditions and symptoms, as well as how the symptoms impact daily life, are discussed firsthand; Few studies have investigated the effect of reality shows specifically on public interest in health issues.

**Diagnosis of polycystic ovary syndrome (PCOS)**—one of the most common endocrine disorders affecting women of reproductive age—has been disclosed and prominently featured on 2 mainstream reality television shows. These shows include *My Big Fat Fabulous Life* in which Whitney Thore disclosed her PCOS stats in an episode airing in January of 2015, and *Teen Mom* featuring Maci Bookout and Kailyn Lowry who disclosed their diagnosis in 2018 and 2020 respectively. Thus, our primary objective is to investigate potential increase in public interest regarding PCOS following these disclosures.

**Methods:** We used Google Trends (Trends.Google.com) to capture monthly relative search interest (RSI;0-100) in “Polycystic ovary syndrome” from January 2004 through November 2021 to capture a 17-year trend in search interest for the disorder. An autoregressive integrated moving average (ARIMA) modeling technique was used to compare relative search interest for the disorder compared to a forecasted trend had Whitney Thore not spoken out about her diagnosis. We then used an integral function to summate continued interest encompassing the subsequent disclosures.

**Results:** Observational analysis of the trends showed RSI in “Polycystic ovary syndrome” increased significantly following Whitney Thore’s disclosure and continued to increase as PCOS was featured on multiple shows thereafter. The peak RSI (94) following Thore’s disclosure resulted in a 34.72 (95%CI: 27.82-41.61) higher RSI compared to the forecasted model—a 58.55% increase. From January 2015 through November 2021 multiple peaks occurred which extended beyond the predicted confidence interval, coinciding with additional diagnosis disclosures by the celebrities mentioned, in addition to a performer on “*Dancing with the Stars*,” resulting in a cumulative RSI increase of 1297 (95%CI: 1292.00-1302.24)—an average 15.76 points (95%CI: 5.71-25.80) higher interest than forecasted.

**Discussion:** Our results suggest that disclosure of PCOS diagnosis among celebrities on reality television shows is strongly associated with an increase in public interest. Their disclosure is often accompanied by personal stories and perspectives on how the condition affects their lives, their experience of stigma, and concerns about their health (potential infertility, weight issues, etc). The celebrities also discuss concerns about their children's health and likelihood of future diagnosis. Thus, their depiction of PCOS may have a positive effect on raising awareness and funding for PCOS research—a valuable insight for health professionals to consider.

**Keywords:** Polycystic Ovary Syndrome, Public Awareness, Reality Television

## **Proteomics Study Reveals a Hydroxysteroid Dehydrogenase (HSD) as a Sex-based Biomarker in Hepatitis C Virus Induced Cirrhosis (Poster Presentation)**

*Sachi Pathak, MS, Anil Kaul, MD, DDS, MPH, Logan Swope, MS, Subhas Das, PhD, Rashmi Kaul, PhD Sachi Pathak, MS, Graduate Student;*

Hepatitis C virus (HCV) infection- related inflammation, liver fibrosis and cirrhosis often lead to development of hepatocellular carcinoma (HCC). In the United States, 4.6 million people are infected with HCV. Studies show that chronic HCV infections are more prevalent in males and progress more rapidly to cirrhosis and cancer development as compared to females. In contrast, pre-menopausal females and women on hormone replacement therapy have been associated with less-severe disease through all stages of HCV infection. We have previously identified sex-based differences in the expression of estrogen receptors (ERs) in normal livers and dysregulated mRNA and protein expression of ER subtypes in both HCV-related cirrhosis and HCC suggesting a possible role in its pathogenesis. Sex-based differential biomarkers could serve as an early prognostic tool for HCV cirrhosis and HCC development. The enzyme families including hydroxysteroid dehydrogenases (HSDs) contribute largely to the synthesis and degradation of steroid hormones such as testosterone and estrogen sex-hormones, as well as cholesterol and fatty acid metabolism. Chronic inflammation due to HCV infection in the liver may alter HSD enzyme regulation and affect hormone metabolism. We hypothesized that chronic HCV infection leads to dysregulated HSDs in male HCV cirrhosis patients leading to development of HCC. Our current study utilized proteomic analysis to determine sex-based differences in HSD protein expression in male and female HCV cirrhosis. We studied a total 40 liver tissues that included both sexes from HCV-related cirrhosis and normal controls. The liver tissues extracts were prepared and sent to NIH IDeA National Resource of Quantitative Proteomics core lab for DIA proteomic analysis. We were able to profile 4,443 genes belonging to different protein families that were differentially expressed in HCV cirrhosis and controls. Within the HSD protein cohort 7 exhibited differential expression in the liver cirrhosis groups compared to healthy controls. Of these 7 proteins, only HSD17B13 demonstrated a significant sex-based differential expression between male and female HCV cirrhosis groups. More specifically, HCV cirrhosis females demonstrated a positive logFC value of 2.241 ( $p < 0.01$ ) when compared to HCV cirrhosis males, suggesting HSD17B13 may serve as sex-based pre-cancerous biomarker. Further, HSD17B13 showed downregulation in HCV cirrhosis males compared to normal control males, but not significantly. No differences were observed in the remaining experimental groups (HCV F vs. normal control F and normal control M vs. normal control F).

HSD17B13 protein may serve as a sex-based biomarker in liver cirrhosis and cancer development. To the best of our knowledge this is the first report showing sex-based differences in HSD proteins in premalignant HCV-related cirrhosis.

Further, detailed studies may lead us to new sex-based tailored clinical therapies in halting cirrhosis and HCC progression in males.

**Key Words:** Hepatitis C virus, Liver cirrhosis, hydroxysteroid dehydrogenases, Gender

## **Drug Induced Thrombocytopenia: Vancomycin Induced IgG Thrombocytopenia (Poster Presentation)**

*Kishen Patel, DO, Fernando Magana, DO, Farzeen Syed, DO Kishen Patel DO, Resident;*

Vancomycin is a broad-spectrum antibiotic widely used in acutely ill hospitalized patients. There is a rare complication of life-threatening drug induced thrombocytopenia associated with Vancomycin that can be overlooked in the setting of multiple potential etiologies for thrombocytopenia. Herein we present a case of a 74-year-old female with history of oxygen dependent COPD, insulin dependent type two diabetes, nonrheumatic aortic valve stenosis, and chronic debility admitted for severe hypoxic and hypercapnic respiratory failure secondary to COPD exacerbation. The patient was empirically started on IV corticosteroids and antibiotics including Vancomycin, Levofloxacin, and Cefepime for pneumonia. She was found to have a precipitous drop in her platelet count from 272 on admission to 1 in a 24-hour period. Haptoglobin and LDH were within normal limits ruling out hemolysis and TTP. Hematology was consulted and the previous antibiotics were discontinued and switched to Piperacillin-Tazobactam. Patient's profound drop overnight yielded a high suspicion for drug induced thrombocytopenia. A drug dependent platelet antibody panel was ordered for Cefepime, Vancomycin, and Levofloxacin, which returned positive for platelet IgG antibody for Vancomycin. Patient's platelets improved to baseline after receiving a one-time dose of IVIG and several days of high dose corticosteroids.

This case demonstrates the importance of recognizing and treating an infrequent cause of drug induced thrombocytopenia due to a commonly used medication. Prompt discontinuation of Vancomycin is critical in preventing potential life-threatening thrombocytopenia in the future.

**Keywords:** Vancomycin Induced Thrombocytopenia

## **A Unique Presentation of Atypical Hemolytic Uremic Syndrome (Poster Presentation)**

*Kishen Patel, DO, Fernando Magana, DO Kishen Patel, DO, Resident;*

Herein we present a unique case of Atypical Hemolytic Uremic Syndrome (HUS) in a 66-year-old woman who initially presented for nausea, vomiting, diarrhea, shortness of breath, and weakness. This patient underwent hemodialysis, plasmapheresis for suspected thrombotic thrombocytopenic purpura, CT Renal needle biopsy to confirm the diagnosis of atypical HUS.

Atypical HUS is similar to HUS in that it has the components of hemolytic anemia, thrombocytopenia, and renal injury. The disorder is mostly found in children. The atypical portion is found in 10% of all HUS but what makes it atypical is that it is not caused by either Stx-producing bacteria or streptococci. In recent years it is mostly found that atypical HUS is associated with mutations or formation of autoantibodies leading to dysregulated complement activation. Atypical HUS can be seen in children and/or adults where symptoms can be similar in nature.

This case demonstrates the importance of recognizing and treating an infrequent cause of HUS. The ability to identify hemolytic uremic syndromes is crucial in hospitalized settings as it can be misdiagnosed as other hematological emergencies. This case is unique, in that it shows the ability to present indifferently when it comes to HUS.

Keywords: Atypical Hemolytic Uremic Syndrome

## **Effect of high salt and high fructose diet on blood pressure in male and female mice (Poster Presentation)**

*Andriana Pena, BS, Liming Fan, MS, Al Rouch, PhD Andriana Pena, BS, Medical Student;*

**Background:** High consumption of either fructose or salt can have deleterious consequences on health and consuming high levels of both leads to serious health problems. Research demonstrates that important sex differences exist with respect to renal metabolism of high fructose intake which directly effects renal handling of sodium. The objective of this study was to investigate sex differences in blood pressure and renal handling of sodium in mice consuming a high-salt and high-fructose (HSHF) diet. We set out to determine if females are protected from high blood pressure when consuming HSHF.

**Methods:** Healthy 4-week-old male and female mice (n=6/group) were placed in metabolic cages for six weeks. For the first week (baseline), all mice consumed a normal diet (0.25% salt) with water. Mice were then placed on the HSHF diet consisting of 4% salt chow with a drinking solution of 20% fructose and 1% NaCl for the next 4 weeks. This was followed by a recovery week with mice on the normal diet with water. Blood pressure was measured daily via the tail cuff technique and averaged weekly. Daily measurements of sodium intake and output were measured. Sodium intake (Nai, mEq/day) was calculated from daily food and fluid consumption and output was measured by sodium excretion (Nae, mEq/day) (urine volume, ml/day x urine sodium concentration, mEq/day). Sodium concentration was measured using the EasyLyte Na/K analyzer. The ratio Nae/Nai indicates sodium retention. Real-time PCR was conducted using custom-made PCR arrays made by Qiagen SA Biosciences) designed with specific primers for mouse renal Na<sup>+</sup> transporters.

**Results:** Mean blood pressure (MBP) was not different between male and female mice in the baseline week and in the first week on HSHF diet. MBP significantly increased in female mice in the 2nd week on the HSHF diet whereas MBP increased in male mice only slightly from baseline. In the 3rd week on HSHF diet male MBP increased to that of the females and MBP in both sexes remained high in the 4th week. In the recovery week, MBP remained elevated in females whereas MBP in males decreased significantly ( $p < 0.01$  compared to females). Female mice showed higher sodium retention during the HSHF period via the Nae/Nai ( $62 \pm 5\%$  vs  $75 \pm 5\%$ ,  $p < 0.001$ ). Molecular expression of renal sodium transporters showed significantly higher expression of the NKCC and the NCC transporter in the female kidney.

**Conclusion:** Results indicate that the HSHF diet significantly increased MBP in female and male mice. MBP in females increased before that in males and remained elevated during the recovery period whereas blood pressure decreased in males in the recovery period. Females had higher retention of sodium and higher expression of renal sodium transporters. We conclude that female mice are not protected from the HSHF dietary-induced increase in blood pressure. This study challenges the current position that females possess protective mechanisms against dietary induced increase in blood pressure.

**Keywords:** Salt, Fructose, Blood Pressure

## **Disparities in Season Flu Vaccine uptake among Spanish and English-Speaking Hispanic Americans (Poster Presentation)**

*Del Perkins, BA, Angel Giron Lopez, MPH, Benjamin Greiner, DO, Micah Hartwell, PhD Del Perkins, BA, Medical Student;*

**Introduction:** Research has shown that vaccination for Seasonal Influenza (flu) is associated with a nearly  $\frac{1}{3}$  reduction in flu-related mortality and a  $\frac{1}{4}$  reduction in likelihood of ICU admission.<sup>1</sup> From 2009-2019, Hispanic residents of the United States had the third highest rate of flu-related hospitalization with more severe outcomes including intensive care and mortality than non-Hispanic Whites.<sup>2</sup> Thus, the purpose of this study is to analyze Behavioral Risk Factor Surveillance System (BRFSS) data in order to compare rates between Spanish- and English- speaking Hispanics aged 18-64 and among those 65 and older from 2017-2020 with a secondary objective to investigate trends among age groups by sex.

**Methods:** For this cross-sectional study we extracted data from the Behavioral Risk Factor Surveillance System (BRFSS) from 2017-2020. The BRFSS uses raking weights to produce population estimates that adjust for survey non-coverage, non-response, and the probability of being sampled given geographic location, age, race, and sex.<sup>9</sup> Respondents were included if they identified as being Hispanic and responding to a question regarding flu vaccination (either via shot or nasal spray). Other variables extracted included the language of survey used (to identify Spanish and English speaking participants), age (18-64 and 65+), and sex. We then estimated the prevalence of flu vaccination among each BRFSS cycle overall and among each sub-group (Language, sex, and age-group) and used X<sup>2</sup> tests of independence to determine associations among groupings.

**Results:** Trends of the data showed that flu vaccine uptake among all Hispanics was lowest in 2018 (25.29%) while 2020 was the highest (34.83%). Each year, the 65 and older age grouping had higher rates of flu vaccine uptake compared to the 18-64 age group. Significant differences among English and Spanish-speaking groups occurred each year, most often occurring among the 18-64+ group of both sexes. Hispanic US adults ages 65 and over had the highest percentage of flu shots received in 2017 (57.75%) while 2018 had the lowest (50.11%). Spanish-speaking men, age 18-64, had the lowest uptake of flu vaccination throughout the time span.

