Evaluating the Relationship Between Physical Activity Level and Bone Structure: a pQCT Analysis

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INTRODUCTION

Physical activity, including bone-loading exercise, is a common recommendation for the prevention of osteoporosis. Traditionally, bone density has been used to evaluate bone health. Recent attention, however, has led to structure as an additional component of overall bone health.

Purpose: To explore the effect of habitual physical activity, as measured by the Human Activity Profile, on bone structure.

METHODS

This is a cross-sectional study examining physical activity and bone structure data collected during the enrollment visit to the Maryland Osteoporosis Prevention Study (MOPS).

Study Design

The study used a cross-sectional design to examine the relationship between physical activity and bone structure.

Sample Size

297 female post-menopausal women aged 50-60 years were included in the analysis.

pQCT

pQCT was used to measure volumetric bone mineral density (vBMD) area, and strength at the 4%, 20%, and 60% sites of the distal tibia.

RESULTS

The results showed a significant positive correlation between physical activity level and bone structure parameters. The average activity level was associated with higher bone mineral density and greater bone strength.

CONCLUSION

These findings support the importance of physical activity in maintaining bone health and suggest that interventions aimed at increasing physical activity may be effective in preventing osteoporosis.
### Evidence-Based Healthcare Forum Virtual Poster Display

Each spring the College of Allied Health Professions sponsors a forum. This interprofessional event is intended as an opportunity for students in all CAHP programs to share scholarly activity that supports evidence-based clinical practice. The primary goal of the scholarly activity that is presented in the forum is to promote the understanding of the research process in allied health. The ultimate goal is the continuous updating of best practices in clinical settings. The following research projects, critical reviews of the literature, and educational exhibits are organized by topic.

Due to social distancing in response to COVID-19, the 2021 forum is presented virtually in this booklet.

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## Women's Health

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Background: Technology and database driven analysis in healthcare is becoming increasingly prevalent, and increasingly user friendly. In the last decade, many advances in hands-free methods of data input have been made and become more viable in a variety of medical professions, with varying results. Additionally, healthcare apps have become increasingly prevalent, acting as learning aids, facilitators of communication, granting patient information access and helping guide clinical decision making. Apps commonly are used to test the limits of new technology, or bridge gaps in existing technology.

Objective: The aim of this study was to assess the advantage or disadvantages of hands-free charting through a voice-to-text app built for perfusionists. This was compared to a traditional paper perfusion chart, and an assessment of the number and timing of delays between noticing or charting events was made.

Methods: Twelve clinical perfusion students using two different simulated bypass cases were recorded and assessed for the number of clinical events noticed and recorded, as well as the speed at which they accomplished these steps. Paper charts from Nebraska Medical Center were compared with a custom app with voice-to-text charting capability. Data was analyzed using linear mixed models to detect differences in length of time until a chartable event was noticed, and how long after the noticing of an event it took to record the event. Timeliness of recording an event was made by assessing log-transformed time data.

Results: There was significantly more information recorded when charting on paper, while charting with voice-to-text resulted in significantly faster mean time from the noticing of an event to the recording of it. There was no significant difference between how much was noticed and recorded. Of the events that were not charted when using paper, a higher percentage of these missed events were drug administration, while voice charting had a higher percentage of missed events that were associated with cardioplegia delivery or bypass timing.

Conclusions: With a decreased time interval between noticing an event and charting the event, speech-to-text for perfusion could be of benefit in situations where many events are occurring at once, such as emergency situations or highly active portions of bypass such as initiation and termination. While efforts were made to make the app as intuitive as possible when interpreting spoken word, there was much room for improvement. The ability of participants to speak naturally to the app may not have eliminated the learning curve associated with the implementation of new technology. Possible confounding factors include passing familiarity with the paper chart and the prototype nature of the app.

Gender plays a defining role in the physical make-up between men and women. While there are obvious differences between men and women, how do those differences affect individual’s health? Is gender something that should be considered for cardiovascular intervention and Extracorporeal circulation? Upon initial research it was confirmed that the majority of studies show that women are indeed thought to experience a higher percentage of morbidity and mortality after undergoing cardiopulmonary bypass. However, there were also a number of studies that published conflicting results. Because of the conflicting data, the purpose of this study was to compile a meta-analysis of the current data and draw results that stem from that data into a systematic review.

In this study, peer reviewed articles were collected and broken down into different categories pertaining to gender and Cardiovascular Health. The categories included: author, title, year, procedure, number of males, number of females, mean age for males, mean age for females, mortality male, mortality female, myocardial infarction males, myocardial infarction females, renal dysfunction males, renal dysfunction females, neuro/stroke males, neuro/stroke females, transfusion males and transfusion females. From the information collected from the articles, a statistician created forest plot graphs to interpret the data.

The conclusion of this study shows that Women were found to have significantly higher rates of postoperative mortality, neurological dysfunction and strokes, renal dysfunction, and incidence of transfusion. Incidence of myocardial infarction was the only category that women were not found to have a higher incidence of postoperatively than men. All of these findings had a confidence interval of 95%.
ABSTRACT #3

Body Surface Area Standardization: Implications for Perfusion Decision-Making
Taryn Reader, Elmir Delic, Scott Sanderson, David Holt. Clinical Perfusion Education program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Body surface area calculations are used in a variety of medical situations, including various perfusion-related calculations, such as cardiac output and delivered oxygen. However, a lack of standardization across BSA equations can result in negative patient outcomes and inhibits quality perfusion-related research.

Methods: This study analyzed the differences in the derived BSA, cardiac output, and delivered oxygen between the DuBois and Mosteller equations, as well as their ideal body weight derived versions. Four years of NHANES data was utilized to create histograms that visualized the differences between the data sets, as well as raw data tables to show the average and largest differences.

Results: The DuBois vs. Mosteller analysis showed that Mosteller BSA is larger for 84.15% of US adults, with an average difference of 0.1 L/min and 12.63 mLO2/min. As a result of higher blood flow and delivered oxygen values for the majority of the patient population, and more reasonable estimates for blood flow and delivered oxygen for high BMI patients, the Mosteller equation seems to be the higher quality standard. The ideal BSA derived flows were 0.5 L/min and 0.6 L/min lower for the Mosteller and DuBois equations respectively, as well as 84.65 mLO2/min and 70.76 mLO2/min lower for the delivered oxygen.

Conclusion: With such stark clinical decisions being forced upon clinicians utilizing the ideal body surface area derived blood flows and delivered oxygens, it becomes clear that the standard body surface area equations are superior as quality standards. Overall, the Mosteller equation showed consistency across a wide range of heights, weights, and body mass indexes and should therefore be used as a perfusion standard in regards to perfusion decision-making.

ABSTRACT #4

Improving ECMO Safety with Online Simulation as a Training Tool
Kyle Sieck, Danielle Nay, Scott Sanderson, David Holt. Clinical Perfusion Education program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Extracorporeal membrane oxygenation (ECMO) has led to improvements in survival rates of patients who are not responsive to other life support options. With an increasing number of ECMO cases, there is an increasing need for ECMO providers. This study aims to identify effective training tools that will increase the number of trained ECMO providers as well as improve ECMO success rates. Twelve second-year clinical perfusion students from the University of Nebraska Medical Center (UNMC) volunteered for this study. Participants were randomized into a control and simulation group; the control group received a informational pamphlet and the simulation group received a recorded simulation with interactive decision-making portions. After completing their assigned ECMO training, participants were asked to take a test consisting of twelve diagnostic (DG) and twelve corresponding corrective action (CA) questions. Each group was evaluated for the average number of correct responses to diagnostic and corrective action questions as well as average total test time. The data indicated that there was no statistically significant difference found between the group test scores (p=0.43) or CA and DG questions (p=0.45), but there was a statistically significant difference found between the simulation and control group total test time (p=0.037). Online ECMO simulations may be useful as an educational tool for students or current ECMO providers and may lead to faster recognition of ECMO complications and, consequently, improve patient safety.

ABSTRACT #5

Supportive Enhancement Devices for Perfusionists with Hearing Impairments
Cassandra Stover, Kaylee Schell, Scott Sanderson, David Holt. Clinical Perfusion Education program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Communication is vitally important in the operating room, which is why perfusionists use close-looped communication. If a perfusionist were to become hearing impaired, there is very little, if any, supportive enhancement available to allow the perfusionist to continue their practice.

Methods: 12 individuals with basic perfusion knowledge completed four rounds of testing, where they were given 15 commands each round. The first round was the baseline data, with the surgeon wearing a non-transparent mask. For the subsequent rounds, a transparent mask, transcription device, and amplification device were used individually as a supportive enhancement device. If the individual was able to respond to the command correctly, using closed-loop communication, they received a score of 1. If the response was incorrect or they were unable to hear the command, they received a score of 0.

Results: The results showed a statistically significant difference between the baseline data and transparent mask when compared to transcription or amplification used for a supportive enhancement device. However, there was no statistical difference between the baseline data and when a transparent mask was used for a supportive enhancement device. Likewise, there was no
statistical difference when amplification and transcription were compared.

Conclusions: Supportive enhancements should be further investigated. The study showed that all supportive enhancements are not equal. Some are more effective than others, and implementing effective supportive enhancement devices into the operating room may help improve communication and may allow a perfusionist with a hearing impairment to continue their practice.

**ABSTRACT #6**

**Assessing the use of heparin concentration testing for initiation of cardiopulmonary bypass**

Samuel Swartz, Yilin Li, Scott Sanderson, David Holt. Clinical Perfusion Education program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Activated Clotting Time (ACT) is currently considered to be the gold standard of anticoagulation management in cardiac surgery involving cardiopulmonary bypass (CPB). Heparin concentration testing performed by Heparin Protamine Titration (HPT) is considered a secondary test in the initiation period of CPB and is only considered to be effective during maintenance of CPB and for determining reversal doses of protamine. The focus of this study was to examine the use of HPT and Heparin Dose Response (HDR) testing using the Medtronic Hemostasis Management System (HMS) Plus in the initiation period of CPB. This experiment involved two different protocols with the goal of comparing the timing of HPT and ACT testing. Protocol 1 involved obtaining multiple blood samples after heparin administration to the subject and allowing it to circulate. The goal of this protocol was to determine how long the heparin would take to circulate and result in an adequate HPT result as compared to the time to receive an adequate ACT result for safely initiating CPB. Protocol 2 involved obtaining multiple blood samples prior to heparin administration to the subject and adding heparin into the samples at amounts equivalent to a total dose for the whole blood volume of the subject. The goal of this protocol was to determine when excluding external factors, which testing procedure alone would more quickly provide a result that indicates a safe initiation of CPB. Unfortunately, many obstacles were encountered during the data collection process, such as obtaining supplies late, technical issues, and emergent situations in the testing environment. There is great value in HPT testing and lessons were learned during the completion of this research project. It is the hope of the authors that this research be continued by future perfusion students at UNMC.

**ABSTRACT #7**

**Effective Techniques for Autotransfusion Blood**

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Background: Allogeneic blood transfusions allow for the life-saving replacement of volume and red cell mass. Unfortunately, this often leads to adverse side effects. These side effects include viral and bacterial infections along with immunologic reactions. Cell salvage is a viable alternative, but also has complications including dilutional coagulopathies due to the loss of platelets and coagulation factors. Ultrafiltration should be explored as an alternative method to autotransfusion that would allow for the sparing of these vital components. An ideal technique would allow for the removal of potassium, heparin, and contaminants while preserving and concentrating all native blood components. A traditional cell salvage device was modified to include an ultrafilter. A standard saline wash was used to create a multi-pass ultrafiltration system to compare to the cell salvage device.

Methods: Ten trials were run through two techniques: cell salvage and a multi-pass ultrafiltration system. Outcome measures were hematocrit, plasma free hemoglobin, and potassium.

Results: Cell salvage produced a product that was significantly lower in hematocrit, but also lower in plasma free hemoglobin. There was no difference in potassium removal between the two techniques.

Conclusion: The multi-pass ultrafiltration system allows for the removal of potassium and conservation of platelets and coagulation factors. However, in comparison to the traditional cell salvage system, the significantly higher plasma free hemoglobin indicates erythrocyte hemolysis created in the multi-pass system. Additional outcome measures of concern that were not addressed in this study include quantification and function of coagulation factors preserved, heparin removal, time to process, and cost-efficiency. Further research needs to be conducted on an ideal system for washing autotransfusion blood.
ABSTRACT #8
The Interrogation of a Bicuspid Aortic Valve Through the Use of Echocardiography
Rebecca Doe, Heather Tischmak, and Gina Varley.
Diagnostic Medical Sonography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

A bicuspid aortic valve is the most common congenital heart anomaly making up roughly 2% of the population and almost three times more common in males than females. This condition occurs when the aortic valve, normally tri-leaflet structure, is fused into a raphe forming into a bi-leaflet valve. If left untreated, the severity can increase and result in a wide range of physiologic conditions. Yet, once diagnosed, proper treatment or specific medical procedures can be implemented. Recently, the use of transesophageal echocardiography (TEE) has proven to be a common procedure when aiding in the diagnosis of a bicuspid aortic valve. This specific assessment will allow for proper interrogation regarding the morphology of the valve as well as its surrounding structures and can assist in determining if surgical intervention is necessary. This particular exhibit discusses utilization of echocardiographic techniques to accurately diagnose a bicuspid aortic valve.

