2017 Denman Undergraduate Research Forum Accepted Student Abstracts
Clinical Health Sciences
Increased motor cortex connectivity associated with knee anterior cruciate ligament reconstruction.

Student Presenter: Christopher Ballance

Faculty Advisor: Onate, James

Abstract: Rehabilitation following an anterior cruciate ligament reconstruction (ACL-R) focuses on the involved limb. However, ACL-R patients who return to sport are 2.16 times more likely to injure their contralateral ACL than the reconstructed knee. This asymmetric risk of injury could be the result of altered brain interhemispheric connectivity. The purpose of this project is to determine if ACL-R is associated with an alteration in motor cortex (M1) connectivity. A healthy group of active participants (N=3, age=24.6±2.08 years, height=1.74±0.06 m, weight=80.5±12.55 kg) and an ACL-R group (N=3, age=23.7.6±3.20 years, height=1.80±0.08 m, weight=83.0±19.8 kg, 42±36 months’ post-surgery) were locally recruited. Functional magnetic resonance imaging (fMRI) and T1 structural imaging were performed for analysis of brain activation during a unilateral left (involved) 45° knee extension/flexion at a rate of 1.2 Hz for 4 blocks of 30 seconds interspersed with 30 second rest. Functional connectivity of the right knee area within the left (M1) served as the seed region and was examined using a psychophysiological interaction analysis. The two groups were then contrasted using a fixed-effects general linear model with a priori cluster threshold of p
Abstract: Research suggests that lateral trunk flexion and knee valgus are positively correlated during jump landings. Since trunk motion is influenced by the trunk extensor and oblique muscles, it can be hypothesized that the strength of these muscles influences trunk and knee movement. The purpose of this study was to examine if knee valgus during rebound landings in basketball is related to trunk and core endurance. Twenty-five female college basketball players (age=19.60±0.24 years, height=1.79±0.02 meters, weight=77.36±1.90 kilograms) performed a basketball rebound task, as well as trunk and core endurance tests. Participants performed the rebound by starting on the ground, a ball was tossed upward and participants were instructed to perform a rebound, land, then immediately jump and shoot. 3D motion capture was collected using a Vicon passive optic motion capture system. Timed maximal effort trunk extension and side bridge tests were used to assess trunk and core endurance. Relationships between trunk extension endurance, side bridge endurance limb symmetry index (LSI) and knee valgus (dominant and non-dominant legs) at initial contact (IC) and peak knee flexion (PKF) were assessed with linear regression. Relationships between side bridge endurance LSI and ipsilateral/contralateral knee valgus at IC and PKF were also assessed. Statistical significance was set a priori at 0.01. Side bridge LSI was not related to dominant, non-dominant, ipsilateral, or contralateral knee valgus at IC (p-value range: 0.10-0.89) or PKF (p-value range: 0.11-0.87). Trunk extension endurance was not related to knee valgus at IC (dominant: p=0.69; non-dominant: p=0.28) or PKF (dominant: p=0.80; non-dominant: p=0.37). No significant correlations were identified between trunk extension endurance or side bridge endurance LSI and knee valgus during a rebound. These results suggest trunk endurance influences knee kinematics during rebounding minimally. As a result, relationships may be more related to factors such as neuromuscular control or strength.
Abstract: Infants with complex congenital heart disease (CCHD) exhibit abnormal autonomic nervous system (ANS) function prenatally and are exposed to stressful environments postnatally that further alters autonomic development. Impaired autonomic function during early infancy influences behavioral, social, and cognitive development, and infants with CCHD are at high risk for developmental delays. The purpose of this study is to describe autonomic function during the perioperative period in newborns with CCHD and to explore associations with type of cardiac defect. In this multiple case study design, linear (power spectral density) and non-linear (Poincare plots) heart rate variability (HRV) were examined using 4-20 hour electrocardiographic recordings collected on four newborn infants with different types of CCHD. Data were collected during hospitalization once before surgery and once 5-7 days after surgery. Hourly HRV was examined graphically, descriptively, with t-tests, and with Mann-Whitney tests. Graphical analyses suggested differences among infants in magnitude and trajectories of linear HRV power. Three infants (diagnosed with coarctation of the aorta, transposition of the great arteries, and double-outlet right ventricle) demonstrated significantly higher post-operative levels of linear HRV power compared with pre-operative levels. One infant (diagnosed with hypoplastic left heart syndrome) demonstrated reduced HRV post-operatively. Non-linear measures showed more abnormal Poincare plots post-operatively (11%-60%) than pre-operatively (0%-18%), revealing increased sympathetic activity following surgery in these infants. The infant with hypoplastic left heart syndrome showed the highest percentage of abnormal plots both pre- and post-operatively (18% and 60%, respectively). These findings revealed differences in linear and non-linear HRV by cardiac defect. Additional studies with larger sample sizes and multiple longitudinal assessments are needed to enhance our understanding of relationships between specific cardiac defects and autonomic function. Knowledge about associations between early autonomic function and type of cardiac defect will assist with tailoring early interventions to optimize neurodevelopment in this vulnerable population.
Category: Clinical Health Sciences

Title: Relationships among ankle dorsiflexion range of motion, ankle inversion moment, and ankle eversion range of motion