**Conclusion:** From 2018 through 2020 there was a statistically significant difference in uptake of English speaking women when compared to Spanish speaking women ages 18-64. Predominantly English speaking women aged 18-64 had higher vaccination rates in 2019 and 2020 while Spanish speaking women had higher rates in 2017. Pearson et al., found that Spanish-speaking Hispanics, aged 65 or older, were significantly less likely to have received the influenza vaccine compared to English-speaking Hispanics from 2005-2007.<sup>3</sup> Our study reveals that this trend changed in 2018 when more Spanish speaking women received vaccination than the English speaking women aged 65+. Spanish speaking men aged 18-64 were also less likely to receive vaccination than Spanish speaking women aged 18-64 across the board when comparing statistically significant data.

**Keywords:** Influenza, Vaccines, Hispanic Americans, Disparity

## **Search interest in Supervised Injection Sites in the US following the opening of two clinics (Poster Presentation)**

*Del Perkins, BA, Rachel Wilkins, BS, Jonas Weygandt, BS, Kelly Dunn, MD, Micah Hartwell, PhD Del Perkins, BA, Medical Student;*

**Purpose of Research:** In Oklahoma, over 3,000 individuals died of overdose from 2014-2017. Supervised injection sites have reduced overdose deaths by 35% in surrounding neighborhoods and increase the participation in substance use treatment programs by more than 30%. By approaching substance use in a holistic manner and considering treatment options and disease prevention strategies currently outside of the norm in the United States, research supports initiation of SIS improve the lives and outcomes of persons using IV drugs.

**Research Question:** Our objective for this study was to analyze the public interest in supervised injection sites and dispel misconceptions to reveal benefits of such strategies.

**Methods:** Using Google trends, we searched for the topic “supervised injection sites” from 2019-2021 to collect relative search interest (0-100). An autoregressive integrated moving average model (ARIMA) was used to forecast the values of search interest if the court decision to legalize SIS in Philadelphia in February of 2020 through June did not occur. We then calculated the percent increase in search interest immediately (1 week) following the ruling.

**Results:** Observational analysis of the plotted data, the largest peak occurred in February 2020 when a US district judge declared that the SIS could be legally opened in Philadelphia. The forecasted value the week after this ruling was 6.95 (95%CI: -2.86 - 16.76), compared to the peak (100) RSI. The difference in these values was 93.04 (83.24-102.86) representing a percent change of 1338.85%. A second peak occurred in November 2021, when New York City opened their first legal SIS. Given current interest in such programs, future peaks are likely as more SIS sites open in the United States.

**Conclusions:** We found that following the court ruling, and opening of SIS, search interest in these facilities significantly increased. Given the novelty of the SIS within the US, their media coverage, and the stigma surrounding IV drugs and those who use them, it is necessary to provide information to the public that demonstrates the benefits of these facilities—reduced overdose deaths and related crime, improved quality of life, and increased uptake of treatment— especially in the midst of the current opioid crisis.

**Keywords:** Addiction, Google Trends, Opioids, Supervised injection site

## **Decreased serum levels of proBDNF, but not mature BDNF during adolescent oxycodone intoxication preceding long-term social neglect and harsh environmental conditions (Oral Presentation)**

*Chelsea Pierce, BS, Alejandro Torres, BS, Jordan Santos, BS, Divya Thomas, Dolores Vazquez Sanroman, PhD., Chelsea Pierce, BS.*

**Background:** Adolescent opioid addiction is a global problem with a significant social and economic burden in the United States. Several studies have suggested that BDNF (mature BDNF) and its precursor play an essential role in alcohol dependence. However, the roles of the mBDNF/proBDNF pathway during adolescent opioid use are not clearly understood. Brain-derived neurotrophic factor (BDNF) plays a role in synaptic plasticity and neuroprotection. Furthermore, BDNF has well-established pro-survival effects, whereas its precursor protein, proBDNF, induces apoptosis. Thus, it has been suggested that the proBDNF/BDNF ratio could indicate neuronal health. Meta-analyses have identified serum levels of brain-derived neurotrophic factor (BDNF) as a potential biomarker for psychiatric disorders in an adult population. However, the lack of information on baseline circulating levels of BDNF and its precursor during the adolescent-onset is still unknown.

**Aims:** therefore, this study aimed to determine blood (serum) levels circulating in adolescent drug naïve adolescent rats compared to levels expressed in oxycodone-treated rats.

**Methods:** Adolescent Sprague Dawley male and female rats were housed in an enriched environment (EE), Standard environment (SC), or socially isolated environment (IC). We established oxycodone dependence using a repeated passive injection model. Rats were injected subcutaneously with incremental doses of oxycodone (OXY) (0.5, 1, 3, and 5mg/kg). After 2 hours of the last injection, the behavior of the animals was recorded for 20 minutes. Brains and truncal blood were collected to analyze Brain-derived neurotrophic factors (BDNF). ELISA immunoassay was employed to determine the concentrations for pro and matureBDNF.

**Results:** oxycodone intoxication increased by 37% in proBDNF levels and decreased without significantly changed matureBDNF concentrations. Regardless of oxycodone, long-term exposure to an enriched environment propelled a 3-fold increase in mature BDNF levels. Moreover, continuous environmental enrichment reduced 23.3% proBDNF concentrations.

**Conclusions:** Our results suggested that the ratio of adolescents circulating proBDNF/mBDNF is significantly changed by oxycodone intoxication and environmental enrichment. More importantly, longterm exposure to social, cognitive, and visual stimulation shifts and increases circulating levels of matureBDNF in the adolescent rat.

**Keywords:** matureBDNF, proBDNF, serum, ACEs, adolescence

## **Prescribing Patterns in the Management of Heparin-Induced Thrombocytopenia (Poster Presentation)**

*Barrett Powell, PharmD, Zachary Dunn, PharmD, Anjly Kunapuli, PharmD, Austin Hinchey, PharmD  
Barrett Powell, PharmD, Resident;*

**Background:** Heparin-induced thrombocytopenia (HIT) is a serious and potentially life-threatening adverse event that occurs when antibodies are formed against heparin-platelet protein factor 4. The American Society of Hematology (ASH) published guidelines for the management of HIT in 2018. These guidelines outline the management of suspected, acute, subacute, and remote HIT. ASH recommends utilizing the 4Ts score to make a presumptive diagnosis of HIT. The purpose of this study is to identify and quantify opportunities for improving the proper diagnosis and management of HIT at our institution utilizing the 2018 ASH guidelines.

**Methods:** This single-center retrospective chart review consists of a cohort of patients divided into two different patient groups where descriptive endpoints will be evaluated. Patients included in the study will include any individual who a Heparin-Induced Platelet Antibody (HIPA) serum assay was ordered for between November 1, 2020 and May 31, 2021. Patients excluded from this study include those who are pregnant, under the age of 18, or carry a HIT diagnosis prior to arrival. The primary endpoint of this study is to identify prescribing patterns for anticoagulation in patients with suspected HIT. Secondary endpoints include cost savings analysis for anticoagulant use and HIT immunoassays, as well as documentation of a heparin allergy after confirmation of HIT. Categories to be evaluated are gender, age, weight, admitting service team, anticoagulation medication, anticoagulation dose, anticoagulation duration, length of stay, 4Ts Score, HIT immunoassay result, time elapsed for HIT immunoassay result, duration anticoagulant was continued past HIT panel result, and allergies. Descriptive statistics will be used to address baseline patient demographics of all patients within the cohorts. Based on the outcomes, descriptive statistical measures will be presented including the mean, median, mode, and range.

**Results:** Out of 126 eligible patients who had a heparin-induced platelet antibody (HIPA) ordered, 10 percent of these patients has a positive test result. 22 percent of patients had documentation of a 4Ts score. 66 percent of patients had indications for treatment dose anticoagulation prior to a HIPA order, and after a HIPA order was placed, 45 percent were placed on treatment doses of non-heparin anticoagulants. After receiving HIPA results, 42 percent of patients were placed back on heparin if HIPA was negative.

**Discussion:** The majority of patients with suspected HIT had negative HIPA results. Based upon the high number of negative results and relatively low number of documented 4Ts scores, it seems like a more gestalt approach to diagnosing HIT it utilized, based solely on declining platelet values. A notable portion of patients with an indication for treatment-dose anticoagulation receive prophylactic dosing with nonheparin products after HIT is suspected. Many patients are not returned to heparin therapy after having a negative HIPA result. These findings may lead to cost-savings for our institution and a higher degree of proper anticoagulation if a 4Ts score is more widely adopted as a tool to identify patients at risk for HIT.

**Keywords:** Anticoagulation, Heparin-Induced Thrombocytopenia

## **Statistical and Graphical Analysis of Exam Raw Data (Poster Presentation)**

*Joseph Price, PhD, Zachariah Fisher, BS*

*Zachariah Fisher, BS; Medical Student;*

Background: Medical students take many examinations during their first two years, thus analyzing exam performance by Course Directors is critical to make sure students perform as expected on exams, and that the exams were written well. Currently, the exam reports from ExamSoft offer a detailed performance raw data. We sought to provide professors at OSU-CHS College of Osteopathic Medicine tools for exploratory analysis coupled with graphical visualization for a more informative evaluation of exam performance data.

Methods & Results: Data was taken from a previous exam administered at OSU-COM and uploaded to the R Studio program to generate code for analysis. The code created allows for statistical analysis of the exam, further broken down by each exam writer, allowing for an in-depth analysis. Furthermore, a tool was created allowing for a certain Percent Correct criterion to be set at the discretion of the course director to extract questions below that criterion. This eliminates human error when viewing these questions, and easily marks questions that may need revision. Conclusion: With these tools, professors will be able to analyze their exams in more depth, allowing for continual improvement of exams administered at Oklahoma State College of Osteopathic Medicine.

Keywords: Exams, Examination analysis, R Studio

## **Sex and Geographic Disparities among NIH NSD-A Study Section Members (Poster Presentation)**

*Lindsey Purcell, BS, Ryan McIntire, BS, Jennifer Volberding, PhD, LAT, ATC Lindsey Purcell, BS, Medical Student;*

Gender and geographic bias among the scientific community disproportionately impact the dispersion of tax payer funding for research. Diversity, equity and inclusion representation is crucial for the evolving U.S. population. Progressing discovery requires development from the next generation of researchers. Therefore, we studied 3 years (2011, 2016, 2021) of rosters at the Neurological Sciences and Disorders Study A (NSD-A) of the National Institute of Health to evaluate the sex and geographic representation. Our team retrieved rosters for the NSD-A NIH study panel for all meetings held in 2011, 2016, and 2021. The study section names, membership type, institution, state, sex, and academic rank were extracted. Study authors used a pilot tested google form for data collection. Sex was determined through web searches and genderize.io (0.6 value required to assign sex). Data was analyzed to detect percentages of male and female study section members and their respective region (using regions defined by the US Census Bureau) of the NSDA study section in 2011, 2016, and 2021. In the years studied, males outnumbered females 2 to 1 or greater, with no detectable trend. The 2011 NSDA study section was comprised of 18 males (67%) and 9 females (33%). 2016 NSDA study section was comprised of 44 males (75%) and 15 females (25%). Lastly, the 2021 NSDA study section was comprised of 32 males (70%) and 14 females (30%). Geographically, regional distributions are represented variably. In 2011, we saw the West and Northeast represented most (each n=7, 28%), followed by the West (n=6, 24%), and the South (n=5, 20%). 2016 showed differences with the Midwest most represented (n=16, 28%), followed by the south (n=15, 26%), the northeast (n=14, 25%), and the West region (n=11, 19%). Lastly, in 2021, the distribution shifts again, with the highest representation from the West region (n=13, 31%), then the Midwest (n=11, 26%), the South (n=10, 24%), and the Northeast (n=8, 19%). Representation geographically showed no noticeable trends, rather fluctuations between regions each year studied. While there is noticeable variety in the 3 years studied geographically, the most significant bias lies on the disproportion between males and females represented in the NSDA study section. Addressing these sex bias to represent a closer reflection of the country's population is essential for a more equitable funding for research studies.

Keywords: Funding, Equity, Neurological Disorders and Stroke, Sex Disparities, Geographic Disparities

## **Gender and Geographical Representation in the National Institute of Health's Neuroscience and Behavior Study Section (AA4): A Longitudinal Analysis (Poster Presentation)**

*Jack Rea, BS, Payton Clark, BS, Matt Vassar, PhD Jack Rea, BS, Medical Student;*

**Background:** Previous studies support the experience of gender and geographical bias in research scientists that receive funding from the National Institute of Health (NIH) in terms of the application success rate and the amount of money received (Silva et al., 2020; Wahls, Wayne, 2016). Our team analyzed gender and geographical differences in the NIH's Neuroscience and Behavior (AA4) study section members to investigate these disparities further.

**Methods:** Using a pilot-tested google form, we collected the members' names, academic degrees, roles within the study section, institutional affiliations, and geographical location of their institutions from all meetings in 2011, 2016, and 2021. To determine gender, we used their online profiles or genderize.io (probability > 0.60); for geographical location, we used the United States Census Bureau's region map.

**Results:** Overall, gender distribution has been trending towards equal values for men and women across all three years. From 2011 to 2016, the number of women decreased (n=54, 41% to n=30, 30%) before the level of men and women became relatively equal (n=32, 47% women, 53% men). As far as geographical distribution goes, the Midwest region consistently ranked as the lowest represented region every year, with a slow gain towards equal representation in 2021 (n=30, 17%). On the other hand, the South began as overrepresented in 2011 (n=52, 47%); in 2021, it leveled out to approximately 33% (n=30).

**Conclusion:** Our study suggests that while gender discrepancies have been leveling out over time, a preference for the South and a lack of representation from the Midwest still exists. These differences may propose one factor for the unequal success rates and award amounts in grants from the NIH, increasing the difficulty in securing adequate funds for research for these groups of people.