ABSTRACT #9
Dual Antiplatelet Therapy Compared to Single Antiplatelet Therapy After Transcatheter Aortic Valve Replacement (TAVR)
Rachael Hall. Physician Assistant program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Antiplatelet therapy after transcatheter aortic valve replacement (TAVR) procedures are needed to prevent platelets from sticking together and forming clots. Clots can build up and cause ischemia in major arteries and veins during and after recovery leading to complications such as cerebrovascular accidents, myocardial infarctions, acute kidney injury, vascular compromise, and even death. Up until now dual antiplatelet therapy (DAPT) has been initiated instead of single antiplatelet therapy (SAPT) for 30-60 days post-operatively without significant research proving clinical effectiveness and reduction of harm. This critical review focused on five meta-analyses and systematic reviews analyzing the effectiveness of SAPT vs DAPT after TAVR. All studies focused on adults with moderate to severe aortic stenosis that received TAVR within the last five years, and outcomes were measured based on morbidity and mortality events such as stroke, bleeding, and death. Overall, a review of the studies showed that major ischemic events and all-cause mortality were not significantly impacted with use of either antiplatelet therapy in all but one study. There was a statistically significant increase in major bleeding events with the use of DAPT post-operatively compared to SAPT in every study analyzed. Based on this information, more randomized controlled trials need to be completed in order to prove the increased risk DAPT has shown in these studies and effectively change practice post-operatively in this patient population.

ABSTRACT #10
Interventional Detection of Collateral Circulation in the Prevention of ST-Segment Elevation Myocardial Infarction
Anna Bohling. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Collateral circulation is a phenomenon where the body develops coronary anastomoses or alternative routes of circulation due to an occluded region of the body. This phenomenon is not well-researched, but with the assistance of interventional radiology, there has been an increase in scientific studies ultimately changing the course of treatment for cardiovascular disease. Coronary disease patients, specifically those that are presented with ST-segment elevation myocardial infarction (STEMI) have been shown to demonstrate these coronary anastomoses during a coronary angiogram. X-ray imaging during the procedure is necessary in determining not only the occlusion, but how the body has been surviving with the occlusion from collateral blood flow. Imaging also leads to suggestions of necessary treatment and procedures going forward focusing on the least invasive as possible. Knowing that this collateral circulation exists, creates endless opportunities for prevention of a coronary event as well as research and learning for developing new therapies. The ultimate goal for this discovery through imaging is to decrease mortality rates and improve patient care through prevention, research, and treatment.

ABSTRACT #11
Myocardial Infarctions
Briggs Bowen. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

In the United States there is a continuous rise of heart conditions. With heart attacks there are 459,840 deaths per year, 38,320 per month, 8,843 per week and 1,259 per day. The problem in the United States today is the increased use of tobacco, the lack of exercise and the lack of knowledge and care about dieting. The purpose of this exhibit is to show the important information of heart
attacks such as what causes them, how they are diagnosed and the treatment used to correct them. With the help form the catheterization lab heart attacks or myocardial infarctions can be treated with noninvasive surgery and can be performed very quickly upon your arrival. The results of performing a percutaneous coronary intervention or balloon angioplasty on someone have been tremendous and has seen many great outcomes when the procedure is done. This exhibit shows the research of a myocardial infarction and how poor daily habits can lead to poor heart conditions, this study also shows the answers in diagnosing and how to treat a heart attack.

ABSTRACT #12

The Diagnosis, Treatment, and Prevention of Coronary Artery Disease
Sophia Mittelstaedt. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

There are several developments in the diagnosis and treatment of coronary artery disease that pertain to medical imaging primarily in the understanding of how long coronary artery disease can develop without symptoms. Education on prevention methods is an important part of managing this disease, and certain aspects of coronary artery disease treatment parallel the prevention methods. Due to coronary artery disease having few early clinical manifestations, those involved in medical imaging and diagnosis of this disease must have a good understanding of the signs of developing atherosclerosis of the coronary arteries.

ABSTRACT #13

Use cyclo-gram intersection point (CISP) to differentiate multiple obstacle crossing strategies between young and older adults
Tangdi Lin, Jung Hung Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction/Purpose: Based on CDC’s data, approximately thirty percentage of older adults aged 65 and older report falling each year in the United States and it is also shown that forty percentage of falls were related to tripping over obstacles. To prevent older adults from falling during obstacle crossing, one previous literature stated that only focusing on spatio-temporal parameters, such as step time, step length, toe clearance and horizontal distance, did not provide enough research-based evidence for fall prevention. This study attempted to use the cyclo-gram intersection point (CISP) to provide another aspect to investigate the strategies of multiple obstacle negotiation.

Method: Twenty-six young and twenty-six older adults were recruited in this study. A pressure-sensing Zeno walkway was used to measure pressure-related parameters. All participants were instructed to complete multiple obstacle crossing with two obstacles five times with the pace and step length they selected. The two obstacles, crafted from polyvinyl chloride (PVC) materials, were set at a height of 10% of participant’s leg length and three steps from each other. Cyclo-gram intersection point (CISP) was introduced to analyze the center of pressure movement in both medial-lateral and anterior-posterior positions. The CISP is the point where two pathways of the center of pressure cross each other to differentiate the locomotor behaviors between two groups in both anterior-posterior (CISP-AP) and medial-lateral (CISP-ML) directions.

Results: A significant two-way interaction between the effect of age and the effect of different obstacles was found on both CISP-AP (F1,50=4.46; p=0.04) and CISP-ML (F1,50=7.39; p=0.009) directions. Post-hoc pairwise comparisons showed that older adults have a significant larger CISP shift in the lateral direction than young adults when stepping over the second obstacle (p=0.024).

Conclusion: A pressure-sensing walkway is applicable for rehabilitation of gait by using pressure-related parameters collection. Importantly, CISP is a potential gait analysis method to differentiate the effect of aging during multiple obstacle crossing.

ABSTRACT #14

Mastoid Vibration Increases Standing Postural Sway Differently in Healthy Young and Older Adults
Yufeng Lin, Ka-Chun Siu, Jung Hung Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Purpose: Galvanic vestibular stimulation (GVS) combined with physical therapy enhances the exercise function in neurological patients by activating the afferent vestibular nerve and affecting the vestibular and peripheral areas of the cerebral cortex. However, this technique could induce nausea on patients. Thus, this study proposed an alternative method, mastoid vibration (MV), to understand whether MV generated a similar outcome, like the function of GVS did in standing but without inducing nausea, in healthy young and older adults.

Methods: 15 healthy young adults and 10 healthy older adults participated in this study. MV was generated by two electromechanical vibrotactile tactors placed on participants’ mastoid processes. A total of 6 conditions were randomly given to participants in one visit combined with 2 eye conditions (open/closed) and 3 types of MV.
(bilateral/unilateral/none). Each condition lasted for 90 seconds. Participants were instructed to stand as still as possible on two 22.9 x 45.7 cm force plates used to collect center of pressure (COP) at 100 Hz. The dependent variable was the total travel distance of COP (ttdCOP). Three-way mixed ANOVA (3 MV groups x 2 eye conditions x 2 age groups) was performed.

Results: A significant interaction effect between different MVs and age was found (F2,46=6.456, p<0.0005). No nausea was reported.

Conclusions: MV significantly increased ttdCOP in both groups. However, the uni- and bilateral MVs showed the same pattern in older adults to increase postural sway, but not in young adults who were only influenced by unilateral MV. We hypothesized that it might be due to the declined visual and somatosensory perceptions in aging people. Those declined systems could not compensate for the perturbed vestibular function, affecting the integration of these sensory signals. For young adults, increased sway only after unilateral MV might be due to increased difficulty in matching inaccurate information from one side of the vestibule with other side.

Clinical relevance: For the future consideration, this MV could be used to 1) diagnose patients with vestibular disorders, and 2) enhance the daily activities in patients with neurological disorders when combining mastoid vibrations with physical therapy.

ABSTRACT #15

**Different types of visual perturbations affect the active control differently**
Muchen Ren, Jung Hung Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Visual is the dominant sensory system for walking. Different studies show that manipulating the visual system in the medial-lateral direction induces different active controls in both the anterior-posterior and the medial-lateral directions. However, these studies focus on the medial-lateral direction but not the nature walking direction (anterior-posterior direction), where most falls occur. Therefore, in the current study, we attempted to investigate the active control in the anterior-posterior direction.

Method: Fourteen young adults and ten older adults were required to walk on our treadmill at their own preferred walking speeds for two minutes under normal vision, reduced vision, and perturbed vision status (anterior-posterior perturbation). The 95% confidence interval ellipse area was calculated by all the coordinates of Heel-Strikes in the transverse plane. Also, the means of long-axis and short-axis of the 95% confidence interval ellipse were reported to determine the types of active controls in locomotion.

Results: A significant interaction between the effect of aging and the effect of visual perturbation was found on active control in the anterior-posterior direction (F (2, 44) = 7.724, p = 0.001). The pairwise comparisons indicate that there existed different types of active control under different visual perturbations.

Conclusion: Anterior-posterior perturbation can result in variability changes in both anterior-posterior direction and medial-lateral direction. Young people and old people have different types of active control to cope with vision perturbations. Not only the variability increase but also the variability decrease can be recognized as the results of active control. For rehabilitation application, the training on the active control with visual perturbations could assist old adults to enhance their balance control.

ABSTRACT #16

**Dual task affects the hip flexion in multiple obstacle crossing among healthy young and older adults**
Haoyu Xie, Ka-Chun Siu, Jung H Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: With the increasing proportion of the older adults living with their grandchildren, it is inevitable to do housework while looking after children. For instance, these older adults may need to step over multiple toys on the way to turn off the oven while talking to their grandchildren. It might increase the potential risk of falling. Therefore, it is essential to understand what strategies are involved in the obstacle negotiation in older adults could help them prevent the falling. Thus, this study was aimed to answer the above requests by investigating what strategies adults used to negotiate double obstacles in the dual task situation.

Methods: Twelve young adults and ten older adults were recruited to perform three obstacle-crossing tasks consisting of Baseline (double obstacles), Easy (the serial sevens + double obstacles), and Hard (the objects recall task + double obstacles). The height of each obstacle was set at 10% of participants’ leg height. Two obstacles were placed three steps apart. Participant performed three trials for each set of obstacle-crossing task to avoid the contingency.

Results: Young adults performed less hip flexion than older adults during the obstacle crossing (p<.05). In three tasks, the hip flexion of leading leg in the first obstacle was significantly lower than that in the second obstacle among young adults (p<.05). The hip flexion of leading leg in the second obstacle was lower in Baseline task, but higher in Easy and Hard tasks among older adults (p<.05). For the hip flexion of trailing leg, there was no significant difference between three tasks among young adults (p>0.05), but a higher hip flexion was observed in the first obstacle within Easy and Hard tasks among older adults (p<.05).
Conclusion: Compared with young adults, older adults were prone to use conservative “overshoot” negotiation strategies, which is more hip flexion, to cross obstacles. Therefore, physical therapists should pay more attention on the hip joint in older adults when performing locomotor behaviors with a second task.

MUSCULOSKELETAL

ABSTRACT #17

A Case of Testicular Adrenal Rest Tumors Secondary to Congenital Adrenal Hyperplasia
Madison Metheny, Georgianna Diley. Diagnostic Medical Sonography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Congenital adrenal hyperplasia (CAH) is an inherited autosomal recessive disorder that affects the adrenal glands. The adrenal glands sit right above the kidneys and produce important hormones, such as: cortisol, mineralcorticoids, and androgens. This specific genetic disorder has non-functioning adrenal glands, due to an enzyme deficiency which prevents the body from producing necessary hormones. Signs and symptoms include hyperplastic adrenomegaly early onset of puberty, accelerated body growth and premature completion of growth. Congential adrenal hyperplasia is usually diagnosed in early childhood. This exhibit will review a case study of testicular adrenal rest tumors that are secondary to congenital adrenal hyperplasia.

ABSTRACT #18

Undifferentiated Pleomorphic Sarcoma; a Case Report
Anna Yanke, Ileana Gonzales. Diagnostic Medical Sonography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Undifferentiated pleomorphic sarcoma (UPS), also known as malignant fibrous histiocytoma, is a rare soft tissue cancer commonly seen in patients between 50 and 70 years old. UPS typically occurs in the extremities but can also occur in other areas of the body. Imaging modalities useful in detecting UPS include magnetic resonance imaging (MRI), computed tomography (CT), and Positron Emission Tomography-CT (PET-CT). Patients may also undergo a biopsy to confirm diagnosis. This case involves a patient who presented with hip pain. This exhibit will cover etiology, signs and symptoms, imaging findings, and treatment.

ABSTRACT #19

Can Incline Treadmill Walking Protocol be Augmented By Visual Perturbation for Physical Therapy Use?
Jie Hao, Ka-Chun Siu. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Incline treadmill walking (ITW) has been used in different patients receiving physical therapy. Given the critical role of visual information in human locomotion, integrating visual perturbation (VP) to treadmill training could induce the challenge to patients, magnifying the training effects. However, literature regarding how VP influences muscle activation during ITW is limited. We hypothesized that VP could increase muscle activation during ITW, and larger VP could elicit higher muscle activation.

Methods: A virtual moving corridor was projected in front of the treadmill to display optic flow. Experiment One (EXP1): 12 females and 6 males were instructed to walk on the treadmill at the preferred walking speed for 8 conditions (two visual conditions: normal optic flow and VP; four inclinations of treadmill: 0, 3, 6, 9-degree) with 2 minutes each. In the VP condition, the optic flow rotated for 180˚ at 20˚/s. Experiment Two (EXP2): 7 females and 3 males participated. There were 4 conditions on the 9-degree incline treadmill, consisting 360˚ rotating VP at 4 different speeds (10˚, 20˚, 30˚, 60˚/s). All the other settings were the same as EXP1. For both experiments, the surface electromyography (EMG) was used to record the muscle activation of quadriceps, hamstring, tibialis anterior (TA) and gastrocnemius of the right leg. Root-mean-square of the EMG (RMS-EMG) was calculated as outcome measure.

Results: In EXP1, For the TA, the RMS-EMG of VP condition was higher than normal condition (P=0.004) at the stance phase, whereas no significant difference for other gait events. The VP effects were evident for the 12 females. With limited samples in EXP2, the individual descriptive analysis was used and indicated that 6 females and 1 male exhibited higher TA activation at 60˚ VP compared to 10˚ VP at the stance phase.