**Keywords:** Gender inequality, geographic inequality, NIH study sections, neuroscience, funding

## **Proposed protocol for avoidance of P-Value Hacking and Data Dredging Bias: Effect of Foot and Ankle Randomized Controlled Trials (Poster Presentation)**

*Arjun Reedy, BA, Jared T. Scott, DO, B. Joshua Stephens, BS, Ashini Patel, MBA, Jake X. Checketts, DO, Wesley Stotler, DO, Brian Hawkins, MD, Matt Vassar PhD Arjun Reedy, BA, Medical Student;*

Background: Misinterpretation of p-values in RCTs is extremely problematic since they are the core basis for high levels of recommendation in clinical practice guidelines, especially Orthopaedics. Benjamin et al. proposed a universal protocol change, moving statistical significance from a p value of .05 to .005 to combat the misinterpretation that is happening in medical literature. In this study, we are looking to evaluate the effect of the protocol suggested by Benjamin et al. on Foot and Ankle-related RCTs in the top 3 Foot and Ankle-related journals.

Methods: We conducted a PubMed search looking at studies published from January 1st, 2016 to November 10, 2021, in the following three journals; Foot and Ankle International, Journal of Foot and Ankle Surgery, and Foot & Ankle International. The inclusion criteria for the study were RCTs published in the above journals with specifically stated primary endpoints. If a study has multiple primary endpoints, all were included. Exclusion criteria were any study that was not prospective and randomized by design, also any study that did not state primary endpoints was excluded. Two authors extracted the data using a pilot-tested Google form, any disagreements or questions were resolved by published methodologic orthopaedic authors.

Results: Of the 222 endpoints, 101 endpoints (45.5%; 101/222) were at or below the .05 threshold while 121 endpoints (54.5%; 121/222) were above the .05 threshold. We also found that 59 endpoints (26.6%; 59/222) were below .005.

Conclusion: Our results suggest that changing the threshold for statistical significance from .05 to .005 in foot and ankle RCTs would heavily alter literature published in the field. By implementing this methodology, it is a promising measure to be able to increase RCT quality until a more substantial solution can be found. With that being said, caution must be taken when interpreting our results, also requiring further evaluation.

Keywords: Data-dredging, Foot and Ankle, RCTs

## **Investigation of the Microbial and Molecular Correlates of Morgellons Disease (Poster Presentation)**

*Samantha Rice, BS, Randy S. Wymore, PhD Samantha Rice, BS; Graduate Student;*

Morgellons disease is a multisystem infectious disease that is controversial in the medical community. This controversy lies in the fact that there are currently no markers for diagnosis and signs and symptoms are often mistaken for a psychiatric disorder known as parasitic psychosis or delusional infestation, the belief of parasites invading the body. Due to the lack of evidence to the etiology or transmission of this disease the debate surrounding Morgellons is considerable.

Morgellons disease does not discriminate and is found within all socio-economic groups, as well as any age group. The distinct feature is the presence of microscopic subcutaneous fibers. These fibers can range in a multitude of colors and are virtually indestructible by heat or chemical means, making analysis difficult by conventional methods. This condition can be debilitating and disabling, as nonhealing lesions with unique colored fiber-like filaments emerge from open wounds. Crawling sensations on and under the skin, with intense itching, severe fatigue, difficulty concentrating, and short-term memory loss are also associated with the sign and symptoms of Morgellons disease.

The aim of this study is to investigate if an infectious etiology of the dermatopathy is present. Recent research suggests *Borrelia burgdorferi* as the causative agent in dermatological specimens, providing a baseline for a spirochetal cause. In this study, lesions from patients are collected and deidentified to remain anonymous to researchers. The lesions are studied for unusual microbial organisms; specifically, *Bartonella henselae*, *Helicobacter pylori*, *Borrelia burgdorferi*, and *Treponema denticola*.

Using epithelial tissue samples from patients, DNA is extracted and amplified using polymerase chain reaction (PCR) with specific primers designed with our bacteria of interest. After amplification, samples are analyzed on 1% agarose gel electrophoresis. The agarose gel is stained using ethidium bromide (EtBr) and viewed using a UV IT Transilluminator. If bands are present, the bands will be extracted, purified, and sent to OSU's core facility to be sequenced. Using bioinformatics tools, the sequenced information is analyzed to verify our genes of interest.

We conclude the use of these methods and various strains allows for potential etiologies to be explored in order to help determine if an infectious etiology of the dermatopathy is present. Unusual microbial organisms have been identified in dermatological specimens suggesting the presence of a co-infection. Future research needs to be conducted to continue exploring etiologies to support our findings. Through further analysis and DNA extraction, hopefully, the answers to this unsolved mystery will be revealed and bring a better understanding to the medical community leading to a cure.

**Keywords:** Morgellons disease, Lyme disease, fibers, *Borrelia burgdorferi*

## **Mineralocorticoid receptor antagonism and blood pressure in gonadectomized mice (Poster Presentation)**

*Kristie Roberts, BS, Liming Fan, MS, Al Rouch, PhD Kristie Roberts, BS, Medical Student;*

**Background:** We previously reported that mineralocorticoid receptor antagonism (MRA) prevents high-salt-induced increase in blood pressure in intact male and female mice. Interesting sex differences exist with respect to blood pressure. Pre-menopausal women are protected from hypertension and cardiovascular disease compared to age-matched males. The sex steroids estrogen and testosterone are likely responsible for these sex differences. The purpose of this study was to determine if MRA also prevents high-salt-induced increase in blood pressure in gonadectomized mice.

**Methods:** Gonadectomized male and female CD-1 mice, 5 – 7 weeks old, were purchased from ENVIGO, Inc. Mice were placed in metabolic cages for a 5-day baseline (BL) period consuming normal food with water. After BL, either a placebo (P) or spironolactone (Sp) pellet (25mg, 21-day release, Innovative Research of America) was implanted sc and mice consumed a salt-deficient (SD) diet (Teklad, TD90228) with water for seven days. After the SD period, mice consumed a high-salt (HS) diet of 4% NaCl with 1% saline for seven days. Groups included male-P (MP), male-Sp (MSp), female-P (FP), and FSp (n=6/group). Systolic blood pressure (SBP, mmHg) was measured daily via the tail-cuff technique (CODA, Kent Scientific).

**Results:** In male mice, SBP did not change in the SD period in either the MP & MSp mice: (MP mice: BL vs SD:  $93.2 \pm 1.1$  vs  $95.6 \pm 1.2$ ; MSp mice:  $95.6 \pm 2.0$  vs  $101.2 \pm 1.8$ , respectively). Also, SBP did not show significant difference when comparing SBP between the SD and HS periods: (MP mice: SD vs HS:  $95.6 \pm 1.9$  vs  $101.7 \pm 4.7$ ; and MSp mice: SD vs HS:  $101.1 \pm 6.4$  vs  $98.1 \pm 1.1$ ). In female mice SBP was not different between the BL and SD periods in either the FP or FSp groups. (FP mice: BL vs SD:  $94.7 \pm 3.3$  vs  $100.1 \pm 1.1$ ; FSp mice, BL vs SD:  $96.8.5 \pm 3.8$  vs  $96.0 \pm 2.7$ ). SBP increased in FP mice in the HS period (FP mice, SD vs HS period  $101.1 \pm 1.1$  vs  $107.4 \pm 1.1$ ;  $p < 0.05$ ). SBP was not increased in the FSp mice (FSp mice: SD vs HS:  $96.0 \pm 2.7$  vs  $98.5 \pm 2.7$ ).

**Conclusions:** MR antagonism prevents HS-induced elevation in blood pressure in the female gonadectomized mice but not in the male gonadectomized mice. Results suggest that sex steroids estrogen and testosterone, particularly the latter play a role in regulating MRA-induced regulation of blood pressure.

**Keywords:** Spironolactone, Blood Pressure, Sex Steroids

## **Person-centered Language in Attention-Deficit/Hyperactivity Disorder Research (Poster Presentation)**

*Kristyn Robling, BS, Caitlin Cosby, BS, Gunner Parent, B,S, Swapnil Gajjar, BS, Tessa Chesher, DO, Michael Baxter, DO, Micah Hartwell, PhD Kristyn Robling, BS, Medical Student;*

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that is frequently found in children. It often goes untreated due to the negative stigma that surrounds the disorder. This stigma is often perpetrated by those in the educational and scientific community. Thus, we conducted a cross-sectional examination to measure the adherence to patient-centered language (PCL) among ADHD-related journal publications. We included a systematic search of PubMed ADHD-related articles (which included MEDLINE) that were published between January 2014 and March 2021. All journals that included at least 20 ADHD-related searches, human research, and were in the English language were included, totaling 5308 articles from 88 journals. These articles were randomized, and the first 500 were selected and screened for inclusion of pre-specified, non-PCL terminology. After exclusion, 311 articles remained. Of these articles, 131 (42.12%) adhered to PCL guidelines. The remaining articles contained stigmatizing language, including phrases such as “problem(s) with [the/a] child or problem child” and “suffers from,” most frequently— occurring in 47.90% (149/311) and 5.79% (18/311) of articles, respectively. There was a significant association between PCL adherence and first author employment ( $P = 0.04$ ). We found that over half of the current literature on children with ADHD did not adhere to PCL guidelines. PCL is associated with positive health outcomes; therefore, its implementation is recommended by multiple professional groups. It is necessary for the medical and scientific community to adhere to PCL so that stigma surrounding ADHD can be mitigated and support can be readily available.

Keywords: ADHD, children, Person-centered language, stigma, cross-sectional examination

## **Gender and Geographical Representation Disparity Within the National Institute of Health Center for Inherited Disease Research Study Group (Poster Presentation)**

*Jazmine Rodriguez, BS, J. Tyler Babek, BSBA, Matt Vassar, PhD Jazmine Rodriguez, BS, Medical Student*

**Objective:** Issues concerning disparities between gender and geographic representation in the scientific field is of increasing concern. The purpose of this study is to address any previous or present bias by investigating the relationship between genders and between geographic regions for members of the National Institute of Health (NIH) Center for Inherited Disease Research (CIDR) panels.

**Methods:** Our team retrieved membership rosters for the NIH CIDR study section panels for all meetings held in 2011, 2016 and 2021. We extracted study section membership types, names, academic degrees, and affiliations. The retrieved data was recorded through a pilot tested google form. To ensure accurate categorization of gender, website searches were conducted and or verified with genderized.io: an algorithm that determines the likelihood a specific name matches a specific gender. Probability values of  $n \geq 0.6$  were accepted for validity.

**Results:** During the inspection of the ratio of men to women CIDR members, we identified 9 males (45%) and 11 females (55%) in 2011, 7 males (41%) and 10 females (59%) in 2016, and 8 males (40%) and 12 females (60%) in 2021. When we addressed the possibility of geographic disparity, we found that in 2011, 47% of study section members originated from a Southern region ( $n = 8$ ), 23% came from a Western region ( $n = 4$ ), 17% of members were from the Midwest ( $n = 3$ ), and 11% were from the Northeast ( $n = 2$ ). In 2016, 28.5% of CIDR members were based in the Northeast ( $n = 4$ ), 28.5% were from the Western territory ( $n = 4$ ), 21% came from the Midwest ( $n = 3$ ), and 21% were located in the south ( $n = 3$ ). Lastly in 2021, 35% of the panel were from the Northeast region ( $n = 6$ ), 29% originated from a southern region ( $n = 5$ ), 17.6% came from the Midwest region ( $n = 3$ ), and 17.6% came from the West ( $n = 3$ ).

**Conclusion:** Our results suggest no significant male to female membership bias across the CIDR membership panels. However, they are indicative for geographic underrepresentation, with the highest representation located in the Southern region and the greatest disparities were located in the midwest region.

**Keywords:** Gender, Geography, Disparity, Representation

## **COVID-19's Effect on Inpatient and Emergency Room Evaluation of Pediatric Asthma Patients in the First Year of the Pandemic (Poster Presentation)**

*Eevar Rossavik, DO, Weyman Lam, MD Eevar Rossavik, DO, Faculty;*

**Background:** Coronavirus disease 2019 (COVID-19) was declared a pandemic March 2020. Social distancing measures reduced person-to-person contact, which also limited common viral pathogen spread. Asthma is a chronic lung disease, and upper respiratory viruses are a known trigger. Reduced asthma exacerbations were noted at our children's hospital during COVID-19, which prompted this study to assess how COVID-19 impacted these visits overall in comparison to the previous years. This study sought to assess the impact of the pandemic within the first year primarily, which may serve as a reference point for comparison in the years that follow given how COVID-19 has persisted within our population.

**Methods:** An IRB-approved retrospective chart review of pediatric patients was performed for individuals who were discharged from the hospital and emergency room from our local tertiary center with a diagnosis including "asthma," "wheeze," or "bronchospasm." Patient data was provided and compared as total numbers in annual visits, and the ranges were sorted in yearly increments from March 2014 to March 2021. The final year was compared against the trends that had developed in the previous years for patient encounters to see what degree of impact the COVID-19 pandemic had on overall asthma visits at our hospital.

**Results:** A list of 43,740 patients was generated for patients discharged from the hospital/emergency room for asthma diagnoses. In looking at annual numbers starting March 2014, the following was revealed: 2014–2015, 9,405 patients; 2015–2016, 8,130 patients; 2015–2017, 5,087 patients; 2017–2018, 5,195 patients; 2018–2019, 5,876 patients; 2019–2020, 6,299 patients; and 2020–2021, 3,748 patients. 2020–2021 had the lowest number of patients with diagnoses including "asthma," "wheeze," or "bronchospasm." Asthma visits were increasing since March 2016 prior to COVID-19. Total asthma hospitalizations/visits in 2020-2021 correlated with an overall 40.50% decrease from the previous year.

**Conclusions:** During the year after COVID-19 was declared a pandemic, our children's hospital experienced the lowest volume of asthma visits compared to the previous six years. Factors including social distancing and masking precautions may have reduced the spread of common pathogens which induce asthma exacerbations. Patients may have also willingly avoided hospitals despite having symptoms. By seeing the trends within our hospital system within this first year of the pandemic, subsequent analyses in the years that follow will more broadly illustrate the impact COVID-19 has had on asthma exacerbations within our pediatric population.