Conclusions: VP increased the TA activation at the stance phase during ITW, and this effect was found dominantly in females. Specifically, higher magnitude of VP could elicit higher TA activation. The gender difference on responding to VP might lead to additional consideration in designing the ITW protocol. Further research is warranted to confirm such unexpected gender discrepancy.
**Validation of Relative Pressure from Pressure Walkway to Force Plates in Young, Active Individuals**

Matthew McManigal\(^1\), Alyx Jorgensen\(^1\,\(^2\), Michael Allen\(^2\), Robert Barber\(^2\,\(^3\), Austin Post\(^1\), Eric Markvicka\(^4\), Matthew Tao\(^2\,\(^3\), Elizabeth Wellsandt\(^2\,\(^3\), 1–Medical Sciences Interdepartmental Area Program, University of Nebraska Medical Center 2–Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, UNMC, 3–Department of Orthopaedic Surgery and Rehabilitation, UNMC, Omaha, NE 4–Department of Mechanical and Materials Engineering, University of Nebraska Lincon, Lincoln, NE

Introduction: Vertical ground reaction force (vGRF) is regularly quantified in research environments using force plates to assess lower limb loading in individuals affected by a neuromuscular disorder or lower limb injury. vGRF is typically measured using force plates (FP), which are considered the gold standard but are typically immobile and require patients to complete testing in a research lab. Transportable pressure walkways (PW), in contrast, can be used to assess limb loading in the field by measuring relative pressure (RP)—but diagnostic loading variables calculated using RP have not been validated against vertical loading measures from FPs to determine whether PWs can provide a viable diagnostic alternative. Thus, we conducted a pilot study to validate RP-based variables from a PW against vGRF-based variables from FPs during walking and running movements.

Methods: This study included 38 healthy individuals, ages 15-35, who completed five trials of walking and running on a PW placed over two embedded FPs. RP data was collected from a 2’x20’ Zeno Walkway. The resulting RP and vGRF data was used to determine key diagnostic variables, including peak loads (PLoad1 and PLoad2), rate of load development from heel-strike to PLoad1, load impulse during stance, total distance traveled by center of pressure during stance (COP-TD), COP mean velocity (COP-MV), and stance time. Variables were correlated using interclass correlation coefficients (ICCs) and Bland-Altman 95% limits of agreement (LoA).

Results and Conclusions: Based on our analysis, the ICCs between RP-based diagnostic variables with vGRF-based diagnostic variables were excellent (>0.9) (stance time), moderate (0.5-0.75) (peak loads, load rate, and load impulse), and poor (<0.5) (COP distance traveled and mean velocity). The accuracy of the COP measurements from the FPs may have been degraded, by their position underneath the PW. Additionally, the PW consistently underestimated peak loads, load rate, and load impulse relative to the FPs; therefore, the bias in RP-based variables may need to be removed to accurately estimate loading using a PW. RP-based loading variables may be appropriate surrogates for a vGRF-based variable, but will depend on whether the acceptable level of error exceeds the LoA for the patient population begin studied.

**The effect of bilateral stimulation on gait parameters during different inclinations**

Yuxiao Sun, Jung Hung Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Objective: Recent epidemiological evidence estimates that approximately 30% of adults above the age of 40 might experience some form of vestibular dysfunction. Such dysfunction could eventually lead to chronic dizziness and imbalance that can have a significant impact on fundamental activities of daily life. Additionally, walking on different inclinations is a part of daily life. Therefore, this exploratory study investigated what the role of vestibular function was in controlling gait during inclined walking.

Methods: Nineteen healthy adults participated this study. Eight different walking conditions were randomly assigned to these participants as following: walking on level treadmill with/without bilateral vestibular stimulation (BVS), walking on 3, 6, and 9 grades of inclination with/without BVS. The dependent variables are the single support time, the double support time, the stand time, the step length, step width, and step time. A two-way repeated measure was used to investigate the effect of inclinations and the effect of the BVS. If the significant interaction was found, Tukey post hoc comparisons were used.

Results: A significant interaction was found in the step length (p = 0.005) and the step time (p = 0.028). Post doc showed longer step length, and step time when walking on the 9 grades than 0 and 3 uphill inclinations (P<0.05). Vestibular interferences, slopes, and interaction brought no significant effects to step width (P>0.05).

Conclusions: These findings suggest that the BVS and inclinations both had effects on gait stability. This result implies that patients with unknown bilateral vestibular dysfunction might be diagnosed by investigating their gait in different inclinations.

**The relationship between meniscal injury presence and kinesiophobia after anterior cruciate ligament injury**

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Background: Anterior cruciate ligament (ACL) injury frequently occurs with concomitant injury to the menisci. Meniscus repairs are designed to restore tissue desgined to restore tissue...
function and reduce deterioration of cartilage over time. After meniscal repair, range of motion and weight-bearing restrictions are more common compared to those who have undergone an isolated ACL reconstruction (ACLR). It is unknown if this altered progression of the rehabilitation process has any potential impact on the psychological health of individuals. The purpose of this pilot study is to examine the psychological impact of concomitant meniscal repair compared to those who undergo ACLR without meniscal repair.

Methods: Twenty-one participants enrolled in a larger longitudinal cohort study were included. Operative reports for all individuals were analyzed for presence of meniscal repair (meniscus repair = MR; no meniscus repair = NM). Participants completed the Tampa Scale of Kinesiophobia (TSK; scored 11-44) and the Anterior Cruciate Ligament Return to Sport after Injury (ACLRSI; scored 0-100) at 2, 4, and 6 months after ACLR. Separate repeated-measures analyses of variance (ANOVA) were performed for each outcome measure. Independent t-tests were used to assess between-group differences in baseline characteristics. A p-value was set to $\alpha=0.05$.

Results: Participants were 71.4% female, 19.3±4.9 years old and had a BMI of 25.0±3.71 kg/m2. There was a main effect for time for the TSK ($p=0.013$) with an improvement (reduction) in scores over time: (2 months: 25.0±1.1, 4 months: 22.5±1.0, 6 months: 21.1±1.0). There was no main effect for time for the ACLRSI ($p=0.94$) (2 months: 57.5±5.1, 4 months: 58.7±4.7, 6 months: 63.3±4.2). There were no main effects of group (MR, NM) or group X time interaction effects for the TSK or ACLRSI ($p>0.05$).

Discussion/Conclusion: Concomitant meniscal repair during ACLR did not alter the trajectory of patient-reported psychological outcomes between 2 and 6 months after ACLR in this pilot study. The additional restrictions related to meniscal repair protocols may not negatively impact progression of patient-reported outcomes compared to individuals who undergo isolated ACLR. Psychologic readiness remains an important variable in recovery following from ACLR with or without concomitant meniscal repair.

### ABSTRACT #24

**Gorham-Stout Disease**

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Disappearing bone disease, other known as Gorham-Stout disease is a rare condition that few will ever have to face. In this condition the bone forming cells are outworked by the osteoclasts, breaking the bone down beyond repair. This leaves the bones within the body with reduced bone mass which leads to an increased risk in fractures. The diagnosis can be very stressful for GSD since it is such a rare condition. It’s often process of elimination that brings physicians to the conclusion of GSD. Once finally diagnosed with disappearing bone disease, there are many different treatment routes that can be pursued. Each case needs to be handled accordingly as every patient seems to be different. The following literature lays out just how serious this condition is. It explains the action of the many cells that take place in the formation of GSD as well as lays out the process of diagnosis and finally goes into detail about the many different treatment options. While GSD is a rare condition, it is still important for healthcare workers to know of its existence because once it gets to serious, there might be no return for its victims.

### ABSTRACT #25

**Assessing Text Neck with Weight-Bearing MRI**

Joy Glynn. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This educational exhibits explores weight-bearing magnetic resonance imaging (MRI) as a gold standard for the medical imaging of text neck from handheld electronic use or other spinal pain pathology. Because diagnostic x-ray and computed tomography provide minimal information if spinal pathology has not impacted bony structures, MRI is a good candidate for gold standard medical imaging because of its use in identifying soft tissue pathology.
Two other advantages of MRI are the weight-bearing capability of newer scanner types and the recently-developed quantitative measures in functional testing that promote radiologist interpretation consistency. With neck pain ranked as one of the longest-lasting disabilities out of 291 conditions globally, it is imperative to find methods that consistently identify neck pain pathologies. Ruptured discs, stenosis, or spinal instability can be overlooked if not analyzed with weight-bearing MRI and functional quantitative test. Further research is required for determining gold-standard medical imaging criteria and investigating treatments and preventions to improve neck pain in individuals around the world.

ABSTRACT #26

The New Age of Knee Replacement
Caroline Hahn. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

In the world of orthopedics, the surgery of total knee replacement is ever-changing. Developing osteoarthritis in the knee can not only affect a patient’s day but also quality of life if it cannot get resolved. From finding out about knee osteoarthritis to deciding to get the new and improved robotic-arm assisted total knee replacement, requires many pre-operative and post-operative images and scans to get the precise measurements for the prosthetic components that match the patient’s joint to a tee. The new age of knee replacement allows patients to get better results with less recovery time.

ABSTRACT #27

Rheumatoid Arthritis
Mary Harrill. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Rheumatoid arthritis (RA) is a chronic autoimmune disease from unknown causes that produces joint pain and damage throughout the body but is primarily found within the small joints of the hands and feet. An autoimmune disease is when the body’s own immune system is attacking their healthy cells and tissues by mistake, and in this case, RA is attacking the joints causing pain and inflammation. Rheumatoid arthritis is the second most common rheumatic disease, after osteoarthritis. The two differ because rheumatoid arthritis primarily involves tissue inflammation rather than joint degeneration. RA is also bilateral, meaning if it happens in one hand, it is also in the other, unlike osteoarthritis. Rheumatoid arthritis often occurs early to mid-adulthood, but there is no specific timeline as to when and where it can develop.

ABSTRACT #28

Osteogenesis Imperfecta
Lauren Teaford. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This exhibit explores research on osteogenesis imperfecta (OI) including the causes and treatments of the children that have OI. Osteogenesis imperfecta, or brittle bone disease, is a rare genetic disorder that causes bones to fracture easily and other health related problems. OI can often be diagnosed at birth or later in childhood. When it is diagnosed later it can often be hard to diagnose because of the dramatic symptoms OI causes. The diagnosis of OI comes from a full evaluation including a skeletal survey, x-rays of each individual bone to view any fractures. There are no curative treatments but there can be symptomatic treatments such as a number of surgeries to prevent fractures, including rod placements.

NEUROLOGIC

ABSTRACT #29

Intracranial Aneurysms
Justin Stephens, Melissa Riege. Cardiovascular Interventional Technology program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

An aneurysm is the weakening of an artery wall that leads to ballooning or bulging of the artery. Intracranial aneurysms occur in the brain and may rupture randomly, causing hemorrhage. Treatment depends on if the aneurysm has ruptured or not. Medical treatment options are best for unruptured aneurysms only. Surgical clipping and endovascular coiling are treatment options that can be used on ruptured or unruptured aneurysms. Advancements in neuroimaging such as MRA and CTA technology have helped with treatment and early detection of intracranial aneurysms. However, DSA angiography is best for treatment and detailed investigation of intracranial aneurysms. The purpose of this exhibit is to analyze intracranial aneurysms, treatment options, and advancements in neuroimaging.
ABSTRACT #30

**Holoprosencephaly and Dandy Walker Syndrome: A Case Study**
Cierra Wynn, Maisie Patzner. Diagnostic Medical Sonography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The prevalence of abnormalities of the fetal central nervous system (CNS) are second only to cardiac malformations. Holoprosencephaly and Dandy Walker are two of the most common CNS malformations. Holoprosencephaly is a malformation of the forebrain resulting in an absent or incomplete cleavage of the prosencephalon. It can include a variety of anatomical variants most often visualized as the telencephalon and diencephalic structures conjoined in the midline. Dandy Walker Syndrome is a congenital brain malformation involving the cerebellum and the fluid spaces around it. The key features of this syndrome are the enlargement of the fourth ventricle, partial or complete absence of the cerebellar vermis and cyst formation near the lowest part of the skull. This case study describes the sonographic features of a fetus diagnosed with Holoprosencephaly and Dandy Walker Syndrome.

ABSTRACT #31

**Using MRI Guided Laser Ablation to Remove Inoperable Brain Lesions**
Jorge Hernandez, Emily Painter. Magnetic Resonance Imaging program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This exhibit aims to inform readers about an alternative and less invasive method to remove brain lesions. Laser ablation is a perfect alternative for patients who can not tolerate classical surgery or whose lesion is in an inoperable location. With magnetic resonance imaging (MRI) guidance, surgeons can ablate pathology in real-time in the MRI suite. With the ability to attain new high-resolution images on demand, surgeons can be more accurate and are able to monitor the ablation process, ensuring the success of the procedure.

ABSTRACT #32

**The Impact of Various Dietary Fatty Acids on Seizure Activity**
Mikaela Clemons, Jana Wells, Corrine Hanson, Mariah Jackson, Megan Timmerman. Medical Nutrition program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Previous research suggests certain fatty acids (FA) play a role in the inflammatory process, and thus are involved in seizure activity. The objective of this study was to assess if dietary intake of proinflammatory and anti-inflammatory FA influenced seizure activity.

Methods: This was a cross-sectional analysis of a cohort composed of 82 children and adults monitored for seizures at the Nebraska Medicine Epilepsy Monitoring Unit. Dietary intake was collected via a validated food frequency questionnaire, and seizure presence and severity scores were recorded. Subjects were separated into groups based on seizure presence and severity. A Kruskal-Wallis test assessed difference between FA intake and seizure severity. A Chi-square test assessed difference between low and high FA intake and seizure presence.

Results: While admitted, 37.80% of subjects had seizures. Subjects consumed an average of 86.22 ± 55.16 grams total fat daily, with highest intake of MUFAs and lowest intake of EPA. There were no statistically significant differences in intake of FAs across each severity level. There were also no statistically significant associations between FAs and seizure presence.

Conclusion: There was no association between dietary FA intake and seizure outcomes, likely due to small intake variations between groups. Intakes in the cohort were lower than research dosing suggested for anti-inflammatory effects. Further research should evaluate the effect of FAs on neuroinflammatory biomarkers and resulting effect on seizure outcomes. Advances in research will provide a better understanding of the intersection of these factors and better therapies can be provided to improve seizures and quality of life.

ABSTRACT #33

**Relationship Between Vitamin B1, B6, B12, and D Intake and UPDRS Motor Scores in Individuals with Parkinson’s Disease**
Angel Rasmussen, Jana Wells, Jenna Wuebker, Megan Timmerman, Mariah Jackson, Corrine Hanson. Medical Nutrition program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Previous studies have demonstrated a relationship between nutritional status and Parkinson’s disease (PD)-related factors. Vitamins B1, B6, B12, and D may be key dietary factors for slowing PD progression and
Background: Orthostatic tremor (OT) is a rare disease characterized by high-frequency tremor in both legs and the sense of unsteadiness during standing. The tremor is featured with a sound resembling a distant helicopter (helicopter sign) during auscultation over the thigh or calf, which make it distinguishable from other tremors. In a previous study with 6 years follow-up, 26% of 68 OT patients have experienced falls and have strong subjective feeling of unsteadiness. However, the feeling of unsteadiness is not easy to detect objectively. Thus, this study attempted to investigate the relationship between diet vitamin intake and UPDRS Part III motor function in patients diagnosed with PD.

Methods: A cross-sectional chart review included 76 subjects diagnosed with PD. Participants completed validated Food Frequency Questionnaires (FFQ) to assess for dietary intake of vitamins. Independent sample t-tests and Pearson’s correlation coefficients were utilized to assess the relationship between vitamin intake and UPDRS scores. Statistical significance was set at p<0.05.

Results: UPDRS scores for overweight subjects represented better motor function than normal weight UPDRS scores, which trended toward significance (p=0.068). There were no statistically significant differences in mean UPDRS scores when sufficient and insufficient vitamin intake groups were compared. There were no statistically significant associations for vitamin B1, B6, B12, and D intake and UPDRS motor scores.

Conclusion: This study found no significant association between vitamin intake and UPDRS motor scores. However, results may suggest clinical significance in regard to better motor function for overweight compared to normal weight subjects. Further studies should continue to consider the relationship between vitamin intake and motor function in PD patients.

**ABSTRACT #34**

**Using sound-wave analysis to detect the changes of tremor patterns in patients with primary orthostatic tremor**

Jing Hu, Diego Torres-Russotto, Ka-Chun Siu, Jung Hung Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Orthostatic tremor (OT) is a rare disease characterized by high-frequency tremor in both legs and the sense of unsteadiness during standing. The tremor is featured with a sound resembling a distant helicopter (helicopter sign) during auscultation over the thigh or calf, which make it distinguishable from other tremors. In a previous study with 6 years follow-up, 26% of 68 OT patients have experienced falls and have strong subjective feeling of unsteadiness. However, the feeling of unsteadiness is not easy to detect objectively. Thus, this study attempted to investigate the usability of sound-wave analysis to detect OT in different virtual scenarios with a hypothesis that fearful environments led to a high frequency of sound-wave of tremor.

Methods: Twenty-one patients with primary OT and 17 age-matched controls were involved. A total of 17 age-matched controls were involved. A total of 68 OT patients have experienced falls and have strong subjective feeling of unsteadiness. However, the feeling of unsteadiness is not easy to detect objectively. Thus, this study attempted to investigate the usability of sound-wave analysis to detect OT in different virtual scenarios with a hypothesis that fearful environments led to a high frequency of sound-wave of tremor.

**Active Lateral Balance Control during Uphill, Level, and Downhill Treadmill Walking**

Weihua Li, Ka-Chun Siu, Jung Hung Chien. Physical Therapy Education program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Human walking is energy efficient. There may be little need for neural control because the passive dynamics alone are sufficient to provide the proper foot placement in the anterior-posterior direction. However, to maintain lateral balance in walking, a higher level of neural control is needed by observing higher gait variability in the medial-lateral direction than in the anterior-posterior direction, particularly for older populations and patients with neurological disorders. It has not been fully understood the mechanism underlying the active control in uphill and downhill walking, which are parts of daily activities. This study attempted to answer these questions.

We hypothesized that uphill or downhill walking required higher active lateral balance control (a wider 95% confidence area of foot placements) than level walking. Twenty healthy young and nineteen healthy old adults participated in this study. Three walking conditions (uphill – 15% grade; level – 0% grade; downhill -- -15% grade of inclination) were randomly given to participants. Each treadmill walking lasted 2 minutes. Total 200 continuous foot placements were used to generate the 95%
confidence ellipse plots. The dependent variables were the area, the length of the long axis (anterior-posterior direction), the length of the short axis (medial-lateral direction) of 95% confidence ellipse. A two-way mixed repeated ANOVA was used for each dependent variable (3 walking conditions x 2 age groups).

Significant interactions between the effect of inclination and the effect of age were found in the area of 95% confidence ellipse (F2, 74 = 9.286, p < 0.0001), in the length of the long axis (F2, 74 = 9.786, p < 0.0001) and in the length of the short axis (F2, 74 = 19.257, p < 0.0001). Pairwise comparisons showed that the area, length of the long axis, and length of the short axis were higher in the old population than in the young population, particularly when walking on the uphill treadmill.

Walking on the inclined treadmill required extra active control in both the anterior-posterior and the medial-lateral directions in young and old adults. This result was in line with previous studies that walking on the inclined surface requires extra neural control.

ABSTRACT #36

Supra-Threshold Plantar Stimulation Enhances the Strategy of Obstacle Avoidance

Huiyan Song, Ka-Chun Siu, Jung Hung Chien. Physical Therapy program, Department of Health & Rehabilitation Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: An intact plantar sensation can send environmental information to the central nervous system and help with the decision of balance control. Previous research has found that applying plantar stimulation enhances balance control during standing and walking in elderly people and patients with balance disorders. However, the knowledge of applying plantar stimulation during stepping over an obstacle is still limited, although tripping over an obstacle is a common reason for falling.

Purpose: This study investigated the influence of the supra-threshold and the sub-threshold plantar stimulations on the strategy of obstacle avoidance.

Methods: Nineteen healthy young adults (age: 25.84 ± 3.35 years) performed fifteen walking tasks consisting of stepping over an obstacle in three conditions (without, with the sub-threshold, and with the supra-threshold stimulation) in a randomized order. The dependent variables were the height of toe clearance in both legs, the distance of obstacle-to-heel-contact of the leading leg, the distance of toe-off-to-obstacle of the trailing leg, and the integrated foot pressure.

Results: As compared to the sub-threshold stimulation and no stimulation, the supra-threshold stimulation on the plantar area increased the height of toe clearance of the leading leg (p < 0.05) and toe-off-to-obstacle distance the trailing leg (p < 0.001). The supra-threshold stimulation also significantly increased the integrated foot pressure in both legs compared with no stimulation (p < 0.001 for both legs) and in the trailing leg compared with the sub-threshold stimulation (p = 0.012).

Conclusion: In this study, the strategy of obstacle avoidance in healthy young adults was enhanced by the supra-threshold plantar stimulation. We speculated that providing the supra-threshold stimulation perturbed the plantar area’s sensation but induced other proprioceptive sensory systems to compensate for the inaccurate plantar sensation. This speculation was supported by the increase of the toe clearance and the foot integrated pressure.

ABSTRACT #37

Stroke Diagnosing and Treatment

Sarah Hawk. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Every four minutes someone in the United States dies from a stroke and those who don’t die struggle from a long-term disability. Chronic high blood pressure, high cholesterol, smoking, obesity, and diabetes are common lifestyles that increase the chance of having a stroke. The prior facts are commonly preached and explained to society, but the process for diagnosing, treatment options, and the road to recovery is rarely talked about. Medical imaging contributes to locating and identifying the parameters of the cranial bleed. Treatment options that are currently available include anticoagulated medication and thrombectomy. A potential therapy option utilizes sonolysis to break up the clot. Research is still being done about this technique rendering its application to hospitals’ stroke protocols. The following content will review the involvement of medical imaging in the diagnostic process and explore the current and future treatment options for stroke patients.

ABSTRACT #38

Hirschsprung’s Disease: An Abnormal Congenital Disorder

Natalie Stewart. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The different types of Hirschprung’s Disease, the etiologies, diagnosis, and treatment of the disease are provided to inform future radiologic technologists of a certain disease that can be seen in x-ray. Scholarly articles were used to obtain information on Hirschprung’s Disease to formulate a basic understanding of what the disease is and how to go about diagnosis and treatment of this specific disease. With there being two main types of treatment of Hirschprung’s Disease, there has been evidence that the results of being able to overcome
this disease are more than likely to happen with these treatments. Hirschsprung’s Disease is a congenital malformation of the large intestine that can be found shortly after birth. This information will be useful for imaging professionals to detect, diagnose and treat this congenital disorder. It is easy to detect, usually, and treatments have been found to fix this abnormality.

**ONCOLOGY**

**ABSTRACT #39**

Re-evaluation of the Efficacy of Endobronchial Ultrasound Guided Staging Procedures in Identifying Metastasis

Sarabeth Haws, Enrique Martinez, David Mckemie.
Cytotechnology program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: Sonora Quest Laboratories, Phoenix, AZ

Introduction: With the shortage of healthcare professionals and the high costs of healthcare, it is worthwhile to re-assess procedures for more targeted and less costly procedures. The Endobronchial Ultrasound (EBUS)-Guided Fine Needle Aspiration (FNA) procedure is considered to be the standard of care for assessing the cause of lymphadenopathy in mediastinal and hilar lymph nodes. This study was aimed to retrospectively re-evaluate the effectiveness of the EBUS procedure at catching lymph node metastasis. Specifically, it looked at whether there was a difference in the procedure’s effectiveness between patients with no previous cancer history and patients with previous cancer history. Effectiveness of the EBUS procedures was determined by diagnostic accuracy. Procedures were determined to be ineffective when lymph node metastasis was detected in follow-up procedures after an initial negative diagnosis.

Methods: Data for this study was obtained from FNA procedures performed at Banner Gateway Medical Center during 2018. 163 EBUS procedures were filtered for evaluation. Cases were excluded if there was a history of granulomatous inflammation, the specimen was inadequate, or if the patient had an EBUS performed earlier in the year. This brought the total to 137 cases. The data was analyzed categorically according to effectiveness across the following different groups: history of lung cancer, undiagnosed lung mass, history of cancers with other primaries.

Results: The results indicated that the EBUS procedures were effective over all, but the most effective procedures had a cancer history that was not of lung origin. These procedures yielded a 100% diagnostic accuracy amongst 44 patients. Out of 24 total patients that presented with undiagnosed lung masses and no previous cancer history, only one patient was diagnosed with metastasis on follow-up (96% diagnostic accuracy). The least effective procedures overall were performed on patients with a history of lung cancer, with 91% diagnostic accuracy amongst 60 patients.

Conclusion: Re-evaluation of EBUS procedures may prove beneficial in determining if there is lowered effectiveness in patients with a history of lung cancer. The implications of this re-evaluation could provide interventional pulmonologists with data to assist in selecting lymph nodes with higher diagnostic accuracy.

**ABSTRACT #40**

Rapid On-Site Evaluation and its Effect on Specimen Adequacy in Fine Needle Aspiration Procedures

Karleen King. Cytotechnology program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: Sonora Quest Laboratories, Phoenix, AZ

Introduction: Rapid on-site evaluation (ROSE) of fine needle aspiration (FNA) procedures has become increasingly common as a way to ensure diagnostic specimens are being collected in real time. Immediate feedback is provided to the performing clinician about the adequacy of the specimen and procedures can be modified if sufficient material is not being collected. However, even with ROSE, some thyroid specimens continue to be deemed inadequate despite communication with the clinician and multiple additional passes. The purpose of this study was to gather data on thyroid procedures and determine how often the feedback of inadequacy of a specimen from the cytotechnologist resulted in an adequate specimen after subsequent passes.

Methods: This study retrospectively examined FNA procedure worksheets from 2 Sonora Quest lab affiliated hospitals in Phoenix, Arizona. Between August 2020 and March 2021 there were 60 thyroid procedures that were included in this study. In total, 42 cases came from Banner University hospital and 18 cases came from Banner Gateway Medical Center’s outpatient clinic. The type of procedure, number of Diff Quick slides reviewed, preforming clinician, and adequacy statement were recorded in a spreadsheet.

Results: It was determined that the majority of cases were considered adequate at both sites. Of the FNAs performed at Banner Gateway, 5/18 (27.8%) procedures resulted in an inadequate specimen based on the initial ROSE from the performing cytotechnologist. While FNA procedures performed at Banner University resulted in an inadequate specimen initially in 4/42 (9.5%) of cases. The adequacy of the 5 cases performed at Banner Gateway did see some improvement after the initial ROSE, with only one case called completely not adequate in the end. However, review of the subsequent passes continued to render an inadequate specimen in all 4 of the cases from Banner University even after ROSE and additional passes were performed.

Conclusion: As with any FNA it is ultimately up to
the pathologist to determine if the sample is diagnostic when they review the case as a whole. However, cytotechnologist and ROSE can help provide real time adequacy information to help guide clinicians in collecting the best possible specimen for diagnosis.

**ABSTRACT #41**

**A Comparison of Urine FISH and Urine Cytology in Bladder Cancer Detection**

Sara Linstead, Oluchi Mbawuike. Cytotechnology program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: ProPath, Dallas, TX

Introduction: Urine cytology and urine FISH are both FDA approved tests for detecting urothelial carcinoma, but both have their own drawbacks. Urine cytology results have been plagued with false positives before the implementation of the Paris system, causing lower sensitivity rates. Urine FISH tests are limited by detecting only samples that show specific chromosomal alterations and by their binary reporting (positive or negative). Alternatively, urine cytology can report a range of results. The purpose of this study was to compare the ability of urine cytology using a modified Paris system and Propath’s in-house manufactured urine FISH test to detect urothelial carcinoma. This would be informative for whether Propath should continue their policy of using urine cytology as the primary urine screening test and utilizing urine FISH as a reflex test for any cases with abnormal results.