**Keywords:** COVID-19, pediatric, asthma, hospitalizations

## **Respiratory Comorbidities Seen in Patients Hospitalized with COVID-19 in the First Months of the Pandemic (Poster Presentation)**

*Evar Rossavik, DO, Weyman Lam, MD, Carolin Haeusler Rossavik, DO, Zain Iftikhar, MBBS, Iftikhar Hussain, MD Evar Rossavik, DO, Faculty;*

**Background:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for the coronavirus disease 2019 (COVID-19) pandemic. It is an airborne, respiratory infection with multisystemic involvement, notably in the upper and lower airways. People of any age with certain conditions have been demonstrated to get more severely ill with COVID-19. The objective of this study was to assess the respiratory comorbidities of patients who were diagnosed and treated with COVID-19 at our hospital within our community's patient population to see which chronic respiratory comorbidities were most prevalent at admission.

**Methods:** We performed an institutional review board (IRB) approved retrospective chart review of patients who were hospitalized and discharged with COVID-19 from our tertiary center. All ages and patient types were included, which included, but were not limited to, pediatric patients, adults, and pregnant patients. Our institution's electronic medical record (EMR) was accessed, and a list was generated of COVID-19 patients diagnosed at our facility. Patient data was collected for those who were admitted at any time from March 2020 to August 2020.

Problem lists and past medical histories were reviewed for respiratory-specific comorbidities present at admission. Findings were subsequently reviewed individuals of multiple specialty backgrounds, including pediatrics, internal medicine, allergy and immunology, and obstetrics and gynecology.

**Results:** A list of 232 patients was generated with a median age of 66 years. 70 patients (30.2%) had a respiratory diagnosis listed in their problem list or past medical history. Overall, chronic obstructive pulmonary disease (COPD) was the most common condition seen in our patient population of COVID-19 patients (11.6%). Asthma/wheezing was the second most common (10.8%), and allergies/seasonal allergies/allergic rhinitis was the third most common (6.5%).

**Conclusions:** 30.2% of our COVID-19 patient population had respiratory comorbidities or histories at diagnosis. Some degree of underlying respiratory disease may play a role in the development of COVID-19, but more definitive correlation with disease severity remains to be seen.

**Keywords:** COVID-19; hospitalization; respiratory; comorbidities

## **The Impact of COVID-19 on Otolaryngology Research: A Cross-Sectional Analysis of Discontinued Trials (Poster Presentation)**

*Brayden Rucker, BS, Nicholas B. Sajjadi, BS, Lacy S. Brame, DO, Matt Vassar, PhD, Micah L. Hartwell, PhD  
Brayden Rucker, BS; Medical Student;*

**Background:** The COVID-19 pandemic has reduced the capacity to conduct medical research due to recruitment difficulties, supply chain shortages, and funding deficits. The clinical practice of otolaryngology was especially impacted due to a reduction in elective procedures, such as facial plastic surgeries and vocal fold injections. The primary objective was to examine the extent of clinical trial disruption secondary to the COVID-19 pandemic in the field of otolaryngology.

**Methods:** On August 1, 2021, we conducted a systematic search using ClinicalTrials.gov for clinical trials related to common otolaryngology disorders. We used the date range January 1, 2020 through August 1, 2021 to identify all trials potentially affected by the COVID-19 pandemic. Investigators performed screening and data extraction in a duplicate, masked fashion. Trials resulting from the search were extracted for trial status, condition treated, enrollment number, funding, study type, study design, last update posted date, and trial location. Trials that explicitly mentioned COVID-19 as a reason for discontinuation or suspension were coded as such. For trials that did not explicitly mention COVID-19, we coded the reason provided from ClinicalTrials.gov. The Oklahoma State University Center for Health Science Institutional Review Board determined that this project did not qualify as human subject research.

**Results:** 1,777 clinical trials met inclusion criteria, and 223 clinical trials were discontinued between January 1, 2020 and August 1, 2021. Thirty-three (14.8%) of the 223 clinical trials reported discontinuation explicitly due to the COVID-19 pandemic. The 33 studies had 1,715 participants enrolled in total. Among the primary interventions, 11 (33.3%) were devices, 10 (30.3%) were drugs, 5 (15.2%) were behavioral, 4 (12.1%) were diagnostic tests, 1 (3.0%) was dietary, and 2 (6.1%) were labeled as "other." Regarding the CT location, 20 (60.6%) were conducted in the United States, and 13 (39.4%) were conducted internationally. Of the 33 clinical trials, 19 (57.6%) were suspended, 9 (27.3%) were terminated, and 5 (15.2%) were withdrawn. The overall most common reason for trial disruption was recruitment difficulties (24.2%). Median enrollment for discontinued trials due to COVID-19 was 37 (IQR: 19-71) and for other reasons was 6 (IQR: 0-27), for which the Mann-Whitney test showed a statistically significant difference between the two ( $z=-3.913$ ,  $P < .001$ ). There were no significant associations between trial location, funding source, randomization, or whether a study involved masked versus unmasked participants.

**Conclusions:** The COVID-19 pandemic has incited a profound impact on clinical research in the field of otolaryngology. To preserve trial continuation amidst future threats to participant interaction and communication, we recommend further exploration of remote monitoring practices and virtual procedures- those of which will maintain the effectiveness and accuracy needed to establish novel therapeutics. We encourage future trials to gauge which remote assessments show the greatest validity, with the long-term goal of establishing innovative study designs resilient to future pandemics.

**Keywords:** clinical trials; otolaryngology; COVID-19; pandemic; cross-sectional analysis; ENT

## **The synthetic cannabinoid, WIN 55212-2, leads to changes of proBDNF/BDNF ratio levels in the periaqueductal gray and blood concentrations in the adolescent rat (Poster Presentation)**

*Jordan Santos, BS, Alejandro Torres, BS, Dolores Vazquez-Sanroman, PhD Jordan Santos, BS, Medical Student;*

Background: The hemp plant *Cannabis sativa*—marijuana and hashish are among the most commonly used illicit substances in adolescents and young adults. The synthetic CB1 agonist WIN 55212-2 (WIN) administration to rats and mice during adolescence leads to long-lasting deficits. Endocannabinoids and neurotrophins, particularly brain-derived neurotrophic factors (BDNF), are potent neuromodulators that play critical roles in many behavioral and physiological processes. Disruption of either BDNF or endocannabinoid signaling is associated with an overlapping set of neurologic and psychiatric diseases. The key to understanding the relationship between stress/anxiety and the endocannabinoid system may not lie in the anxiolytic or anxiogenic properties of various CB1 receptor ligands but in the ability of the endocannabinoid system to modulate the reactivity of affective or hypothalamic-pituitary-adrenal (HPA) processes. Hence, the periaqueductal gray (PAG), a midbrain structure that regulates anxiety, is key to understanding the relationship between stress/anxiety and the endocannabinoid system. Also, neurons within the PAG are a release-site for BDNF and are involved in analgesic agents, including opioids. This neurotrophin plays a role in synaptic plasticity and neuroprotection.

Furthermore, BDNF has well-established pro-survival effects, whereas its precursor protein, proBDNF, induces apoptosis. Thus, it has been suggested that the proBDNF/BDNF ratio could indicate neuronal health; however, the roles of the mBDNF/proBDNF after synthetic cannabinoids during this critical period is not clearly understood. Therefore, the present study aimed to evaluate the effect of adolescent exposure to WIN on the proBDNF/BDNF ratio levels in the PAG and blood concentrations in the adolescent rat.

Methods: Adolescent rats received five daily injections of either vehicle (1 mL/kg i.p.) or the cannabinoid (CB1 and CB2 receptor) agonist, WIN 55212-2 (0.2 mg/kg i.p. every other day). The PAG and nucleus accumbens were dissected and truncal blood samples were collected to analyze. Brain tissue and serum were used in an ELISA immunoassay to determine the concentrations for pro and mature BDNF.

Results: Chronic exposure of the synthetic CB1 agonist modified the proBDNF/BDNF ratio drastically, increasing 33% proBDNF levels and 47% BDNF in the dorsal PAG. Interestingly, only proBDNF blood concentrations were significantly increased (47%) compared to drug-naïve rats.

Conclusions: Our study revealed that synthetic CB1 receptors during adolescence significantly increased proBDNF levels in brain tissue and blood, demonstrating that the PAG and proBDNF/BDNF ratio are involved in endocannabinoid mediated neurotransmission.

Keywords: Synthetic cannabinoid, brain-derived neurotrophic factor, periaqueductal gray, adolescents

## **Examining Trends in the Public's Awareness of Exocrine Pancreatic Insufficiency in the United States Using Infodemiology Metrics (Poster Presentation)**

*Adam Schultz, BSc, Blake Burrows, BSc, Nicholas B. Sajjadi, BSc, Matt Vassar, PhD, Micah Hartwell, PhD  
Adam Schultz, BSc, Medical Student;*

**Background:** Exocrine Pancreatic Insufficiency (EPI) is a disorder caused by multiple etiologies leading to decreased pancreatic function. EPI presents with nonspecific symptoms and is largely unknown by the public, making EPI a difficult diagnosis. Awareness campaigns for EPI have been supported by AbbVie, a pharmaceutical company that manufactures the only available treatment for EPI (Creon), but it is unknown whether the campaigns have led to increased EPI awareness.

**Aims:** We sought to assess changes in EPI awareness over time evidenced by internet searches in the United States. Findings from this study may reveal how awareness campaigns, such as radio ads, have influenced the public awareness of EPI.

**Methods:** Google Trends is a popular and validated infodemiology tool. Using Google Trends allows for real-time data analysis that reflects public awareness over time, which is reported as relative search volume (RSV). RSV represents a relative percent change in Google searches for selected terms over a given time period. We observed trends for the term "Exocrine Pancreatic Insufficiency" over the date range January 1, 2011 to October 1, 2021 to capture search trends before and after AbbVie's advertisement campaigns. We used an ARIMA model to forecast expected search volumes based on search data before Abbvie's campaign for Creon.

**Results:** We found many statistically significant increases in RSV since the launch of AbbVie's campaign, with peak RSV occurring in August and September of 2021, together representing a 122.5% increase compared to expected values ( $P < .001$ ). Similar peaks were observed in March 2019 and January 2020, though every year since the launch had multiple statistically significant increases in RSV for "Exocrine Pancreatic Insufficiency."

**Conclusion:** Results from our study suggest that the US public interest in EPI has increased steadily over the last 5 years compared to the 5 years prior, possibly reflecting the success of Abbvie advertisement campaigns. AbbVie has steadily increased advertisement spending since 2016, with reported net revenue for Creon following a similar trend. The success of AbbVie's radio, TV, and internet advertisements may have served to educate patients on EPI, prompting them to search Google for more information or to find a physician who could evaluate them for EPI. Increasing awareness may support quicker and more accurate diagnosis of EPI.

**Keywords:** Exocrine Pancreatic Insufficiency

## **Osteohistology of Antilocaprid Horncores (Poster Presentation)**

*Katherine Slenker, BA, Holly Woodward, PhD, Haley O'Brien, PhD Katherine Slenker, BA, Graduate Student;*

Cranial bony projections (“headgear”) have diverse forms and functions, such as defense, species recognition, and mate selection. Most commonly, cranial appendages are associated with the mammalian order Artiodactyla. Broadly, all artiodactyl headgear—antlers, horns, ossicones, pronghorns—are osseous protrusions of the frontal or parietal bone with an integumentary covering, although there is taxonomic developmental and histological disparity. This discrepancy is underinvestigated, yet its exploration could inform metabolic demands and sociality during life, and diagnostic features in the fossil record. While a plethora of literature addresses the osteohistology of ornamentation in cervids, bovids, and giraffids, current literature on antilocaprid horns is restricted to keratin sheath growth and conflicting descriptions aligning development with the disparate patterns of both cervids and bovids. Furthering confusion about antilocaprid horncore development and evolution are recent genetic sequencing reports that show a closer relationship between Antilocapridae and Giraffidae. Despite their wide availability as specimens, no modern osteohistological examinations of antilocaprid horncores have been completed. This study provides a novel osteohistological description of antilocaprid horncores in order to build a comparative understanding of how these structures develop. Preliminary data of an adult male and female reveal the majority of cortical area in transverse section is secondarily remodeled trabecular cortex, indicating the horncore undergoes frequent remodeling. Deep to the periosteal surface, the thin outer cortex of compact tissue is highly vascularized fibrolamellar bone, revealing continued growth of the horncores beyond skeletal maturity. A greater understanding of horncore development is fundamental to further research into the evolution and function of headgear in Antilocapridae, such as social behaviors and thermoregulation.

Keywords: headgear, antilocaprid, evolution, osteohistology

## **The Effectiveness of Whole-Body Vibration on Improving Balance in Athletes with Chronic Ankle Instability: A Critically Appraised Topic (Poster Presentation)**

*Caitlyn M. Smith BS, Hana Ogino BS, JSPO-AT, Matthew O'Brien PhD, LAT, ATC, PES, CES Caitlyn M. Smith BS, Graduate Student;*

Context: Chronic ankle instability is a condition that can occur after multiple ankle injuries, or one severe ankle injury, and can affect balance, proprioception and walking mechanics. Improving balance can be helpful in rehabilitating those with chronic ankle instability. Whole body vibration treatment (WBV), vibration delivered at a specific amplitude and frequency through a platform that the patient is standing on, has been used to help increase neuromuscular control and proprioception in lower extremity injury rehabilitation but very little is known about WBV's effect on balance. Balance in athletes with CAI has been seen to improve with balance training but there is little research on the effects of using WBV in this population.

Clinical Question: Does Whole-Body Vibration treatment effectively improve balance in athletes with Chronic ankle Instability more than balance training

Summary of Key Findings: The following data bases were used to search terms of Chronic Ankle Instability (CAI), whole body vibration treatment (WBV), CAI and Athlete, CAI and WBV(PubMed, EBSCOHost, and SPORTSDiscus.) Only peer reviewed studies that were randomized control trials that were published within the last 5 years were included. Of the two studies included, both found that whole body vibration treatment did not improve balance when compared to balance programs.