Methods: Using Propath’s database, a search for samples with a urine FISH test and urine cytology test was performed. Samples with adequate results for all tests within the last two years (2019 and 2020) yielded a population of 119. Case results were then categorized into positive or negative results for each corresponding test. A result of atypical or above was placed in the positive category.

Results: The sensitivity and specificity of both urine cytology and urine FISH tests were evaluated by comparing these results to the corresponding pathology results. It was found that urine cytology results were more sensitive than urine FISH (84% vs 61%). However, urine FISH had a higher specificity than urine cytology (89% vs 84%).

Conclusion: Propath uses a modified Paris system in the diagnosis of urothelial carcinoma which has shown an improved diagnostic precision for urothelial carcinoma when compared to FISH diagnosis. Urine FISH has a lower sensitivity in detecting low grade lesions and has higher false negative results due to its specific chromosomal alteration requirements. This study demonstrates that urine cytology has a higher sensitivity and slightly lower specificity for detecting urothelial carcinoma when compared to FISH analysis. However, detection of urothelial carcinoma is optimal when FISH analysis is used as a reflex test after an abnormal cytology result.

**ABSTRACT #42**

**Investigating Correlations between Fluid Cytology Interpretation and the Corresponding Cell Block Findings with the Aid of Immunohistochemical Stains**

Bethany Slobodzian. Cytotechnology program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: Blanchard Valley Hospital Findlay, Ohio.

Introduction: Cytologic evaluation of body cavity fluids in the clinical setting is essential to evaluate the presence of pathological disease. While pap-stained cytology slides alone can produce diagnostic results, often the accompanying additional cell block is necessary to more accurately determine malignancy.

Methods: This was a two year (2019-2020) retrospective study. A Cerner application was used to select cases previously diagnosed as benign, atypical, suspicious, or malignant at Blanchard Valley Hospital in Findlay, Ohio. This data retrieval process resulted in 318 cases. These cases were reviewed for discrepancies between the cytologic findings on Thin-Prep and the concurrent cell block diagnosis, particularly with the use of immunohistochemical stains.

Results: A total of 318 cases were reviewed and 134 cases yielded a cell block. Of these 134 cases, 26 had discrepant diagnoses between the Thin-Prep pap-stained interpretation and additional cell block slides. All 26 cases with discrepancies used immunohistochemical staining to aid in diagnosis. Furthermore, immunohistochemical staining was used on 90 of the 134 specimens that produced a cell block. Effectively 67% of the cases required immunostains to help make a diagnosis.

Conclusion: This retrospective study confirmed the importance of cell blocks in making an accurate diagnosis, especially for the purpose of special stain assistance. Cell blocks are a vital part of the diagnostic process and every effort should be made in producing one from evaluated cytology fluid cases.

**ABSTRACT #43**

**A Case Study of Medullary Sponge Kidney**

Ashlynn Gates. Diagnostic Medical Sonography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Medullary sponge kidney (MSK) is a congenital disorder that occurs when small cysts form on the tubules of the kidney in the medulla. These cysts can reduce the outward flow of urine from the kidneys. MSK most commonly affects both kidneys; approximately 75% of cases are bilateral. It affects women more commonly than men and occurs in young to middle age adults. MSK is a benign disorder that is usually asymptomatic, but it can lead to other problems, such as urinary tract infections and
kidney stones. The most common imaging studies done to diagnose MSK are intravenous pyelogram, Computed Tomography (CT), and ultrasound. This exhibit will review a case study of MSK and discuss the etiology, sonographic findings, treatment, and diagnosis.

ABSTRACT #44
The Path to Freedom - Cryptorchidism
Sabrina Salas. Diagnostic Medical Sonography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Cryptorchidism is characterized by the absence of at least one testicle from the scrotum. This condition occurs when the testis fail to descend from the abdominal cavity through the inguinal canal, which is located in the lower anterior abdominal wall, and into the scrotum. Ultrasound imaging is the modality of choice to diagnose an undescended testis by evaluating the scrotum and surrounding area to prove its location. The objective of this poster is to provide relevant information on the diagnosis of cryptorchidism, etiology and the associated risks, and the treatment options to manage the condition. Additionally, a case study of cryptorchidism and its location will be discussed in detail.

ABSTRACT #45
The Association between Serum Vitamin D Levels and Bone-Related Outcomes in Patients 100 Days Post-Bone Marrow Transplant
Raelyn Haubensak1, Mariah Jackson1, Rachael Schmidt2, Jana Wells1, Megan Timmerman1, Corrine Hanson1.
1– Medical Nutrition program, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, 2– Cancer Service Line, Nebraska Medicine, Omaha, NE

Background: Bone marrow transplants (BMT) can have adverse outcomes, including low bone mineral density (BMD). However, little research has investigated the association of vitamin D status and bone-related outcomes in patients after BMT. Therefore, this study aims to describe the association between vitamin D status and bone-related outcomes in patients +100 days post-BMT, along with treatment practices that may affect vitamin D status.

Methods: This retrospective chart review examined 149 BMT patient records and determined the relationship between serum 25(OH)D concentration and DXA T-scores using linear regression, correlation coefficients, and Chi-square tests. Chi-square tests were used to determine the association of vitamin D status and various categorical risk factors.

Results: The mean 25(OH)D concentration for the study population was 36.46 ng/mL. Over 60% of subjects had DXA T-scores that corresponded to a normal BMD. There was no significant association between 25(OH) D concentration and DXA T-scores. Vitamin D status was significantly associated with age (p=0.01), diagnosis (p<0.01), transplant type (p<0.01), immunosuppressant use (p<0.01), vitamin D supplementation (p=0.01) and amount (p=0.04), calcium supplementation (p=0.02) and amount (p=0.05).

Conclusion: Risk factors are present post-BMT that may affect vitamin D status. However, the role that vitamin D plays in maintaining adequate bone mineral density in this population is unclear. Cross-sectional studies with larger sample sizes, stratification by transplant type, and increased length of time post-BMT should be conducted to further assess this association.

ABSTRACT #46
Benefits of Prone Irradiation in Large Breasted Women
Katelyn Backhaus, Jalen Jole, Patrick Moeller. Radiation Therapy program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Placing a patient in the prone position for breast treatments was a method introduced for larger breasted women. This position allows gravity to control the breast and pull it away from the chest wall. The hanging breast increases separation between the chest wall and the treatment field allowing the angle of the beam to be flexible. This technique also reduces breast thickness; thereby decreasing inhomogeneities and the need for beam modifiers. Treating breast cancer in the prone position has also shown to decrease the acute and possible late toxicities to the heart and lung field. The prone set-up equipment allows the opposite breast to be placed out of the treatment field, as well. The hanging breast also reduces skin folds, which can help reduce the severity of side effects such as dermatitis or desquamation. Prone treatments result in a significantly smaller dose to the contralateral breast as well as other critical structures.
ABSTRACT #47

Benefits of Using SpaceOAR Hydrogel in Prostate Radiation Therapy Treatment
Michaela McClellen, Caleb McGowan. Radiation Therapy program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Radiation therapy is one of the best treatment options for prostate cancer. The intensity-modulated radiation therapy (IMRT) treatment field is very precise and offers a greater survival rate in patients with low-stage prostate disease and helps minimize treatment-related side effects. Patients undergoing prostate radiation treatment commonly experience adverse events during treatment or within 3 months of treatment completion called rectal toxicities. These side effects tend to go away on their own with time, commonly up to 90 days after completing radiation treatment. Late radiation-induced rectal toxicities are considered symptoms that persist or develop past 90 days after radiation therapy treatment ends. The use of SpaceOAR helps reduce late toxicities. It is a hydrogel spacer that can be surgically inserted prior to prostate radiotherapy. This is achieved by creating an artificial space between the prostate and rectum to reduce common toxicities such as diarrhea, proctitis, and rectal pain. This spacer will maintain its shape for three months while the patient is undergoing radiotherapy. After the treatment is finished it undergoes hydrolysis, liquefaction, and then is absorbed into the bloodstream and cleared via renal function. The combination of using SpaceOAR along with IMRT enables a high dose of radiation to be help reduce late toxicities.

ABSTRACT #48

Hepatic Epithelioid Hemangioendothelioma: The Cancer that Only Strikes 1 in a Million
Gracie Grote. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Hepatic epithelioid hemangioendothelioma (HEH) is a rare malignant tumor located in the vascular origin of the hepatic region of the human anatomy. HEH has an unknown etiology and can be treated with few therapeutic strategies. This study is of great significance because it brings HEH to light and informs readers of the rarity of the disease as well as provides statistical information regarding this malignancy. The primary objective of this exhibit is to introduce and define hepatic epithelioid hemangioendothelioma by including statistics, symptoms, diagnosis, and treatment.

An ultrasound diagnostic image of the malignancies within the liver, a photo of a cadaver liver showing the gross anatomy of HEH tumors and photomicrographs revealing the cells within the central portion of a tumor are highlighted.

ABSTRACT #49

Prostate Cancer
Karlee Hall. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Prostate cancer is the most common cancer in men and a leading cause of death in cancers. There is no known information on the exact cause of prostate cancer, despite the many research. Prostate cancer has many ways to be able to diagnosis it as well as treat it. It is studied that diet is a root to the tumor growth. There is ongoing research that a certain diet can help prevent prostate cancer. It is important to know the prevention, diagnosis, symptoms, and treatment options for prostate cancer, as it is the most common cancer in men. There is a high number of deaths when it comes to prostate cancer, however there is a huge survival rate as well. New treatments for prostate cancer have been implemented over the years and have been successful. Doctors play a vital role in education to help patients understand prostate cancer, the prevention, and the treatments.

ABSTRACT #50

Rotationplasty as Treatment for Osteosarcoma
Wayne Howell III. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Osteosarcoma is a bone cancer that derives from osteoblasts that have mutated to grow rapidly with no pattern, which turns into a tumor. Patients suffering from this bone tumor tend to present to their doctor with bone or joint pain, swelling, and occasionally fever and secondary anemia. Diagnostic imaging can be utilized to identify the tumor location, the specific type of lesion, and how it affects the bone. Osteosarcoma generally affects children and young adults with most of the tumors occurring in the distal femur. Treatment options include chemotherapy and tumor resection combination, amputation, or rotationplasty. Rotationplasty was initially utilized in 1981 as a reconstructive technique for patients suffering from bone deficits. The procedure consists of taking the distal part of the leg rotating it 180 degrees and fixating it to the remaining proximal portion of the leg, causing the reversed ankle to function as a knee. Patient outcomes from this procedure tend to be more beneficial than with an above-knee amputation leading to a better quality of life and functionality.
Osteosarcoma
Kylie Schnell. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Osteosarcoma is the most common bone sarcoma. It affects approximately 560 children and adolescents annually in the United States. There is a greater incidence of new diagnoses of this cancer seen in the second decade of life due to the rapid bone turnover during adolescent growth. It commonly affects areas that undergo rapid turnover, including the distal femur, proximal tibia, and proximal humerus. There are a wide variety of signs and symptoms for osteosarcoma. This bone cancer can be diagnosed by using a wide range of imaging modalities including x-ray, computed tomography, magnetic resonance imaging, as well as positron emission tomography. A biopsy will generally be done to test the affected area. Treatment usually includes preoperative chemotherapy, surgical resection of the tumor, followed by postoperative chemotherapy. When it comes to the resection of the tumor, a limb salvage procedure will likely be utilized in order to allow for optimal quality of life for the patient.

Pituitary Adenomas
Caty Weber. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Pituitary adenomas, although non-cancerous, can be detrimental to a person’s health in many ways but go undetectable causing health problems resulting with treatments that can be lifelong. The purpose of this research poster is to inform readers and imaging professionals about pituitary adenomas. The information depicted through the etiology, diagnosis, and treatment of pituitary adenomas described important signs and useful information for healthcare providers and patients. Pituitary adenomas are one of the most common types of pituitary tumors. These adenomas are often detected through imaging techniques.

The effects of diet education on empowerment for individuals who have an increased risk for developing breast or colon cancer
Kaitlyn Tlusty¹, Mariah Jackson², Bronson Riley³, Terri Blase⁴. ¹ – Genetic Counseling program, ² – Medical Nutrition Education, Department of Medical Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE, ³ – Southeast Nebraska Cancer Center ⁴ – Munroe-Meyer Institute for Genetics and Rehabilitation

Strong evidence indicates following a healthy diet is protective against cancer development, however the psychological impact of diet education on cancer genetic counseling patients has not been evaluated. Study participants included patients who had met with a cancer genetic counselor without a history of cancer. Participants received pre- and post-diet education surveys including questions to measure empowerment, likelihood to make lifestyle changes, and feedback for diet education in relation to cancer risk. Empowerment was measured using a ten-question survey adapted from the Genetic Counseling Outcome Scale (GCOS), validated to measure empowerment in clinical genetics settings. The diet education consisted of an infographic based on World Cancer Research Fund and American Institute for Cancer Research guidelines for diets that are protective against developing cancer. Twenty-eight participants completed both surveys and reviewed the diet education intervention. There was no change in empowerment between pre- and post- diet education (mean change = -0.5; p = 0.49). Participants previously learned about the relationship between a healthy diet and cancer protective benefits from several sources including family and friends (25.0%), online (25.0%), and primary care providers (25.0%). Most participants preferred diet education to be delivered online (42.9%), followed by on paper (39.3%), and in-person delivery (17.9%). This pilot study promotes further investigation on the impact of diet or lifestyle education on individuals who have an increased genetic risk for disease. While the results demonstrated no change in empowerment because of diet education, the results established a desire for learning about a healthy diet related to cancer risk, preferences for the modes of delivering education, and the need for evaluation of different diet interventions to promote empowerment.
ABSTRACT #54

**Treating Alzheimer’s Disease with MR Guided Focused Ultrasound**

Michael Gries. Radiography program, Department of Clinical, Diagnostic, & Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Alzheimer’s disease is a degenerative disease that breaks down the white matter and neurons of the brain. This destruction of brain tissue leads to impaired cognitive abilities and changes in behavior. The search for a cure for Alzheimer’s has been researched in depth, however, magnetic resonance guided focused ultrasound treatment has been hypothesized as an effective treatment because it can help to open the blood brain barrier non-invasively, allowing for entry to the brain where beta amyloid plaque build ups can cause Alzheimer’s. This exhibit dives into the causes and the physiological effect of Alzheimer’s. It then explores studies utilizing magnetic resonance guided focused ultrasound. Results found that successful opening and closing of the blood brain barrier can be paired with anti-amyloid medications to improve neural pathway formation and spatial recognition.

ABSTRACT #55

**Melanoma – a Literature Review**

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Melanoma is the second most common form of cancer for young people ages fifteen through twenty-nine. It is the most serious type of skin cancer that develops in the cells that produce melanin. Melanoma begins in melanocytes, which produce pigment known as melanin. Melanin gives skin its color. Melanoma can develop from overuse of tanning beds or overexposure to the sun. DNA is damaged from the ultraviolet rays that come from the sun or tanning beds. When the DNA is damaged, it causes changes or mutations in the melanocytes resulting in uncontrolled cellular growth, this leads to melanoma. Melanoma can be identified by irregular mole shapes or spots on the body. Surgical removal and excision of the melanoma are the two most common ways to treat melanoma. By using alternative methods like self-tanners and limiting the amount of expooure to UV rays can be ways to avoid melanoma.

ABSTRACT #56

**The Role of Imaging in Diagnosing Rheumatoid Arthritis**

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Rheumatoid arthritis is an autoimmune disease that damages the body, primarily at the joints. Like any autoimmune disease, the body attacks itself with pro-inflammatory cytokines that are activated by macrophages. These cytokines can lead to swelling, pain, and stiffness in the affected areas. The current literature states that there is no known cause for rheumatoid arthritis, but it is known that it can be genetic. In order to be diagnosed with this disease, imaging is required. It has been found that x-ray is best utilized when examining patients who are suffering from advanced stages of this disease. Magnetic resonance imaging and sonography, however, have been found most affective with earlier stages. Treatment options are available and are dependent on patient status. To properly help manage and treat patients with rheumatoid arthritis, it is imperative to understand what it is, what it looks like, and how to best treat it.

PROFESSIONAL PRACTICE AND EDUCATION

ABSTRACT #57

**Consequences of Splitting Small Tissue Biopsies from Cytology Specimens**

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Introduction: Until recent years, both Fine Needle Aspiration (FNA) and Fine Needle Biopsy (FNB) specimens were processed as cytology specimens. Tissue triage of FNB to cytology versus histology has become controversial. In the last few years, FNB specimens have been redirected to the histopathology department. Splitting of FNA and FNB specimens from a single biopsy procedure can give rise to several problems that can impact patient care.

Methods: A retrospective study analyzed all FNA/FNB performed between January, 1st 2019 and March, 31st 2019. Diagnoses and ancillary studies were compared between the split (between cytology and histology) FNA and FNB specimens. Cases were classified as concordant or discordant based on diagnosis. Discordant cases were further subclassified as minor (specificity of diagnosis) or major (different diagnosis). The use of ancillary studies was assessed for redundancy and optimal tissue used.
Results: The study cohort consisted of 244 patients, with 232 (74.4%) having split FNA and FNB specimens from the same lesion (joined cases) and 12 (3.8%) having split FNA and FNB specimens obtained from different tissues from a single procedure (disjoined cases).

Of the 232 joined cases cohort, 154 (64.4%) cases were concordant, and 78 (32.6%) cases were discordant. Of the discordant cases, there were 37 (15.5%) minor and 41 (17.1%) major discrepancies. Ancillary studies, in case of the joined cohort, were redundant in 5 (2.2%) and not performed on the most optimal tissue in 2 (0.9%) cases.

The analysis of the 12 disjoined cases revealed that 5 (29.4%) cases were concordant, and 7 (41.2%) cases were discordant. Of the discordant cases, there were 4 (23.5%) minor and 3 (17.6%) major discrepancies. Ancillary studies were redundant in 3 (17.6%) cases and not performed on the most optimal tissue in 1 (5.9%) cases.

Conclusions: Splitting FNA from FNB resulting in two separate reports from cytopathology and histopathology from a single biopsy procedure may result in discordant diagnostic reports and cause redundant use of hospital resources, which may not be performed on the most optimal tissue.

ABSTRACT #58

Evaluating AUS Thyroid Cases: defining cytologic criteria that is characteristic of a benign Afirma result
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Introduction: The Bethesda System has diagnostic categories when evaluating thyroid specimens cytologically. Atypia of Undetermined Significance (AUS) is used for specimens that contain cells with architectural and/or nuclear atypia that are not sufficient to be classified into higher malignant or neoplastic potential categories. Because AUS is not a definitive diagnosis, the suggested interpretation rate limit is 10%. Afirma is a gene expression classifier that determines the likelihood that thyroid specimens are benign and is helpful when evaluating AUS cases. Benign Afirma results can save the patient from additional FNAs or a lobectomy. The goal was to determine which of the criteria were more characteristic of a benign Afirma result.

Methods: This was a retrospective study, using a subset of data consisting of patients who were diagnosed with AUS following a Fine Needle Aspiration Biopsy of the thyroid at Carle Foundation Hospital from January 3, 2019 to February 28, 2020. Cases without Afirma results were excluded. An excel spreadsheet was created that listed 49 cytologic criteria highlighted in The Bethesda System. Ninety-nine cases were screened while using the spreadsheet to track criteria. After screening all the cases, the cases were separated by their Afirma result category, with 77 being Benign and 22 being Suspicious.

Results: There was not a criteria that fit exclusively into one group, however several criteria occurred at a higher frequency for cases with a benign Afirma result. When reviewing the AUS criteria as a whole, only 10% of the cases were found to be of high cellularity, and 63% presented with cyst content. Only four cases were both highly cellular and contained cyst content; of those all had benign Afirma results.

Conclusion: There was no single criteria that correlated with a benign result. A common finding for AUS cases at Carle was an abundance of cyst content accompanied by low cellularity. This may lead to further studies on the correlation between thyroid specimen collection techniques and the incidence of AUS cases.

ABSTRACT #59

Benign Myoepithelial Neoplasm: A Case Study
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The purpose of this case study is to evaluate a middle aged patient with a benign myoepithelial neoplasm of the parotid gland. The parotid gland is a major salivary gland. A benign myoepithelioma is a salivary gland tumor that occurs in the oral cavity of the head and neck region. Myoepitheliomas account for approximately 1% of all salivary neoplasms. The most commonly affected site is the parotid gland, accounting for 40% of all benign myoepithelial neoplasms. This case involves a patient who presented with facial numbness and tingling. They received a soft tissue neck ultrasound examination and were later referred to have an interventional biopsy procedure. The biopsy revealed a benign myoepithelial neoplasm of the parotid gland. This research analysis will assess the etiology, signs, symptoms, sonographic appearance, treatment, and prognosis of benign myoepitheliomas.

ABSTRACT #60

Thyroid Nodule Case Study: Classification, TI-RADS, and Management Following Ultrasound Imaging
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In a general ultrasound department, a Diagnostic Medical Sonographer could scan up to three thyroid exams per day. Ultrasound is an efficient and diagnostic way to assess the thyroid and pathology associated with the gland. A patient was imaged via Computed Tomography and the report described a thyroid nodule visualized on
the exam. The patient was then sent for an ultrasound to further investigate and classify the nodule. TI-RADs is a standardized system for classifying thyroid nodules based on sonographic appearance. TI-RADs classifies nodules from levels 1-5: from benign to highly suspicious for malignancy. TI-RADs are based off of a point system: composition, echogenicity, shape, margin, and echogenic foci. The patient’s nodule was classified as a TI-RAD level 3, with recommendation for a Fine Needle Aspiration (FNA). This case study will describe the sonographic appearance, treatment, and classification of thyroid nodules.

**ABSTRACT #61**

**Perceived Social Support: A Study of Genetic Counseling Graduate Students in the United States and Canada**

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Social support is described as having positive psychological and physical outcomes and even protective benefits against mental illness. Social support available to genetic counseling graduate students has not been previously evaluated, though this population is prone to elevated levels of stress in addition to field-specific phenomena like compassion fatigue and burnout. To examine this population, an online survey was distributed to genetic counseling students in accredited programs within the United States and Canada to gain information about 1) demographic information, 2) self-identified sources of support, and 3) the availability of a strong social support network. Two hundred thirty-eight responses were included in the analysis, yielding a mean social support score of 3.84 on a 5-point scale, where higher scores indicate increased social support. The identification of friends or classmates as forms of social support significantly increased social support scores (P<0.001; P=0.006, respectively). There was also a positive correlation between increased social support scores and the number of social support outlets (P=0.01). Social support scores were higher for second-year students than for first-year students, and the difference reached borderline significance. Post hoc analysis focused on potential differences in social support for minority participants (comprising less than 12% of participants), revealing that this population identified friends significantly less than their white counterparts, and mean social support scores were also significantly lower. Our study underscores the importance of classmates as a source of social support for genetic counseling graduate students while uncovering discrepancies that exist in social support sources for white and minority students. Stakeholders in genetic counseling student success should prioritize fostering a community and supportive culture within a training program (whether traditionally in-person or online) to encourage support amongst students.

**ABSTRACT #62**

**Describing the patient population, indications for referral, and post-visit recommendations made in a general adult/pediatric genetic counseling clinic**

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In 2018, the Munroe-Meyer Institute of Genetics & Rehabilitation at the University of Nebraska Medical Center in Omaha, NE created a genetic counseling clinic as a way to increase access to care and decrease clinic wait time for patients. In this service delivery model, genetic counselors can see patients autonomously or with geneticists being an advisor rather than a primary provider. Additional descriptions of these newer clinics are necessary to understand what patients can be seen and what recommendations are given in a genetic counseling clinic. We conducted a chart review of 109 patients seen in this clinic from November 1, 2018 through March 16, 2020 to analyze the patient population, indications for referral, and post-visit recommendations. We found the patient population of the clinic to primarily be non-Hispanic White (79.8%), female (65.1%), with an adult visit type (54.1%). We found that the primary indications for the clinic were review of previously ordered genetic testing (43.2%), coordination of genetic testing for a known familial variant (30.2%), and concerns for personal or family history suspicious of a genetic condition without dysmorphic features (24.8%). The most common post-visit recommendation made by genetic counselors in this clinic was genetic testing order (56.1%) followed by a specialist referral (26.5%). These specialists mainly included endocrinology (n=5), neurology (n=4), cardiology (n=4), ophthalmology (n=3), and audiology (n=3). This study identifies that the genetic counseling clinic model may be appropriate for patients with 1) genetic test results requiring interpretation 2) a known familial variant or 3) a personal or family history suspicious of a genetic condition, without dysmorphic features. The study also highlights genetic testing and specialist referrals as common post-visit recommendations made by genetic counselors in an autonomous clinic setting.
Genetic Testing Methodologies and The Patient-Genetic Counselor Relationship
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The emergence of direct-to-consumer (DTC) and consumer-driven genetic testing options has allowed consumers to learn about their risk for hereditary breast cancer in more accessible and affordable ways. With these self-ordered (SO) options, genetic counselors may or may not be involved to help patients interpret results. For those patients who meet with a genetic counselor, the potential impact of testing modality on the patient-genetic counselor relationship is not known. To assess this relationship, a mixed-methods survey utilizing the Genetic Counseling Satisfaction Scale (GCSS) and Genetic Counseling Outcome Scale (GCOS) was administered to breast cancer support groups and a total of 118 participants completed the survey. There were no observed differences between the provider-ordered (PO) and SO groups, except that PO participants were more likely to agree that they did not know who else in their family might be at risk (p=0.04). Responses to the question, “How would you describe your experience with the genetic counselor?” were thematically analyzed and coded. The qualitative themes that emerged from this study included gaining knowledge, care management, psychosocial support, and communication with others. Gaining knowledge was the most prevalent theme for all participants suggesting this is valued by both groups. These findings propose that even though there is not an observed statistical difference between the two groups, participants viewed the session with their genetic counselor positively when helpful information was received. Additionally, participants who reported their background knowledge in alignment with the information provided by their genetic counselor viewed their experience positively. Since genetic counselors may not always be involved with SO testing, the responses provided in this research suggest that participants value seeing a genetic counselor regardless of how genetic testing was obtained.

Presence of Discharge Summary Recommendation Impacts Outpatient Genetics Follow-Up for Patients in a Level IV NICU
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Patients seen in the neonatal intensive care unit (NICU) for genetics consultation often need to be seen for follow-up within the first year of life. This follow-up appointment is critical for establishing a diagnosis, directing care based on a known genetic condition, or evaluating growth and development of the child. There is a lack of standardized recommendations specific to patient phenotype, which leaves follow-up recommendations up to the genetics team’s discretion. The current rate of patient follow-up from an inpatient setting to an outpatient genetics appointment in the United States is unknown. We conducted a retrospective chart review for 171 neonates who received a genetics consult while admitted to the NICU at Children’s Hospital and Medical Center, Omaha between January, 2017 and December, 2018. We reviewed whether genetics recommendations were stated in the discharge summary, follow-up outcome, and patient mortality. In total, 48% (66/138) of patients followed-up with the genetics team in an outpatient setting, excluding 33 patients that passed away within the study period. The majority (67%) of neonates who had a recommendation to follow-up listed in the discharge summary followed-up. Of the 72 patients that did not, 42% did not have any genetics follow-up recommendation in the discharge summary. We also reviewed phenotypes for patients who did not follow-up and whose discharge summary did not include any follow-up recommendation. The majority of these patients were found to have an isolated congenital anomaly (n=16). Other phenotypes included multiple congenital anomalies (n=8), aneuploidy (n=3), dysmorphic features (n=2), and seizures (n=1). This study highlights clarity of discharge summary recommendations as a potential moderator of outpatient genetics follow-up from an inpatient setting. In addition, it suggests the importance of additional discourse regarding which inpatients should follow-up in an outpatient setting.
Factors Influencing a Genetics Referral: A Comparison Between Rural and Urban Providers in Nebraska
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Primary care providers oversee routine care of their patients, as well as determine when to make genetics referrals. Genetic services can be essential for children who experience a variety of health concerns without a known cause. Recent studies have shown that there are challenges to a genetics referral, including access to genetic services, financial concerns, and questions on when to refer. These concerns are what shaped the framework for this study. We assessed how frequently Nebraskan healthcare providers refer pediatric patients to genetic services and what barriers they may face.