Clinical Bottom Line: There is moderate evidence that indicates that WBV does help improve balance but does not improve balance more than a balance training in athletes with CAI. While recent, there is limited research on this topic at this time.

Strength of recommendation: B

Keywords: Chronic Ankle Instability (CAI), whole body vibration treatment (WBV), CAI and Athlete, CAI and WBV

## **Coronary No Reflow Phenomenon: A Case Study (Poster Presentation)**

*Derek Srouji, DO, Joshua George, DO, Alicia Tomlin, DO, Dev Jaiswal, DO, Dan Wildes, DO Derek Srouji, DO, Resident;*

Background: The phenomenon of coronary no reflow is defined as inadequate myocardial perfusion through without angiographic evidence of epicardial obstruction. After percutaneous coronary intervention (PCI), coronary filling is assessed using the Thrombolysis in Myocardial Infarction (TIMI) grading system. Coronary no reflow is defined when TIMI flow grades are 0. The mechanism is likely multifactorial and consists of causes including distal embolization of thrombus fragments during PCI, microvascular dysfunction, coronary dissection, and vasospasm. Therapy is dependent upon the underlying etiology. In this case report we discuss a patient scenario in which coronary no reflow occurred after elective PCI and was managed in the catheterization laboratory.

Case Presentation: A 50-year-old gentleman with a past medical history of insulin dependent diabetes and essential hypertension who presented for typical chest pain. Prior to presentation, the patient had recently had an echocardiogram that revealed an ejection fraction of 50-55%

Upon presentation to our facility, the patient had lab work that was significant for a troponin level within normal limits and an electrocardiogram that did not reveal any evidence of acute ischemia. Ultimately a decision was made to pursue additional ischemic evaluation with coronary angiogram.

The patient underwent coronary angiogram which revealed 80% disease of the mid right coronary artery in which PCI was performed. The patient subsequently had ST segment elevations in the inferior leads and concurrent chest pain. Upon repeat coronary angiogram poor blood flow distal to the lesion was appreciated and acute dissection was suspected. Subsequently, a drug eluting stent was deployed to the mid and distal right coronary artery which did not improve blood flow to the artery. A second drugeluting stent was deployed proximal to the stent in an overlapping fashion. Subsequent angiography revealed continued no reflow.

Intravascular Ultrasound (IVUS) was utilized which did not reveal any evidence of coronary artery dissection and good stent apposition was appreciated. Multiple doses of vasodilator medications, including nitroprusside and nicardipine, were administered with ultimate improvement of blood flow to the coronary artery with TIMI III flow.

Discussion: Coronary no reflow phenomenon is recognized in less than 2% of elective PCI cases. Risk factors of no reflow include age, smoking, diabetes mellitus, and depressed left ventricular ejection fraction. Our patient did display risk factors including smoking and diabetes, placing him at increased risk. IVUS has become an invaluable tool in helping to define underlying etiology of no reflow and ruling out coronary dissection. During our patient case, after no reflow was appreciated IVUS was incorporated to help discern the etiology. Pharmacotherapy for the treatment of no reflow is targeted towards local vasodilator or antiplatelet therapy. Our patient responded well to vasodilator therapy with eventual improved coronary flow. Although more research is needed for appropriate prevention of no reflow, early studies indicate that factors such as reducing time to intervention and administration of preprocedural medications such as aspirin, beta-blocker, and heparin may improve microvascular integrity and reduce risk of subsequent no reflow.

Keywords: Coronary No Reflow

## **Tricuspid Valve Endocarditis: A Case Study (Poster Presentation)**

*Derek Srouji, DO, Alicia Tomlin, DO, Joshua George, DO, Tori Opalecky, DO Derek Srouji, DO,*

**Background:** Endocarditis is a life-threatening inflammation of the inner lining of the heart's valves. Most commonly endocarditis is caused by bacterial infection originating from the bloodstream that then settle on the valves of the heart called Infective Endocarditis (IE). Tricuspid Valve Infective Endocarditis (TVIE) is less common than left-sided endocarditis of the mitral or aortic valve, encompassing only 5-10% of cases of IE. Most cases of TVIE are treated with long term antibiotics targeted at the culprit bacteria. In this case report we discuss a patient scenario in which treatment of TVIE had to be escalated beyond antibiotic therapy for resolution.

**Case Presentation:** A 27-year-old female with a past medical history of intravenous drug use originally presented to our facility with a chief complaint of fevers and generalized fatigue that had been ongoing for the previous two weeks prior to presentation. Blood cultures taken grew methicillin sensitive staph aureus (MSSA) in two out of two blood cultures. An echocardiogram revealed an ejection fraction of 40% and a large 3.0 by 1.1-centimeter vegetation on the tricuspid valve and sub valvular apparatus with severe tricuspid regurgitation were appreciated. The patient was initiated on appropriate IV antibiotics however patient continued to spike fevers and repeat blood cultures grew MSSA again in two out of two blood cultures. Cardiothoracic services were consulted and due to the overall size of the vegetation, persistent bacteremia, and significant tricuspid regurgitation a decision was made for the patient to undergo tricuspid valve replacement with extracellular matrix cylinder reconstruction. The patient tolerated the procedure well and was ultimately discharged in stable condition.

**Discussion:** The prevailing cause of TVIE is IVDU. Other, less common, causes include infection of pacemaker and defibrillator leads. The most common organism associated is Staphylococcus Aureus, making up 60-75% of cases associated with IVDU. Other common organisms include Candida glabrata, Streptococcus bovis, and Pseudomonas aeruginosa. The major indications for surgery for TVIE are tricuspid valve vegetation greater than 20 millimeters with or without evidence of right sided heart failure, IE caused by microorganisms that are difficult to treat with antibiotics such as fungal species, and right sided heart failure secondary to severe tricuspid regurgitation. Our patient displayed fulfillment of these criteria with the size of the vegetation and the significant tricuspid regurgitation present. Principles of surgery for TVIE include tricuspid valve repair or tricuspid valve replacement. If damage to the valve is determined to be too significant, determined either by the size of the vegetation present or the degree of regurgitation then tricuspid valve replacement is the gold standard. A bioprosthetic valve is preferred over a mechanical valve as this eliminates the need for lifelong anticoagulation. Our patient displayed such significant tricuspid regurgitation that repair was deemed not to be an option and patient underwent full prosthetic valve replacement. Mortality rates of surgical replacement of TVIE are minimal and long-term prognosis is promising. Our patient displayed a full recovery after operation.

**Keywords:** Tricuspid Valve Endocarditis

## **An Evaluation of Reporting Guidelines and Clinical Trial Registry Requirements Among Ophthalmology Journals (Poster Presentation)**

*Jordan Staggs, BS, Mitchell Love, BS, Vaishnavi S. Reddy, BS, David Wenger, BS, Arjun K. Reddy, BA, Mostafa Khattab, DO, Matt Vassar, PhD Jordan Staggs, BS; Medical Student;*

**Background:** Systematic reviews and RCTs represent the pinnacle of clinical evidence and are considered level-1 evidence in the formation of ophthalmology clinical practice guidelines.

**Objectives:** Here we aim to investigate the editorial policies and their enforcement of reporting guidelines and clinical trial registration. Additionally, we seek to determine whether RCTs published in journals requiring the previously mentioned guidelines and registries are more compliant than their counterparts in journals not requiring such guidelines.

**Methods:** This study used a cross-sectional design to select RCTs published in the top 20 ophthalmology journals from June 8th 2019 to June 8th 2021. Individual studies were evaluated for adherence to clinical trial registration as well as the CONSORT guideline for clinical trials by the presence or absence of a CONSORT flow diagram and clinical trial registration number in the published text. Additionally, the top 20 journal's "instructions for authors" section was evaluated to determine if a journal "required", "recommended", or "did not require" the 20 most commonly used study guidelines.

**Results:** Of the 20 top ophthalmology journals, 14 (70%) did not "require" the use of a single guideline within their "Instructions to Authors" section. The remaining 6 (30%) "required" the use of at least one guideline. Additionally, 8 (40%) of the journals did not require clinical trial registration prior to publication among RCTs. Among the journals requiring CONSORT guidelines, only 89 (62%) of the 144 RCTs included a CONSORT flow diagram within the study. Among the journals recommending CONSORT guidelines, only 34 (38%) of the 89 RCTs included a CONSORT flow diagram within the study. Journals requiring CONSORT guidelines were more likely to include flow diagrams compared to journals recommending CONSORT (odds ratio [OR] = 2.62, 95% confidence interval [CI] = 1.52 to 4.51)

**Conclusions:** Our study found that there is room for improvement in top ophthalmology journals in the requirement of reporting guidelines, with limited RCTs following CONSORT in their studies. Also, a limited number of ophthalmology journals require trial registration in their study. We propose that ophthalmology journals augment their requirements for publication to include these two steps, and we believe that this will allow for better adherence to higher methodological quality in ophthalmologic research.

**Keywords:** Ophthalmology, Randomized Controlled Trials, Clinical Trial Registry, CONSORT

## **Evaluating Reporting Completeness of Patient-Reported Outcomes in Esophageal Motility Disorders: A Cross-sectional Analysis of Randomized Controlled Trials (Poster Presentation)**

*Jordan Staggs, BS, Cole Williams, BS, Mitchell Love, BS, Abbey Renner, BS, Micah Kee, BS, Cody Hillman, BS, Samuel Shepard, BS, Shelby Rauh, MS, CCC-SLP, Ryan Ottwell, DO, Micah Hartwell, PhD, Matt Vassar, PhD Jordan Staggs, BS; Medical Student*

**Background:** Esophageal motility disorders (EMD) can have significant effects on quality of life. Patient-reported outcomes (PROs) provide valuable insight into the patient's perspective on their treatment and are becoming increasingly used in randomized controlled trials (RCTs). Thus, our investigation aims to evaluate the completeness of reporting of PROs in RCTs pertaining to EMDs.

**Methods:** We searched MEDLINE, Embase, and Cochrane Central Register of Controlled Trials for published RCTs focused on EMDs. Included RCTs were published between 2006-2020, reported a primary outcome related to an EMD, and listed at least one PRO measure as a primary or secondary outcome. Investigators screened and extracted data in a masked, duplicate fashion. Data extraction was carried out using both the CONSORT-PRO adaptation and Cochrane Collaboration Risk of Bias 2.0 tool. We assessed overall mean percent completion of the CONSORT-PRO adaptation and a bivariate regression analysis was used to assess relationships between trial characteristics and completeness of reporting.

**Results:** The overall mean percent completion of the CONSORT-PRO checklist adaptation was 43.86% (SD=17.03). RCTs with a primary PRO had a mean completeness of 47.73% (SD=17.32) and RCTs with a secondary PRO was 35.36% (SD=13.52). RCTs with a conflict of interest statement were 18.15% (SE=6.5) more complete ( $t=2.79$ ,  $P=.009$ ) than trials lacking a statement. No additional significant associations between trial characteristics and completeness of reporting were found.

**Conclusion:** PRO reporting completeness in RCTs focused on EMDs was inadequate. We urge EMD researchers to prioritize complete PRO reporting to foster patient-centered research for future RCTs on EMDs.

**Keywords:** Esophageal Motility Disorder, Randomized Controlled Trials, Patient-Reported Outcomes, CONSORT-PRO, Completeness of Reporting, Quality of Life

## **Trends in Gender and Geographic Representation in a National Institutes of Health Study Section (Poster Presentation)**

*Laura Strand, PharmD, Andee Beth Fitts, BS, Kimberly Kaase, BS, Matt Vassar, PhD Laura Strand, PharmD, Medical Student;*

**Background** It is widely known that certain groups have been largely underrepresented in the scientific and medical community, including women and professionals from certain geographic regions. In her article “Does Gender Bias Still Affect Women in Science?” Roper states, “Recent studies show that gender bias affects student grading, professional hiring, mentoring, tenure, promotion, respect, grant proposal success, and pay.” In order to better understand if gender and geographic bias play a role in the distribution of funds from the National Institutes of Health, our team examined the composition of the funding distribution committee for Dental and Craniofacial Research (DSR). We examined the gender and geographic makeup of these committees over a period of 10 years to determine whether improvements had been made. The results of this study have important indications about the representation of certain minorities in positions of power.

**Methods** Our team began by locating the roster information from study section DSR of the National Institute of Dental and Craniofacial Research committee. Using a pilot-tested Google form to collect data, we entered our study section, meeting year and month, member’s name, degree held, academic rank, membership type, institution, state, and gender into the form. This was collected from the rosters of meetings held in February, June, and October of the years 2011, 2016, and 2021. When entering each gender, we went to the institution’s website to locate each member or used genderize.io to verify the gender and only accepted results with a 0.6 probability or greater. After all data collection took place, each year’s data was compiled into one spreadsheet to be analyzed. Starting with 2011, any member’s name that was duplicated because of attending multiple meetings was deleted so only one name appeared for that person. We then determined the number of males and females in attendance from that year along with the total number of members representing each state. The same process was done for years 2016 and 2021.

**Results** Women were initially underrepresented in this study section with 46 (65%) men and 25 (35%) women in 2011. There were 46 (60%) men and 31 (40%) women in 2016. In 2021, there were 56 (55%) men and 47 (46%) women. This demonstrates a more equal balance between men and women in the study section. Geographically, there were 15 (22%) representatives from the Northeast, 18 (26%) from the Midwest, and 19 (28%) from the South in 2011. In 2021, the South was most represented with 32 (33%) of members, followed by 26 (27%) from the Northeast, 24 (25%) from the Midwest, and 14 (15%) from the West. This trend indicates a slight shift from the West to the South and Northeast.

**Conclusions** Our results suggest the NIH has improved in selecting women as section members. However, geographical locations appear less evenly distributed over time.