Participants consisted of pediatricians, family physicians, nurse practitioners, and physician assistants. They completed an online survey that assessed if the provider had ever referred to genetics specialists, indications for referral, referral frequency, and perceived barriers. In total, 13 participants were included in this study (10 urban, 3 rural). Almost all providers (92%, n=12) had referred a patient to genetic services at some point in their career, 8 within the last year. The most common indications for referral were growth and learning concerns. Barriers that seemed to occur more frequently for rural providers included “lack of patient interest,” “distance from genetic services,” and “unclear referral process.” One rural and two urban providers indicated that the unclear referral process to genetics in Nebraska was the barrier that prevented them from referring most often. Strategies to reduce barriers to make genetics referrals for Nebraska doctors in rural and urban setting could include: 1) the use of genetic tools in the electronic medical record that provide alerts on when to refer, 2) improving inter-office communication with a patient referral form, and 3) increasing access to genetic telehealth appointments.

Improving Patient Comfort with New MRI Coil Technology
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Magnetic Resonance Imaging (MRI) has been used in practice for several decades. However, current research is aimed at improving image quality and patient comfort. Researchers have examined screen printed flexible coils that accomplish those qualities of image improvement and patient comfort, and many more. Newly created light and flexible MRI coils have been developed, leading to shorter scan times and increased patient comfort. In this study, five coils were fabricated using the same geometry but different materials and capacitors. Using these coils on infants and volunteers, researchers have found an increase in signal to image noise (SNR). The coils are integrated into a fabric which allows the coil to be wrapped comfortable around the patient, conforming to the shape and size of the anatomy being imaged. The closer the coil is to the patient, the better the image quality and the higher the signal gained from the coil. These coils are made of a flexible, lightweight material that allows the tech to place the coil are the specific body part being imaged. The flexibility and decreased weight of the coil increases patient comfort permits patients to remain in a stable position, more comfortably, for longer periods of time, which improves image quality and has the benefit of the patient not being burdened with heavy coils placed on them. Implementation of these coils into routine practice is potentially a cost-effective method to improve an imaging department’s ability to scan patients. Research has shown the coils’ images are diagnostic when read by a radiologist, suggesting that they are just as good or perhaps even better than standard coils.

Case Study Review of Capnocytophaga canimorsus in the Clinical Laboratory
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Capnocytophaga canimorsus is a capnophilic Gram-negative rod that is part of the normal gingiva flora in canines and felines. The organism can cause severe infections in immunocompromised individuals, such as post-splenectomy and diabetic patients. The purpose of this study aims to educate healthcare professionals about the organism’s prevalence and characteristics using a case study. A 59-year-old man with a history of Type II diabetes presented to his physician for treatment of a left ankle wound following a bite by his dog. A swab of the wound was sent to the laboratory for a routine wound culture. Due to the overgrowth of normal skin flora, the causative pathogen was not identified. Two days later, the man was admitted to the emergency department with a fever, joint pain, and loss of appetite. Blood cultures and a complete blood count (CBC) were collected upon admission. The following day, two of two aerobic blood culture bottles flagging positive. A Gram stain of the blood showed thin Gram-negative rods. A PCR multiplex panel for blood cultures was performed with results of
ABSTRACT #68

Indirect Calorimetry Vs Predictive Equations In Critically Ill Patients

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Background: Predictive equations are often used in place of indirect calorimetry (IC) due to cost and limited resources. However, these equations may not be as accurate as IC in estimating resting energy expenditure in critically ill patients, putting them at risk for inadequate nutrition. The purpose of this study was to describe the actual energy needs, as measured by IC, of critically injured patients and compare them with the results obtained by three calorie estimation formulas: (1) Mifflin-St Jeor equation, (2) Harris Benedict equation, and (3) the 25-30 kcal/kg/d ASPEN weight-based equation.

Methods: This was a retrospective chart review of adult patients admitted to Nebraska Medicine between March 1, 2019 and May 31, 2020 who had completed IC performed. All predictive equations were calculated using either patient admission actual body weight for BMI < 30 kg/m2 or ideal body weight for patients with BMI > 30 kg/m2. Statistical analysis was performed by using ANOVA, one sample t-test and Pearson’s correlation.

Results: Eleven patients met inclusion criteria. No significant differences were found between the predicted and measured energy requirements (p = 0.19). Pearson’s correlations indicated non-significant associations when HBE, MSJ and ASPEN equations were individually compared to IC (r= 0.49, p = 0.12; r= 0.43, p= 0.19; r=0.09, p= 0.77, respectively). Conclusion: This study supports the use of predictive equations to sufficiently measure a patient’s REE (resting energy expenditure) when IC is unavailable in order to minimize malnutrition in this patient population.

ABSTRACT #69

Handgrip Strength and Pulmonary Function in the Pediatric Cystic Fibrosis Population

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Background: In Cystic Fibrosis (CF), adequate nutrition promotes good pulmonary function and overall quality of life. Handgrip strength (HGS) has promise as an indicator for nutrition status and predictor of pulmonary function, with associations found in adult CF. The purpose of this study is to determine, in pediatric CF, if HGS is associated with pulmonary function, and if it is a better predictor compared to body mass index (BMI), the current nutrition measurement.

Methods: This is a cross-sectional, retrospective chart review of 48 pediatric patients followed at the Nebraska Regional Cystic Fibrosis Center, Pediatric Program. Associations between HGS, BMI, and pulmonary function measures (FEV1, FVC) were assessed using linear regression and adjusted for age and sex.

Results: Significant associations were found between HGS and percent predicted forced expiratory volume in one second (FEV1) and forced vital capacity (FVC) (β=1.347, p = 0.001 and β=1.278, p < 0.001, respectively). BMI was also significantly associated with percent predicted FEV1 and FVC (β=2.380, p = 0.033 and β=2.151, p = 0.027, respectively).

Conclusion: HGS was found to have a significant association to pulmonary function, however BMI remains a stronger predictor. These results support the continued use of BMI as a primary measurement for nutrition status in the CF population. HGS is a promising tool for clinic use and more research is needed to evaluate its efficacy within the pediatric CF population.

ABSTRACT #70

Physical therapy students’ perspectives on providing interprofessional telehealth patient care in a student-run clinic for the underserved

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Background: Many universities include interprofessional education (IPE) in graduate healthcare professional programs. The application of IPE in a real-world environment is a rare opportunity for students as educational programs are typically conducted in a controlled, simulated environment. The purpose of this
The novel SARS-CoV-2, or COVID-19 virus, has been manifesting in atypical ways, including dermatological and vascular ways. It is true that chilblain-like lesions or “covid toes” are the most common skin manifestations associated with COVID-19. Nonetheless, other type of lesions have also been reported in association with the virus. A reviewed of literature through PubMed/MeSH database for published articles and the medRxIV.org database for preprint articles was conducted for articles published between December 31st, 2019 and June 26th, 2020. There have been reported at least 6 different dermatological manifestations in patients with COVID-19: vesicular (varicella-like) lesions, Vasculopathic lesions, chilblain-like (“COVID-toes”) lesions; dermatitic, maculopapular and urticarial morphologies. It is imperative for medical providers to have a wide expectations in dermatological manifestations in COVID-19-positive patients.

**ABSTRACT #72**

**Pharmacogenomic Testing, A Guide for Treatment of Major Depressive Disorder**

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Pharmacogenomic testing is a growing field with potential to change how pharmacological treatments are prescribed. The following is a critical review of the current literature on using pharmacogenomic testing, primarily GeneSight Psychotropic Testing, as a guide for treatment of Major Depressive Disorder (MDD). A PUBMED search found 3 meta-analyses and 1 systemic review. Current Randomized controlled trials demonstrate improved efficacy when using pharmacogenomic testing versus unguided treatment in MDD. However, additional factors such as cost analysis and MDD disease remission should be investigated. In addition, controlled studies that are not funded by drug cooperations such as Assurex would help support the use of pharmacogenomic testing in MDD.

**ABSTRACT #73**

**Rate of Fatal Opioid Overdoses Per State Compared to State Prescription Drug Monitoring Program Policies**

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Introduction: The prescription drug monitoring program (PDMP) is a widely used resource in the United States in efforts to decrease levels of opioid abuse. The system allows clinicians to view whether a patient has received controlled substances from other providers before prescribing a controlled substance. Each state has different policies incorporated within their PDMP as in whether it can access information from other states, whether it is mandatory or required for providers. My hypothesis was that states with more of these policies in place would have a lower rate of fatal opioid overdose.

Methods: States were grouped into categories based off which services they utilized and were analyzed for average death rate per group. A second analysis was
made based off the number of services used (ranging from zero to all three services) and a linear regression was made showing the average death rate for each PDMP group.

Results: The correlation between PDMP features and fatal overdoses fatalities was not statistically significant (p= 0.234). Although not statistically significant, the trend showed that the more PDMP features state utilized the more fatal opioid overdoses occurred.

Conclusion: Although not clinically significant, the data trended to show an opposite conclusion of the hypothesis. This most likely shows that not only is opioid overdose multifactorial, but that states most likely implement these policies retrospectively instead of preventatively. Further research must be done in order to know all the factors that contribute to fatal opioid death rates in the United States.

ABSTRACT #74

The Importance of Thalassemia Testing
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Our objective is to inform people what Thalassemia is and why testing for it is vital. Thalassemia is a genetic blood disorder that causes the body not to make enough hemoglobin or have an abnormal form of hemoglobin present. When there is not enough hemoglobin, the body’s red blood cells do not function properly and last for shorter periods. As a result, fewer healthy red blood cells traveling in the bloodstream- a condition called anemia.

The severity of the anemia varies greatly depending on the type of Thalassemia. Symptoms in moderate to severe cases of Thalassemia carry the same complications as anemia: fatigue, weakness, and pale or yellow skin. Additional problems could include facial bone deformities, slow growth, abdominal swelling, or dark urine. Iron overload can cause damage to the heart, liver, and endocrine system. In advanced stages of severe cases, excessive breakdown of red blood cells causes a diploe in the expanded bone marrow to extend into the trabeculae in the skull.

Thalassemia only transmits from parents to future generations. Many people are carriers of the gene without knowing it. It is important to find out if you are a carrier. If a person’s mate is also a carrier, it could cause offspring to have serious health complications. Blood tests show if someone is a carrier.

Approximately 5% of the worldwide population has some variation of Thalassemia. It is estimated that 60% of that 5% are asymptomatic trait carriers. It is most common among Italian, Greek, Middle Eastern, South Asian, and African descent. 1 in 10,000 people in the European Union experiences an asymptomatic version.

Thalassemia is a serious disease that is quite common and can be transmitted along unknowingly. A person may be a carrier of the trait but not have the disorder themselves. Some ethnicities are at an increased risk of having Thalassemia. Individuals, particularly those of reproductive age, should find out if they have the gene so they do not pass it on to future generations.

ABSTRACT #75

Spinal Disc Herniation: Diagnosis and Treatment Methods
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Herniated discs account for 4% of the total cases of mechanical low back pain, and occur in approximately 2.8 million patients annually. Spinal disc herniation ranks second among medical complaints in the United States. Common symptoms that patients with disc herniation experience include general back pain, sharp pain, tingling sensations, and even numbing sensations in their back and lower limbs. Radiographic imaging modalities are commonly used in the diagnosis and treatment of disc herniation. Magnetic resonance imaging (MRI), computed tomography (CT), and fluoroscopy are the radiographic imaging modalities most commonly associated with disc herniation.

ABSTRACT #76

The Safety of MRI
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Magnetic resonance (MR) images are a great option when it comes to looking for pathology, and have become more popular over the years. These scans provide a very detailed look into the body that can reveal even the smallest abnormality. While the use of MR imaging removes the aspect of patient radiation exposure, this type of scan does come with its own set of safety issues. Due to the magnetic properties of the scanner, ferromagnetic materials are not compatible. If a ferromagnetic material is brought too close to the scanner, it can become a dangerous projectile object. This can potentially pose problems with implanted hardware and devices. Pacemakers are a common device, but if proper safety measures are followed then an exam can be completed without complications. Institutions should have set protocols and safety measures in place to avoid potentially life-threatening accidents from happening. With the use of proper signage and training, it should be very easy to keep a department safe and accident free.
ABSTRACT #77

Imaging Modalities Used to Identify Small Bowel Obstructions
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Small bowel obstructions (SBO) are becoming more commonly diagnosed in the emergency department (ED). Patients come into the ED with complaints of cramps, loss of appetite, constipation, vomiting, and a firm abdomen. A physical exam will be done by the provider to assess the situation. The physician will listen for bowel sounds along with feel along the firm abdomen all while asking a series of history questions. With just a common physical, there could be a number of indications similar to other abdominal disorders. With the advancements in digital imaging, the physician is able to diagnose small bowel obstruction and pinpoint the exact location more accurately. Radiographic x-ray, computerized tomography (CT), ultrasound (US), and magnetic resonance imaging (MRI) are all modalities used to visualize small bowel obstruction. CT scans are the most commonly ordered modality due to the quickness in scan time and no need for contrast. Physicians are able to visualize in multiple planes when viewing a CT scan, which aids in the diagnosis of SBO. Without proper treatment, SBO can lead to necrosis, peritonitis, and possibly death of the individual. Proper medical imaging and knowledge of SBO is key when diagnosing and treating an individual with SBO.