**Keywords:** NIH, representation, gender, regional

## **Proteomics Study Reveals a Gender-based Ribosomal Inflammatory Biomarker in Hepatitis C Virus Induced Cirrhosis (Poster Presentation)**

*Logan Swope, MS, Subhas Das, PhD, Sachi Pathak, MS, Anil Kaul, MD, DDS, MPH, Rashmi Kaul, PhD  
Logan Swope, MS, Graduate Student;*

Hepatitis C Virus (HCV) infection is a major cause of Hepatocellular Carcinoma (HCC). Further, HCC is a leading cause of liver-related death world-wide linked to liver cirrhosis and chronic liver disease. Clinical evidence suggests that pre-menopausal women, with elevated levels of circulating estrogen, clear HCV infection faster than males, and show low incidence of HCC. Our studies have shown gender-based differential estrogen receptor expression in the normal liver, which could contribute to protection in pre-menopausal women against chronic liver diseases including HCC. There is a gap in the current knowledge of biomarkers that could be used for early detection of HCV-related cirrhosis and HCC development. Further, biomarkers that account for gender differences in HCV-related pathogenesis have not yet been identified.

The purpose of this study was to identify early cancer biomarkers in HCV-related cirrhosis by analyzing liver proteins—specifically focusing on ribosomal family of proteins (RPs). Ribosomal proteins play an important role in cellular apoptosis, cell proliferation, and cancer development. Ribosomes convert mRNA into proteins using various RPs and have been shown to change in different tissues and tumors. Ribosomal gene FAU (Finkel-Biskis-Reilly murine sarcoma virus) has recently been identified as an apoptosis regulatory gene involved in ovarian, breast, and prostate cancer. To identify gender-based protein differences in male and female liver cirrhosis patients, we investigated RPs via proteomic study. Normal and HCV diseased liver tissue extracts were processed and sent to NIH IDeA National Resource for Quantitative Proteomics core lab for DIA proteomic analysis. We had four experimental groups with 10 samples in each group. The four groups included were normal control male, normal control female, HCV cirrhosis male, and HCV cirrhosis female. A total of 4,443 proteins were identified of which 132 were ribosomal proteins. Within the ribosomal protein cohort, 78 exhibited differential expression in liver cirrhosis compared to normals, with 13 showing gender-based significance.

FAU gene encodes for the 40S ribosomal protein S30 in the cytoplasmic ribosome and illustrated gender-based differences in cirrhosis group. FAU was significantly upregulated (logFC 1.04050553) in HCV females compared to HCV male liver tissues (p-value .0012) and was significantly downregulated in HCV male liver tissues compared to normal control males. No differences were observed in remaining experimental groups (HCV F vs. normal control F and normal control M vs. normal control F). This study identified the ribosomal protein FAU and its potential to serve as a novel gender-based biomarker in liver cirrhosis and cancer development.

This finding could be essential in understanding why males may be more susceptible to developing HCC. To our knowledge, this is the first report showing FAU ribosomal protein in HCV-related cirrhosis with significant gender-based differences. FAU could serve as a valuable prognostic biomarker to monitor HCC disease progression and response to treatment.

**Key Words:** Hepatitis C virus, Liver cirrhosis, Ribosomal Proteins, Gender

## **Trauma across generations: A novel look at Adverse Childhood Experiences using the Behavioral Risk Factor Surveillance System (Poster Presentation)**

*Rachel Terry, BS, Sadie Schiffmacher, BS, Lauren Conway, DO, Julie M. Croff, PhD, Micah Hartwell, PhD  
Rachel Terry, BS, Medical Student;*

**Introduction:** The adverse childhood experiences (ACEs) study was one of the first to demonstrate the robust, life-long effects of family dysfunction, child maltreatment, and neglect during childhood. The initial study of well-educated, middle-class adults indicated that early life traumatic events are common and frequently co-occur with more than 66% reporting having at least 1 ACE and over 20% with 3 or more. Subsequent studies representative of the general population have identified higher rates of 3 or more ACEs. There is a dose-response relationship with the ACEs accumulated and a range of adverse health outcomes including, but not limited to, pulmonary disease, cardiovascular disease, cancer, depression, substance misuse, and suicide. The effects of ACEs appear to drive lasting behavioral and biological adaptations that may increase the risk for ACEs in future generations.

**Methods:** To assess this theory, we performed a cross-sectional analysis using data from the 2020 Behavioral Risk Factor Surveillance System (BRFSS)— a nationally representative survey performed in the United States. ACEs were collected in 28 states and Washington D.C. To assess trends in ACEs by year of birth, we summed the ACE items from the BRFSS ACEs module and calculated the mean number of ACEs by reported participant age with survey design and sampling weights provided by BRFSS. To determine participants' year of birth, we subtracted the reported age from the survey year (2020). We then used an auto-regressive integrated moving average (ARIMA) to forecast the birth year when US residents surpass a mean of 3 cumulative ACEs— a benchmark in which multiple studies have shown the disparities in comorbid diseases and disrupted education increases significantly.

**Results:** Of the participants reporting ACEs ( $n=116,378$ ;  $N=63,076,717$ ), the average number of participants per yearly age from 18-79 was 1714.6 ( $SD=535.9$ ) and 10,071 respondents in the 80+ grouping (Supplement 1). The mean number of ACEs reported by participants 80 years or older (born in or before 1940) was 0.79 (95%CI 0.74-0.85), while the highest ACEs were reported by respondents who were 22 years of age (born in 1998; Figure 1). The forecasted model shows that individuals born in 2018 will, on average, surpass a cumulative of 3 ACEs.

**Discussion:** The accumulation of ACEs across the past 80 years supports behavioral and biological theories regarding the transmission of intergenerational trauma. Further, these analyses estimate that U.S. children born in 2018 will, on average, experience more than 3 ACEs. Implementation of resilience practices is necessary in order to prevent the continued intergenerational accumulation of ACEs and associated mental and physical comorbidities. CDC Guidelines for Preventing ACEs include strengthening economic support to families, teaching skills (social-emotional learning, parenting, healthy relationships) to families, and early intervention by trauma-informed primary care and victim-centered services may affect this trajectory. Not all children exposed to ACEs experience poor health outcomes; indeed, future research target inclusion of measures and interventions on protective factors associated with resilience.

**Keywords:** Adverse Childhood Experiences, Child Abuse and Neglect, Trauma

## **Adverse Childhood Events & Cognitive Decline: Analysis of Behavioral Risk Factor Surveillance System (Poster Presentation)**

*Rachel Terry, BS, Sadie Schiffmacher, BS, Avery Dutcher, BS, Michael A. Baxter, DO, Julie M. Croff, PhD, Micah Hartwell, PhD Rachel Terry, BS, Medical Student;*

Background: Cognitive functioning plays a crucial role in maintaining a healthy, active, and independent lifestyle. A 2017 study found the total net cost of care for an individual with dementia was 175% more than a person without dementia<sup>1</sup>. With an aging population and increasing rates of dementia in the U.S., improved etiology of cognitive decline is pertinent to establishing preventative measures, and therefore slowing increasing rates. The aim of this study was to determine the association between domains of Adverse Childhood Experiences (ACEs), and subjective cognitive decline (SCD) in a representative sample of the US adult population.

Methods: Data was obtained from the 2019 and 2020 Behavioral Risk Factor Surveillance Survey (N=18,096; > 45 years). ACEs were summed and categorized into 0, 1-2, and 3+ for ACE accumulation analysis. Among individuals reporting one ACE, domains of adversity (Family Mental Illness, Family Substance Abuse, Family Incarceration, Parental Divorce, Intimate Partner Violence, Emotional Abuse, Physical Abuse, and Sexual Abuse) were compared to those reporting 0 ACEs. We estimated prevalence of ACEs among individuals responding to the SCD questions within BRFSS and used multivariate logistic regression to determine the association between ACE domains and SCD.

Results: Our sample included 178,441 respondents representing a population estimate of 38,215,839. Among respondents aged 45 and over, 10.14% (n = 18,096; N = 3,960,992) reported experiencing cognitive decline. Mean ACE scores among participants reporting cognitive decline were 2.61 compared to an ACE score 1.44 in participants not reporting cognitive decline, a statistically significant difference (P<.001).

Compared to individuals reporting 0 ACEs, individuals reporting 1-2 ACEs were more likely to report frequently experiencing memory (OR: 1.59; 95%CI 1.43-1.76) and even greater among those reporting 3 or more ACEs (OR: 3.58; 95%CI: 3.23-3.96). Individuals reporting 3 or more ACEs were also significantly more likely to report frequent difficulties with ADLs, needing assistance with ADLs, and experiencing social limitations due to cognitive decline compared to individuals with no ACEs. Further those with higher ACEs scores were significantly less likely to have spoken with a healthcare provider about their cognitive decline.

Among individuals reporting 1 ACE of family mental illness, family substance abuse, family incarceration, emotional abuse, and physical abuse had significantly greater odds of reporting memory loss compared to individuals with no ACEs. Individuals with 1 ACE of parental divorce were less likely to get help with ADLs when needed, and individuals reporting 1 ACE of sexual abuse were significantly less likely to experience social limitations compared to those with no ACEs.

Conclusions: Having multiple ACEs was significantly associated with higher odds of cognitive decline and associated limitation of social activity and inversely associated with getting help when it is needed. Further, many ACE domains were associated with SCD—a novel addition to the literature and the methodology used herein. Interventions focused on improving cognitive health and preventing cognitive decline should consider the potential role of ACEs among affected populations.

Keywords: Adverse Childhood Experiences, Cognitive Decline, Dementia

## **The variable phylogenetic distribution of Wormian bones within mammals (Poster Presentation)**

*Paula Tran, BBA, Lianna M. Marilao, BS, Daniel E. Barta, PhD Paula Tran, BBA, Medical Student;*

Wormian bones, also known as intrasutural bones, are irregularly shaped bones that variably develop from separate ossification centers between sutures. Cranial bones derive embryologically from neural crest cells (anterior skull) or mesoderm (posterior skull), divided by the coronal suture. However, the interparietal bone, posterior to the parietal and superior to the occipital, derives from neural crest cells, which differs from its neighboring bones.

There is no concrete explanation for how and when intrasutural bones form, although both genetic and environmental factors have been proposed. Brain development can affect signaling of skull formation and suture timing. Parts of the embryonic brain are associated with specific parts of the skull formation; the presence of an intrasutural bone could reflect development of that associated brain region. Additionally, mechanical stress on the skull may lead to the formation of intrasutural bones to reduce strain. Restriction of bone growth, such as coronal suture synostosis, has been associated with surrounding sutures remaining open, with an increased incidence of intrasutural bones. Intrasutural bones have been highly correlated with central nervous abnormalities in humans such as osteogenesis imperfecta, rickets, and pyknodysostosis. The incidence and location of intrasutural bones vary among species. In order to comprehensively document this variability in the occurrence of different types of intrasutural bones within Mammalia, we conducted a comprehensive literature review.

We searched electronic databases to retrieve species that satisfied our criteria for Wormian bones. Synonyms for the main search term 'Wormian bone' included supernumerary, intrasutural, and fontanelle bone. Searches of wormian bones may have contained specific identifiers based on suture location. References were screened for photos and illustrations.

Entries for each Wormian bone include the species classification, location of bone, and an illustration (if provided). Based on the location of the bone, the species were sorted into an intrasutural bone category: bregma, coronal, frontal-maxilla, interparietal (1, 2, 3, and 4 elements), lambdoid, metopic, nasal, orbital, pterion, and sagittal. A cladogram was created based on existing trees was created to map the relationship between the species and occurrences of Wormian bones.

Intrasutural bones are identified within most mammal groups in various locations. The bregmatic bone has a variable occurrence throughout Mammalia. When a supernumerary bone has been identified in the frontalmaxilla or orbital region, there is not an instance of a bregmatic bone. Instances of a supernumerary bone towards the front of the skull (metopic, nasal, and coronal) are rarely identified together in the same species. Supernumerary bones at the pterion are mostly recorded in primates. The bregmatic and interparietal bones are less variable among species compared to smaller, anterior intrasutural bones.

The pattern of Wormian bones anterior to the coronal suture may fluctuate more than those posterior, possibly due to greater variability in neural crest-derived bones development vs. mesoderm-derived bones. Alternatively, the more variable bones among mammals could result from greater variation of the associated brain region itself between species. Future work seeks to more extensively survey individual species to assess how variable each Wormian bone is within a species.

Keywords: intrasutural bone, development, skull, mammal

## **The Influence of COVID-19 on Clinical Trial Discontinuation in Anesthesiology (Poster Presentation)**

*Brett Traxler, BS, Brayden M. Rucker, BS, Mary C. Greenough, BS, Nicholas B. Sajjadi, BS, Micah L. Hartwell, PhD Brayden M. Rucker, BS, Medical Student;*

Background: Clinical trials are at the forefront of modern medicine and evidence-based care, as they provide novel diagnostic tools and interventions for a variety of conditions. Unfortunately, the COVID-19 pandemic has significantly disrupted clinical trial conduct and hindered trial accessibility and overall development due to public safety measures, such as lockdowns and mandatory closures.

Anesthesiologists have played a vital role in the COVID-19 pandemic response, specifically regarding airway management and ventilatory support due to virus-induced hypoxemia, pulmonary infiltrates, and altered lung function. Moreover, the increased demand for anesthetic equipment required for intubation of COVID-19 patients has led to a downstream shortage of supplies for elective cases, placing non-COVID-19 patients at a disadvantage to receiving adequate care. Given their important role in perioperative medicine, anesthesiologists will continue to rely on findings from clinical trials to stay up-to-date with novel interventions and therapies, and interruptions to clinical research may have important implications. Therefore, the primary objective of this study is to highlight the impact of COVID-19 on the progress of clinical trials relating to anesthesiology.