ABSTRACT #78

Diagnostic Imaging Role in 3D Printing for Arthroplasty
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Arthroplasty is a surgical procedure performed to restore the structure and function of a joint. It is often the last resort when other forms of treatments no longer relieve pain and combat dysfunction. Osteoarthritis gradually worsens over years of casual “wear and tear”. It is the most common joint disorder, affecting over 32.5 million US adults and is the number one indicator for arthroplasty. Radiology has a new and improved role in the joint replacement process using CT and MR imaging as a model for 3D printing. This creates a customized prosthesis to fit each patient’s needs. From clinical outcomes now exist for patients with temporomandibular joint replacements who received a 3D printed prosthesis model. Statistics show it leads to more effective patient outcomes. Researchers and surgeons are hopeful that these medical advances in arthroplasty will continue to grow and provide relief to the millions of Americans who suffer from osteoarthritis and other debilitating joint conditions.

WOMEN’S HEALTH

ABSTRACT #79

Retrospective Correlation of ASCUS Pap Diagnosis and HPV Molecular Results at the University of California, Davis
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Introduction: The use of high-risk Human Papilloma Virus (hrHPV) molecular testing for the management of Pap smears interpreted as atypical squamous cells of undetermined significance (ASCUS) has been well implemented for identifying and preventing the development of cervical cancer. The benefit of hrHPV testing in Pap smears diagnosed as ASCUS allows for the appropriate follow-up treatment of a colposcopy referral for a patient who tests positive and exclusion for those who test negative. The main purpose of this study was to evaluate the accuracy of the diagnosis of ASCUS at the University of California, Davis, Health System (UCDHS) by correlating it with the hrHPV results.

Methods: A retrospective study was conducted in which ASCUS Pap cases with hrHPV molecular tests were identified at UCDHS from February 2018 through December 2020. ThinPrep Pap smears were interpreted and classified according to the Bethesda System and the Roche Cobas HPV Test was utilized for hrHPV molecular testing. An Excel sheet was used to tabulate the data and the ASCUS/hrHPV results were compared with findings from other institutions in the United States.

Results: A total of 27,713 Pap cases were evaluated, of which 540 (1.9%) cases were interpreted as ASCUS. Of the 540 ASCUS cases, 429 (79%) cases had correlating hrHPV molecular tests. hrHPV was detected in 304 (71%) out of the 429 hrHPV-tested ASCUS cases.

Conclusion: UCDHS’s cytologic diagnosis of ASCUS correlated with 71% of ASCUS cases, as these cases were positive for hrHPV molecular testing. UCDHS’s ASCUS/hrHPV-positive rate of 71% was comparable to the rates of the other institutions – which approximated from 50 to 70%. This study demonstrates the importance of hrHPV molecular testing for ASCUS cases and its cost-effectiveness for cervical cancer screening by eliminating unnecessary colposcopy exams, without reducing the detection of cervical neoplasia.
**Prevalence of Human Papilloma Virus in High-Grade Squamous Intraepithelial Lesions**

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Introduction: Molecular testing for Human Papilloma Virus (HPV) has been proposed as an alternative method to screen for cervical cancer. However, the percentage of high grade squamous intraepithelial lesions (HSIL) in HPV negative patients has not been sufficiently analyzed.

Methods: This study retrospectively identified 620 HSIL diagnoses via traditional Pap smear over a three-year period (2017-2020). Resulting cases were then further analyzed to determine the patients’ HPV status. Cases were triaged into separate categories based on two factors: the presence of a confirmatory biopsy (366 cases did have biopsy confirmed HSIL), and if HPV testing was done on the Pap diagnosed with HSIL (242 cases had HPV ran on the initial Pap diagnosed with HSIL) or on a separate Pap (having results of <HSIL) within six months of the initial HSIL diagnosis. Then, the percentage of HSIL lesions with HPV negative status were calculated.

Results: Group one (biopsy confirmed HSIL and HPV ran on the initial pap diagnosed as HSIL) had 5 cases that were HPV negative (3.33%). Group two (HPV ran on the initial pap diagnosed as HSIL but lacking biopsy confirmation of HSIL in addition to the cases identified in group one) had 11 cases that were HPV negative (4.55%). Group three (biopsy confirmed HSIL with HPV ran off a different Pap within 6 months of the HSIL diagnosis in addition to the cases identified in group one) had 9 cases that were HPV negative (5.73%). Group four (HPV ran off a different Pap within 6 months of the HPV diagnosis without biopsy confirmation of HSIL in addition to the cases from all the other groups) had 16 cases that were HPV negative (8.60%).

Conclusions: If molecular HPV testing replaced the Pap smear as a primary screening technique, it is possible that between 3.33% and 8.60% of patients would have undetected HSIL. This underscores the need to continue using the traditional Pap smear, or at least cotesting, to ensure these pre-cancerous lesions are detected.

**Spinal Muscular Atrophy Carrier Screening: Current Practice and Perceived Barriers in a Midwestern Women’s Health Care Clinic**

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Spinal muscular atrophy (SMA) carrier screening has been universally recommended to be offered to all women of reproductive age by the American College of Obstetricians and Gynecologists since 2017. This quality improvement study surveyed women’s healthcare providers at a single clinic in an attempt to evaluate practices and assess barriers to offering SMA carrier screening to patients. Certified nurse midwife, internal medicine, obstetrician/gynecologists, and maternal fetal medicine providers were invited to participate in a survey comprised of multiple choice, Likert scale, and open ended questions. Full participation included 26 out 54 providers in the clinic. Most respondents are uncomfortable discussing SMA symptoms (70.4%), positive carrier screening results (84.6%), and residual risk with negative screening results (92.3%). Despite guidelines, only 42.3% (n=11) of providers offer SMA carrier screening to their patients. Those who are offering screening described barriers including lack of time (9/11), lack of pre-appointment patient education (10/11), and difficulty ordering testing (9/11). Participants in this study suggest possible solutions including developing patient educational materials, referral to genetic counseling, and ordering integration into the electronic medical record system as possible solutions. Results of this study show a discrepancy between SMA carrier screening guideline recommendations and practice implementation. This study supports a need for quality improvement initiatives including provider education, material development, and standardization of test ordering, as well as suggests the extension of similar studies to other clinics for quality improvement purposes.

**Impact of Infertility: Lived Experiences of Individuals with Turner Syndrome**

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Turner syndrome (TS) is a chromosome condition caused by the absence of a second sex chromosome. Infertility is commonly seen for patients with TS, and this is often the main concern for patients and/or their parents
in this population. The psychosocial impact of infertility on individuals with TS is not well understood though described in non-TS women who experience infertility. This study aimed to assess the impact. A mixed methods survey was created and sent to members of local and national TS groups. The survey included perceptions of infertility, questions on family planning, and two open-ended questions. The Rosenberg Self-Esteem Scale measured self-esteem while the HADS depression and anxiety scales measured anxious and depressive traits. Sixty-one participants completed the questionnaire, and 48 participants responded to the open-ended questions.

This study establishes the idea of anticipatory infertility and how it has its own impact on the patient lived experience, even before an individual begins family expansion. A majority of participants across all ages described the impact of infertility on their lives to be negative. Participants described the infertility impacting four categories: perception of self, community interaction, relationships, and family planning. Twenty participants (33%) had low self esteem scores, 13 participants (22%) had abnormal anxiety scores and 21 participants (36.8%) had borderline abnormal anxiety scores. Those who reported infertility having a negative impact on life had more abnormal anxiety scales and lower self-esteem than those who reported the impact of infertility to be positive, neutral or both positive and negative. Further research into this expectant infertility and its implications on the TS community should be conducted. Anticipatory infertility has unique impacts on an individual, and resources should be developed to support these challenges.

ABSTRACT #83

A Comparison of Infant Birth Outcomes Based on Maternal Category of Glucose Screening
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Background: Infants of mothers diagnosed with gestational diabetes mellitus (GDM) may experience adverse outcomes. However, research on outcomes of infants whose mothers have impaired glucose tolerance but do not meet diagnostic standards of GDM are sparse. The objective of this study was to compare infant weight-for-length amongst mothers categorized based on their oral glucose tolerance test (OGTT) screening.

Methods: This was a cross-sectional, secondary analysis of a prospective cohort of mother-infant dyads. Glucose tolerance was assessed using a two-step OGTT between 24-28 weeks gestation per Carpenter-Coustan criteria. Mothers passing the 1-hour OGTT were categorized as being normal glucose tolerant (NGT). Glucose impaired was identified as failing the 1-hour but passing the 3-hour OGTT. Mothers failing both the 1-hour and 3-hour OGTT were diagnosed with GDM. Differences in infant weight-for-length between maternal categories were analyzed using Kruskal-Wallis test. Differences in additional infant outcomes between maternal groups were assessed using Kruskal-Wallis and Chi Squared tests. Linear regression and correlation coefficients described the relationship between maternal Body Mass Index and infant weight-for-length.

Results: No statistical significance was found in infant weight-for-length between NGT (n = 271), glucose impaired (n = 43), and GDM (n = 17) groups. Insignificant trends in incidence of additional infant outcomes were identified between maternal groups.

Conclusion: Study results show no difference between maternal groups and infant weight-for-length. Further studies should be completed with a larger sample size to identify an association between infant weight-for-length outcomes in NGT, glucose impaired, and GDM mothers.

ABSTRACT #84

The Effect of Dietary Protein and Amino Acid Intake on Total Hip and Lumbar Spine Bone Mineral Density Measurements
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Background: Osteoporosis is multifactorial disease with multiple treatment recommendations. Although dietary protein intake is essential for maintaining skeletal and lean muscle mass, there are conflicting results regarding how much total protein or specific amino acids are adequate for the prevention and treatment of osteoporosis.

Methods: This was a cross-sectional, secondary analysis of 230 postmenopausal women from the Heartland Osteoporosis Prevention Study (HOPS study). Data was collected via Harvard Willett Semi-quantitative food frequency questionnaires and dual energy x-ray absorptiometry (DXA) scanning. Independent t-tests, chi-squared test, simple linear regression and correlation tests were used to evaluate the data.

Results: Average protein intake was 1.2 g/kg/d or about 84 g/d. Participants with normal bone density (NBD) consumed significantly less protein (g/kg/day) than those with low bone density (LBD) in both the lumbar spine (1.1 vs 1.3 g/kg/d; p=0.005) and total hip region (1.1 vs 1.4 g/kg/d; p=0.002). For every one unit increase of protein intake (g/kg/day), bone mineral density (BMD) t-scores in both the lumbar spine and total hip region decreased (β = -0.544; p=0.001 and β = -0.354; p=0.003, respectively). There were no significant associations between lysine or proline intake and BMD measurements.

Conclusion: Those with NBD consumed less...
protein (g/kg/d) than those with LBD, though still consumed considerably higher amounts compared to the RDA. Further research should examine an intake threshold, distinguishing a cut-off level between beneficial and deleterious effects of higher protein intake on BMD.

**ABSTRACT #85**

**Comparing postpartum depression scores and lutein + zeaxanthin blood levels in post-partum mothers with newborns in the NICU**

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Background: Lutein and zeaxanthin (L+Z) are dietary carotenoids linked to eye health and cognitive function, however, less is known about their role in maternal health. Postpartum depression (PPD) is a prevalent mood disorder associated with childbirth. With no known cause, research is exploring the relationship between maternal dietary intake and severity of PPD. Therefore, the purpose of this study is to determine if there is a relationship between PPD screening scores and L+Z serum levels in postpartum women.

Methods: A cross-sectional study of 28 postpartum mothers with newborns admitted to the Neonatal Intensive Care Unit (NICU). Data collected was food frequency questionnaires (FFQ), Edinburgh Postnatal Depression Score (EPDS) questionnaires, maternal serum L+Z, mother-infant demographics and birth outcomes. Per scoring criteria set for the EPDS screener, mothers were categorized into 2 groups (no PPD vs PPD). Serum L+Z was analyzed by high-performance liquid chromatography. Descriptive statistics, correlations, and Mann-Whitney U were calculated. Statistical significance was set at a p-value <0.05.

Results: L+Z serum levels and L+Z dietary intake showed no significant differences between the two groups. Correlations were shown between L+Z serum levels and gestational birth age (r = 0.389; p = 0.041) but not EPDS (r = -0.031; p = 0.876) and L+Z dietary intake (r = -0.143; p = 0.525).

Conclusion: The study results showed no significant relationship between L+Z serum levels and L+Z dietary intake between mothers with and without PPD. Further testing with a larger sample size should be done to more adequately assess the mother-infant pairs.

**ABSTRACT #86**

**An Overview of Ovarian Cancer**

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Ovarian cancer is considered to be one of the most morbid gynecological cancers. It occurs mostly in older women, with ages ranging from 50-65. Although it only accounts for a small percentage of cancers in women, overlooked symptoms often lead to a late diagnosis. Symptoms frequently present as normal complications that can arise from aging and hormonal changes such as with menopause. There are five types of ovarian cancer: epithelial, germ cell, metastatic origin, sex cord-stromal, and unclassified. Imaging is essential in the diagnosis of ovarian cancer. Modalities like ultrasound, computed tomography, magnetic resonance imaging, and positron emission tomography are able to identify benign and malignant masses. Chemotherapy and surgery are the two types of treatment used to manage ovarian cancer.

**ABSTRACT #87**

**Breast Cancer**

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Breast cancer affects hundreds of thousands of women in the United States each year. There are three main types of breast cancer. The type of breast cancer determines the type of treatment that will be used and the prognosis. Breast cancer is categorized by stages, I-IV. The stage of breast cancer also determines the type of treatment and prognosis. Some of the risk factors of breast cancer can be controlled and changed, thus reducing an individual’s risk. Breast cancer can be diagnosed early through routine screening. Routine screening greatly reduces the stage and the mortality of breast cancer.
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