Methods: We generated a systematic search on October 2, 2021 using ClinicalTrials.gov to identify clinical trials related to the practice of anesthesiology. To receive all trials potentially affected by the COVID-19 pandemic, our date range was January 1, 2020 through October 1, 2021. Investigators screened for relevant studies and performed data extraction in duplicate. Trials were included for the criteria that follow: (1) the study is relevant to the clinical practice of anesthesiologists for use in perioperative care including: induction, sedation, emergence, analgesia, hemodynamic stability, oxygenation, pain management, and complications secondary to anesthetic methods, (2) the study is interventional in nature, (3) the study status is ongoing (recruiting, active but not recruiting, enrolling by invitation) or discontinued (suspended, withdrawn, or terminated), and (4) the study is in any phase (I, II, III, IV).

Results: A total of 823 clinical trials met inclusion criteria, and 146 clinical trials were discontinued within the designated date range. Twenty-four (16.4%) of the 146 clinical trials were halted explicitly due to the COVID-19 pandemic. The majority of the trials (20, 83.3%) were found to have a primary intervention of Drug, while 4 (16.7%) were Procedure. A significant association existed between trial enrollment numbers and the likelihood of discontinuation due to COVID-19, as larger trials were more likely to be disrupted ( $z = -2.914, P = .0036$ ).

Conclusions: The COVID-19 pandemic crisis has played a significant role in anesthesia-related research progress. Therefore, it is critical to consider further efforts in maintaining trial conduction with the purpose of improving anesthetic care. The value of collective data collection and dissemination to researchers and anesthesia providers has been evident throughout the COVID-19 pandemic. Overall, anesthesia-related research must continue even during difficult times, and the unforeseen end to the COVID-19 pandemic should spark an initiative to incorporate innovative methods for data retrieval and trial conduct within the breadth of anesthesiology.

Keywords: clinical trials, anesthesia, anesthesiology, COVID-19, pandemic

## **Improving Interprofessional Practice and Cultural Competence with Interprofessional Education (Poster Presentation)**

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Challenge/Issue: Interprofessional education (IPE) and cultural competence (CC) training have become a staple in healthcare education programs with the ultimate goal of improving patient care. IPE, where students from two or more professions learn from, about, and with each other to optimize care, resulting in great team building, sharing of knowledge, communication, and collaboration. CC involves an individual's ability to recognize, assess, appreciate, and respect unique backgrounds such as race, ethnicity, sexual minorities, gender, identity, religion, and age, to make greater informed decisions in healthcare and minimize inequities. Within educational programs, both constructs can occur simultaneously to optimize learning and patient-centered outcomes.

Objective: To identify the impact of a Diversity, Equity, and Inclusion IPE single-day event on the perceptions of interprofessional practice and ability to provide culturally competent care in students enrolled in Doctor of Osteopathy (DO), Pharmacy, and Athletic Training (AT) education programs.

Approach: An experimental design used pre- and post-test measures of IPE and CC knowledge with a one-day conference as the intervention. Participants included students (205 pre and 200 post) enrolled in DO, pharmacy, and AT programs at two Midwestern universities. Participants completed the Interprofessional Collaborative Competences Attainments Survey (ICCAS) and three modified components of the Tool for Assessing Cultural Competence Training (mTACCT) before and after the event that included baseline information about the different professions, three CC presentations, and two case studies with small group discussions. Due to uneven sample sizes in the pre- and post-test, and violations of normality and homogeneity of variance, Kruskal Wallis tests were used to assess differences in the intervention.

Results: Five items on the ICCAS and all items on the mTACCT demonstrated statistical significance. On the ICCAS, students demonstrated increases in their ability to; "actively list to Interprofessional (IP) team members' ideas and concerns", "working effectively with IP members to enhance care", "recognizing how others' skills and knowledge complement and overlap with their own", "to develop an effective care plan with IP team members", and "negotiate responsibilities with overlapping scopes of practice". This demonstrated that discussing the professions in general and utilizing case studies and small group discussions allowed students to understand the roles, skills, and responsibilities of their peer professionals which will lead to better communication and teamwork resulting in improved patient outcomes and satisfaction for both patients and staff. The results of the mTACCT demonstrated overall improvement in skills but highlighted students are consciously incompetent, where they recognize a deficiency but demonstrate a desire for greater understanding. Students felt that initially they lacked the ability to identify bias and stereotyping in healthcare but after the intervention felt better equipped. It is important to note that while we found improvements within CC, a single event should not be the only point of CC inclusion within curriculums. Our intervention provided students from three different healthcare programs with an educational opportunity to strengthen their skills in both IPE and CC.

Keywords: Diversity Education, Patient-Centered Care, Interprofessional Education

## **A Longitudinal Analysis of Gender and Geographical Bias in NIH Research from the Allergy, Immunology, and Transplantation Study Section (Poster Presentation)**

*Shaelyn Ward, BS, Katherine Cox, BS, Matt Vassar, PhD Shaelyn Ward, BS, Medical Student;*

Scientific research studies and funding should promote diversity, equity, and inclusion to represent those who contribute to scientific advancement. However, those who identify as a woman, and those who reside in certain geographical areas influence underrepresentation in the scientific community. A review of medical literature found that only one third of all first authors were female (Hsiehchen, 2019). It has also been reported that fifteen states receive twenty-nine percent more funding than any other (Wahls, 2016). Therefore, a longitudinal study was conducted to investigate these discrepancies, with a focus on NIH study panel members in the Allergy, Immunology, and Transplantation study section. Member rosters were retrieved from the NIH study section Allergy, Immunology, and Transplantation for all meetings held in 2011, 2016, & 2021. Study authors used a pilot tested google form for data collection of each section member's name, affiliation, academic degree & geographic location. Gender was determined through website searches of the associated institution, and if it could not be determined this way, the browser genderize.io was used to determine gender identity. A probability of 0.6 or higher was required to confidently assign gender to a study section member. Women were less represented in study sections in the past compared to more recent years. In 2011, there were 29 (74%) males, but 10 (26%) females. The 2016 study included 27 (60%) males and 18 (40%) females. A higher proportion of females were involved in 2021, with 19 (46%) males to 22 (54%) females. There was an observable increase over time for women participation. Regarding geography, the majority of 2011 study section members were from the South (n=17, 44%) followed by the Northeast (n=8, 20%) and the Midwest (n=9, 23%), while the least represented region was the West (n=5, 12%). In 2016, all four regions had equal representation. In 2021, all regions were equally represented, except the West which had the lowest (n=7, 17%). Overall, sex bias in the scientific community has declined over time as women gain more representation and inclusion within scientific studies. It seems that geographic representation has become more equally distributed over time, however, more data is needed to make this conclusion. Results may vary among different study sections, therefore we can only be confident in our findings regarding the allergy, immunology, and transplantation study section.

Keywords: Gender, Geography, NIH, Allergy, Bias

## **Analysis of the Evidence Underpinning the American Academy of Orthopedic Surgeons Knee Osteoarthritis Clinical Practice Guidelines (Poster Presentation)**

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Background: CPGs are important tools which support decision-making by clinicians in patient management and should be based upon a comprehensive review of available literature. Because these guidelines have wide-reaching implications in patient care, these CPGs should be critically appraised to ensure their recommendations adhere to high-quality standards of reporting. The objective of this study was to evaluate the methodological quality and completeness of reporting of randomized controlled trials (RCTs) used to underpin clinical practice guidelines (CPGs) published by the American Academy of Orthopedic Surgeons (AAOS).

Methods: We evaluated the completeness of reporting for each Consolidated Standards of Reporting Trials (CONSORT) checklist item for all RCTs included in our analysis. Screening and extraction of RCTs included in the AAOS CPGs for surgical and non-surgical management of osteoarthritis of the knee was conducted in a double-blind fashion. We then evaluated the adherence of RCTs according to the CONSORT 2010 checklist criteria. We conducted a multiple regression analysis assessing CONSORT adherence against characteristics of the included studies (i.e. type of intervention, funding source, etc.).

Results: A representative sample of 179 RCTs were assessed for adherence to CONSORT criteria. The overall adherence was 68.5% with significant differences between those published prior to and since the development of the 2010 CONSORT guidelines ( $p=0.02$ ). We found that RCTs receiving funding from Industry/Private sources showed more complete adherence than RCTs which reported receiving no funding ( $p < 0.01$ ). We found that RCTs cited in the CPGs often failed to adequately report methods for randomization and blinding according to the standards set forth by CONSORT 2010 guidelines. Finally, studies that included a Conflict of Interest statement had significantly higher CONSORT adherence ( $p=0.018$ ).

Conclusion: We found suboptimal CONSORT adherence for RCTs cited in AAOS CPGs for management of osteoarthritis of the knee. Therefore, the AAOS CPGs are likely supported by outdated evidence and lack of high quality reporting. It is important that the evidence used to guide clinical decision-making be of the highest quality in order to optimize patient outcomes. In order for clinicians to confer the greatest benefits to their patients, CPGs should provide the totality of evidence and emphasize emerging high quality RCTs to ensure up-to-date, evidence-based clinical decision making.

Keywords: CONSORT; Adherence; Clinical Practice Guidelines; Reporting; Osteoarthritis

## **The Impact of COVID-19 on Otolaryngology Research: A Cross-Sectional Analysis of Discontinued Trials (Poster Presentation)**

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Background: Clinical trials for the treatment of pediatric orthopaedics are critical to enhance the quality of life of these children. In response to the COVID-19 pandemic, the FDA updated guidance on conducting clinical trials to prioritize patient safety; however the degree to which the pandemic disrupted pediatric orthopaedic-related clinical trials is unknown. Thus, our objective is to quantify the number of these trials disrupted due to the COVID-19 pandemic.

Methods: We searched ClinicalTrials.gov for ongoing and discontinued trials between 01/01/2020 - 10/31/2021. Trials were screened for relevance to the study and the number of participants, trial location, funding source, and reason for discontinuation. Associations between reasons for termination, funding source, trial location, and the number of participants enrolled were evaluated using Mann-Whitney U tests or ANOVA, where appropriate.

Results: Our search returned 544 trials, of which 128 were included with a total of 15,194 participants. Of the included Pediatric trials of orthopedic conditions, 9 were discontinued with a total of 497 participants. Of the 9 discontinued trials, 1 of 3 stated COVID-19 as a reason. Mann-Whitney U tests and ANOVA showed no statistically significant difference in enrollment between trials discontinued due to COVID-19 compared to other discontinued trials, nor among funding or location.

Conclusion: Our study shows 33% of discontinued pediatric orthopaedic-related clinical trials cited COVID-19 as a reason for discontinuation; however, only 12% of all children enrolled in discontinued trials. Findings from this study highlight the importance of developing strategies for safely continuing clinical research amid global emergencies that will almost certainly arise in the future.

Keywords: Pediatric, Orthopaedics, Clinical Trials, COVID-19

## **An Evaluation of Reporting Guidelines and Clinical Trial Registry Requirements Among Otolaryngology Journals (Poster Presentation)**

*David Wenger, BS, Rachel Wenger, BS, Haley Hendrix, PA-C, Chris Hendrix, BS, Arjun Reddy, BS, Matt Vassar, PhD David Wenger, BS, Medical Student;*

**Background:** The field of Otolaryngology is rapidly evolving and thus requires trustworthy clinical evidence to support the most current medical technologies and techniques.

**Objectives:** To evaluate the editorial policies of the top Otolaryngology journals and determine their adherence to reporting guidelines and clinical trial registration. Additionally we aim to evaluate whether RCTs published in journals requiring these guidelines are more compliant with trial registration and reporting guidelines compared to their counterparts not requiring such guidelines.

**Methods:** This study used a cross-sectional design to select RCTs published in the top 20 Otolaryngology journals from June 8th 2017 to June 8th 2021. Individual studies were evaluated for adherence to clinical trial registration as well as the CONSORT guideline for clinical trials by the presence or absence of a CONSORT flow diagram and clinical trial registration number in the published text. Additionally the top 20 journal's "instructions for authors" section was evaluated to determine if a journal "required", "recommended", or "did not require" the 20 most commonly used study guidelines.

**Results:** Of the 20 top Otolaryngology journals, 9 (45%) did not "require" the use of a single guideline within their "Instructions to Authors" section. The remaining 11 (55%) "required" the use of at least one guideline. Additionally, 9 (45%) of the journals did not require clinical trial registration prior to publication among RCTs. Among the journals requiring CONSORT guidelines 119 (59%) of the 199 RCTs included a CONSORT flow diagram within the study. Among the journals recommending CONSORT guidelines, only 92 (39%) of the 235 RCTs included a CONSORT flow diagram within the study. Journals requiring CONSORT guidelines were more likely to include flow diagrams compared to journals recommending CONSORT (odds ratio [OR] = 2.31, 95% confidence interval [CI] = 1.57-3.40)

**Conclusions:** Our results indicate that there is subpar utilization of reporting guidelines as well as enforcement of these guidelines among the top Otolaryngology journals. Of equal concern is the similar lack of utilization and enforcement of clinical trial registration. Based on the findings of our study this is a problem which can be solved at the journal level as requirement of these editorial policies leads to a 2.3x increased likelihood of adherence. As such we encourage Otolaryngology journals to adapt their policies to require incorporation of reporting guidelines and clinical trial registration in their published RCTs.

**Keywords:** Otolaryngology, CONSORT, Trial Registration

## **Clinical Trial Discontinuation and Non-Publication for the Pharmacologic Treatment of Post-Traumatic Stress Disorder Among Military Veterans (Poster Presentation)**

*Jonas Weygandt, BS, Morgan Moody, BS, Nicholas B. Sajjadi, BS, Benjamin Greiner, DO, MPH, Alicia Ford, PhD, Micah Hartwell PhD Jonas Weygandt, BS, Medical Student;*

**Background:** Failures by researchers and clinicians to understand, confront, and overcome barriers in veteran-health research may result in the waste of finite resources. Research waste includes clinical trial discontinuation and non-publication which have been shown to be substantial among several fields of medicine. It is the ethical responsibility of researchers, as scientists, to contribute their findings to the existing literature as supported by the International Committee of Medical Journal Editors and the National Institute for Health Research and the Declaration of Helsinki regarding human subjects. Given the rates of discontinuation and non-publication of clinical trials among other fields of medicine and the lack of evidence demonstrating publication rates of clinical trials (CTs) among veterans, our primary objective was to determine rates of discontinuation and non-publication among post traumatic stress disorder (PTSD) focused CTs with pharmaceutical interventions specific to the veteran population.

**Methods:** We performed a systematic search of registered trials using ClinicalTrials.gov for pharmaceutical interventions for the treatment of PTSD. Studies were screened in a duplicate masked fashion and extracted study characteristics including sample size, study design, trial status, phase, and funding source. We then searched the trials designation ID and title to identify publications associated with the study. If no study was found, and the study was not prematurely terminated, the study's primary contact was emailed to identify potential publications. Studies were classified as completed or discontinued based on the status category provided from ClinicalTrials.gov. Descriptive statistics of trials will be reported and associations of trial termination and non-publication will be assessed using logistic regression.

**Results:** Our search returned 351 studies, 54 of which met inclusion criteria. Among these 54 studies 11 were discontinued and 15 were not published. The median enrollment among all trials was 37 (IQR). Among the terminated studies, 0 participants were enrolled. Among the non-published trials, 12 were enrolled. Reasons for study termination included low enrollment, withdrawn funding, and deployment of the principal investigator overseas. We found a statistically significant association between sample size and discontinuation, but not among any other examined study characteristic.

**Conclusion:** We found that a combined 29% of trials of medications for PTSD among veterans were either discontinued or not-published. Engaging in clinical trials research without publication of results wastes the finite resources available to investigators. This may also lead to limitations and bias within the existing medical literature. Further, it is not only the ethical responsibility of researchers to publish results, but a legal requirement under Section 801 of the FDA Amendments Act (FDAAA) of 2007 to report study results, which has been reaffirmed and strengthened in 2017 and the first preliminary litigation was announced. In light of the dedication of our service men and women to serving the United States, sometimes at great personal cost, it is the ethical responsibility of researchers to advance clinical knowledge via CT publication as it relates to improving treatments for veterans diagnosed with PTSD is greater than ever before.

**Keywords:** Veterans, PTSD, Clinical Trial Discontinuation

## **Breastfeeding Status and its Influence on Native American Women's Food Preferences (Poster Presentation)**

*Liza-Ann Whitaker, BS, Hope Davis, BS, Alexis B. Jones, PhD Liza-Ann Whitaker, BS, Medical Student;*

**Introduction:** To evaluate if breastfeeding alters Native American women's food preferences, recently postpartum women were offered food interest surveys during their 6-week postpartum checkup at WWHastings Indian Hospital in Tahlequah, OK (a Native American serving health facility owned by the Cherokee Nation of OK).

**Methods:** Surveys were offered at check in, and no identifying information (name, age, race, SSN) or protected health information was collected. Women were asked whether they were breastfeeding, number of infants delivered, and if this was their first baby. Level of hunger was rated on a Likert scale that ranged from 1 (not hungry at all) to 9 (very hungry), with 5 indicating "don't care."

**Results:** Overall, breastfeeding women indicated increased hunger ratings over non-breastfeeding women. Next, the rate of interest in eating specific foods from 6 different taste categories (salty, sweet, meaty, bitter, sour, and hot) was determined. There were no striking differences in eating foods in particular taste categories, except for sweet foods. In the sweet group, there was a greater interest in eating chocolate bars and cookies in the breastfeeding women.

**Conclusions:** These findings represent the potential impact of breastfeeding on the interest in eating certain foods by Native American women and how breastfeeding status may guide food preferences, thus altering food choices. We found that Native American women in the breastfeeding group indicated a higher interest in eating foods of the sweet category in comparison to the nonbreastfeeding Native American mothers. These choices may have implications for postpartum weight loss as well as for childhood disease processes such as diabetes mellitus, obesity, and other nutrition related diseases as maternal food choices influence family meals and the overall health of her children.

**Keywords:** Breastfeeding, Food Choices, Taste Preferences, Native American Women

## **Pet therapy reduces blood pressure in elderly (>65 years) females: A preliminary report (Poster Presentation)**

*Megan Whorton, BS; Katie Sahlstrom, BS; Alexis Jones, PhD Megan Whorton, BS, Medical Student;*

Research indicates, pets influence the social, psychological, and physical health of the elderly population by lowering stressors associated with decreased social engagement and activity. The presence of pets also seems to alleviate elderly morbidity and mortality rates. Current studies have focused on the psychological and physical effects of pet therapy over time or induced acute stressors in the presence or absence of pet therapy. These studies indicate good outcomes but have small sample sizes and rarely investigate how short-term pet therapy might affect elderly health. Our main goals in this study were to: 1) determine whether or not short-term pet therapy reduces blood pressure in the elderly (>65 years old); 2) lay the foundations for a large database. We hypothesized that a 15-minute pet therapy encounter would reduce both systolic and diastolic blood pressure in the participants. We collected data from two groups by manually measuring blood pressure (BP) before and after each encounter. Both groups consisted of a 15-minute in-person visit with either pet therapy (experimental) or no pet therapy (control). Preliminary results showed visits with pet therapy decreased systole (3.44%) and diastole (4.76%). Without pet therapy, systole decreased by 0.23% and diastole increased by 3.11%. Human error within this project includes manually measuring BP and mistiming encounters (will fix with a stopwatch). Instrumental errors likely result from utilizing two separate BP devices. Moving forward, we hope to include both male and females along with Native American participants.

Keywords: Pet therapy, Blood pressure, Elderly

## **Evaluating the Need for Increased Culturally Centric Graduate Medical Education Training Opportunities within American Indian/Alaska Native Communities (Poster Presentation)**

*Bailey Wiggins, BS, Ashley Lee, BS, Jana Vanbeckum, BS, Mckenzi Ormsbree, BS, Natasha Bray, DO, MSED, Douglas Nolan, DO, Micah Hartwell, PhD Bailey Wiggins, BS, Medical Student;*

**Objectives:** Studies have shown that American Indian/Alaska Native (AI/AN) populations experience lower health status and poorer outcomes when compared to other Americans. Indian Health Services and Tribal Healthcare Facilities provide healthcare to approximately 2.6 million AI/AN people but are chronically facing high physician vacancy rates. Participation by healthcare facilities in graduate medical education (GME) has been demonstrated as an effective strategy to address physician workforce shortages. The availability of Accreditation Council for Graduate Medical Education (ACGME) training programs within AI/AN communities has not been investigated. This paper will assess the number of ACGME accredited residency positions in family medicine, obstetrics and gynecology, emergency medicine, and psychiatry in the ten states with the highest population of AI/AN citizens. Additionally, we will explore the percentage of a state's total ACGME family medicine, obstetrics and gynecology, emergency medicine, and psychiatry positions that offer culturally centric training within IHS or tribal healthcare facilities.

**Methods:** Based on the 2019 AI/AN minority population profiles on the Human Services Office of Minority Health website, we focused our efforts on the ten states shown to have the largest Native populations: Arizona, California, Oklahoma, New Mexico, Texas, North Carolina, Alaska, Washington, South Dakota, and New York. Utilizing the ACGME Program Search website we determined the total number of ACGME accredited family medicine, obstetrics and gynecology, emergency medicine, and psychiatry positions located in each of the ten states. The ACGME Program Search website as well as specific program websites provided information we used to compare the total number of family medicine, emergency medicine, obstetrics and gynecology, and psychiatry positions available in each state to the number of positions within those specialties that provided focused AI/AN culturally centric training; defined as completing at least 1 month of clinical training or a longitudinal continuity clinic experience within an IHS or tribal clinic.

**Results:** Compared to the total number of ACGME accredited family medicine, obstetrics and gynecology, emergency medicine, and psychiatry positions the amount of culturally centric ACGME accredited positions in these specialties was found to be: 13.4% (78/581) in Arizona; 0% (0/4242) California; 31.6% (175/553) Oklahoma; (66/238) New Mexico; 0% (0/2351) Texas; 0.03% (42/1244) North Carolina; 100% (36/36) Alaska; 0.07% (48/734) Washington; 0% (0/83) South Dakota; and 0% (0/2895) New York. Alaska was the state with the highest percentage of culturally centric training opportunities.

**Conclusions:** Our study suggests that in comparison to the total number of ACGME accredited family medicine, obstetrics and gynecology, emergency medicine, and psychiatry opportunities available, there is a significantly lower amount of ACGME accredited training opportunities in these specialties that are culturally centric to Native communities where the population of AI/AN is highest in the United States. Our findings provide evidence that showcases the need for an increase in GME training opportunities within IHS facilities or tribal healthcare clinics to potentially combat the shortage of physicians within Native Communities.      **Keywords:** ACGME, Graduate Medical Education Training Opportunities, Culturally Centric, American Indian/Alaska Native

## **Asthma Call Back Survey Results: A need for increase of asthma actions plans and allowance to carry medication (Poster Presentation)**

*Rachel Wilkins, B.S, Sadie Schiffmacher, BS, Ashton Gatewood, MPH, Savannah Nicks, BS, Benjamin Greiner, DO, MPH, Micah Hartwell, PhD Rachel Wilkins, BS, Medical Student*

**Purpose of Research:** Asthma is the most common chronic disease affecting children in the United States. Goals for asthma management include symptom control, ability to maintain a normal activity level, and minimizing adverse events.

**Research Question:** Our objective is to analyze the amount of children with asthma that are permitted to carry medications at school and without an asthma action plan.

**Methods:** In this study we analyzed the Center for Disease Control and Prevention's Asthma Call Back Survey to assess the prevalence of children in school allowed to carry medication and with asthma action plans. Using sampling weights provided, we estimated population prevalence by age group and urbanicity.

**Results:** Results showed that, overall, 34.8% of students reported that they were not allowed to carry asthma medications in school. Specifically, nearly 51% of children ages 5 - 9 and 33% of children ages 10-14 were reported not to be allowed to carry medications at school (Figure 2). Further, 58.2% of children did not have a written asthma action plan. Reported urbanity was not significantly associated with access to medication at school ( $P=.46$ ) or having an asthma action plan ( $P=.57$ ).

**Conclusions:** In our study, more than one-third of students were not permitted to carry asthma medications and nearly three-fifths did not have a written asthma action plan. Osteopathic Principles and Practices should guide asthma management. Therefore, we recommend partnerships between schools, healthcare students, and physicians to increase access to asthma action plans and medication in schools.

**Keywords:** Asthma, Medication, Action Plans, Schools

## **Longitudinal Analysis of Gender and Geographic Representation Among National Cancer Institute Study Section Members (Poster Presentation)**

*Andrew Wilson, BS, Christian Hemmerich, BS, Matt Vassar, PhD Andrew Wilson, BS, Medical Student;*

**Background:** The scientific enterprise should be at the forefront of incorporating diversity, inclusion, and equity — to leverage the heterogeneity of ideas. The National Institutes of Health (NIH) study sections review grant proposals and determine funding and without appropriate representation, we are narrowing our cognitive bandwidth within the scientific literature. Race and gender have been at the forefront of diversity discussions; however, geographic representation has been under appreciated. Therefore, the objective of this study is to investigate gender and geographic representation among National Cancer Institute study section members over time.

**Methods:** In this longitudinal analysis, we retrieved the meeting rosters for the National Cancer Institute career development study section panel (NCI J) for all meetings held in 2011, 2016, 2021. We collected member name, member degree, member academic rank, membership type, member institution, membership state, members gender and compiled this data into a google form for pilot testing and data extraction. We determined the gender presentation of the study section members by confirming their academic affiliated profile picture. If unidentified, we used the genderized.io software with a probability of .60 or higher for gender verification.

**Results:** Our data showed that, in general, women were represented in equal proportions to men. In 2011, there were 46 (52%) women and 42 (48%) men. In 2016, there were 28 (48%) women and 30 (52%) men. In 2021, men and women were represented equally at 35 (50%) each. Regarding geographic representation in 2011, the South and West were equally represented (n=17, 25%), the Northeast had the highest representation (n=19, 28%) and the Midwest had the lowest representation (n=15, 22%). In 2016, the Northeast again had the highest representation (n=18, 33%), followed by the South (n=16, 30%), the Midwest (n=12, 22%) and West (n=8, 15%). In 2021, the South had the highest representation (n=27, 38%), followed by the West (n=18, 25%), Midwest (n=14, 19%), and Northeast (n=13, 18%).

**Conclusion:** These findings indicate that the National Cancer Institute has had nearly equal representation of gender but has lacked in geographic representation. We want equity in research, and we should be leading this effort. More focus on geographic representation is needed to ensure our brightest minds are being represented across the country.

**Keywords:** Diversity, Study Sections, Funding

## **Study of time dependent degradation of mRNA encoding the SPRR3 and S100A9 gene markers in saliva stains (Poster Presentation)**

*Kayla Woodson, BS, Jun Fu, PhD, Robert Allen, PhD Kayla Woodson, BS, Graduate Student;*

When a body fluid stain is found at a crime scene, it may be beneficial to use the RNA found within to approximate the age of the stain. This is important in cases where a person of interest has been known to be in a location several times before any crime occurred. RNA has proven to be useful in the field of forensic investigation; however, it has been shown to be less stable than DNA. The analysis of mRNA includes common methods like reverse transcription PCR, or RT-PCR. Research has previously been conducted in this laboratory has shown the relationship between the age of a blood stain and semen stain and the amount of RNA degradation. In this experiment, buccal swabs were collected and placed in a box to dry in a room temperature environment. Swabs were left to dry for time intervals of up to one month, after which mRNA was extracted and reverse transcribed to cDNA. Transcripts for the saliva specific marker SPRR3, along with S100A9, typically expressed in the esophagus, were analyzed through real time qPCR analysis. Results so far show that as the time between sample acquisition and analysis increases, Ct values increase for the marker SPRR3, which shows the transcripts are undergoing degradation. Ct values for the S100A9 marker appears to stay relatively constant. These results can be helpful in real world case work where a saliva sample may have been left out accidentally, but can still be used to produce mRNA. By studying the effects of time on mRNA degradation, the age of a stain can be approximated.

Keywords: mRNA degradation, saliva stains, qPCR analysis