Student Presenter: Savannah Boleky

Faculty Advisor: Onate, James

Abstract: Medial Tibial Stress Syndrome (MTSS) affects upwards of 35% of runners, yet the exact cause of MTSS is unknown. Ankle dorsiflexion range of motion (ROM) and asymmetry may contribute to MTSS by influencing ankle eversion ROM and internal ankle inversion moments, proposed risk factors for MTSS. The purpose of this study was to determine if ankle dorsiflexion ROM (total motion and asymmetry) was related to ankle eversion ROM or internal ankle inversion moments. It was hypothesized that greater dorsiflexion ROM would be related to greater eversion ROM and inversion moments while running. Eight female collegiate cross-country runners (age=19.50±1.07 years, height=1.65±0.08 meters, weight=55.66±4.36 kilograms) underwent 3-dimensional motion analysis using a Vicon passive optic motion capture system (Vicon Motion Systems; Oxford, UK). Ankle dorsiflexion ROM was defined as the maximum amount of dorsiflexion that occurred during an active backward lunge task. Ankle eversion ROM and inversion moments were assessed during a 5k pace shod run. Spearman correlations were used to assess relationships between ankle dorsiflexion ROM (total motion and asymmetry), eversion ROM, and inversion moments for dominant and non-dominant legs. Relationships between ankle dorsiflexion ROM asymmetry, eversion ROM, and inversion moments were also assessed for the ipsilateral and contralateral legs. Ipsilateral and contralateral were defined as the legs corresponding to the worst and best performing sides, respectively. Significance was set a priori at p ≤0.05. Ankle dorsiflexion ROM (total motion or asymmetry) was not related to dominant, non-dominant, ipsilateral, or contralateral ankle eversion ROM (p-value range: 0.24-0.93). Ankle dorsiflexion ROM (total motion or asymmetry) was not related to dominant, non-dominant, ipsilateral, or contralateral internal ankle inversion moments (p-value range: 0.24-0.84). Future studies should assess a more global assessment of foot posture, including pronation and navicular drop, which may be more related to ankle eversion ROM and internal inversion moments.
Abstract: A ranula is a mucus filled pseudocyst that is caused by leakage of a salivary gland after trauma or blockage. Occurring in or around the mouth, they most commonly arise from the sublingual gland with the next most common site being the submandibular gland. A simple or intraoral ranula is located within the floor of the mouth; while a plunging ranula extends inferior to the floor of the mouth herniating down into the neck. Surgical drainage or needle aspiration will not successfully treat the problem due to continued leakage of the offending gland. Surgical removal of the gland along with the ranula is the most commonly practiced treatment but it can result in complications including nerve damage, vascular damage, and facial scarring. In Interventional Radiology at Nationwide Children's Hospital we developed a unique minimally invasive procedure to treat ranulas. We perform ultrasound guided percutaneous aspiration of the pseudocyst followed by ablation of the offending salivary gland with a combination of sotradecol and alcohol. This study retrospectively evaluates our minimally invasive alternative treatment. Information was gathered from our electronic medical record on a cohort of 24 treated patients. The sample contained a mix of simple (n=11) and plunging (n=13) ranulas. The average follow up time after treatment was 9.3 months. Fifteen of the patients (62.5%) resolved after the first treatment, 5 patients required two treatments (20.8%), and 1 patient (4.1%) required three treatments for a total of 21 patients (87.5%) cured. The 3 remaining patients (12.5%) were incompletely treated and required surgical excision. No permanent complications were observed. As with successful surgical practices, our percutaneous treatment drains the cyst and treats the gland responsible. Our image-guided treatment is minimally invasive (performed exclusively with needles using no incisions), safe, and effective. We believe that our percutaneous treatment is an exciting new procedure that should be considered as a primary treatment option for ranulas.
Abstract: Currently in the U.S., there are people living with a mild to moderate hearing loss who are unaware of their deficit and its impact on daily living. The purpose of this research project was to determine whether the Digits-in-Noise method, an automated speech recognition threshold test in adjusted background noise, or the Automated Method for Testing Auditory Sensitivity, an automated pure tone audiometry test, is a more sensitive detector of a mild to moderate hearing loss. Twenty-two participants of the age range 18-23 with normal hearing thresholds were used for testing. First, a pure tone audiogram was obtained to confirm normal hearing thresholds. Next, the right or left ear was randomly selected for occlusion with an earplug, and the audiogram was repeated, to determine the magnitude of the simulated hearing loss produced by the ear plug. Lastly, the participant underwent the two hearing screening tests at a KIOSK booth with the earplug in place. The order of testing, AMTAS or Digits, was alternated across subjects. The results show the sensitivity of each test based on a simulated mild to moderate conductive hearing loss. Further study with participants who have mild to moderate sensory-neural hearing loss is underway.
Category: Clinical Health Sciences

Title: Accumbens-prefrontal interactions in the regulation of multiple transmitter systems: implications for cognitive deficits in schizophrenia

Student Presenter: Nicholas Capaci

Faculty Advisor: Bruno, John

Abstract: The interactions between cortical and subcortical regions mediate the complex executive functions of cognition (i.e. attention, working memory) via top-down regulation of goal directed behavior. The neural network involving the nucleus accumbens (NAc), basal forebrain and prefrontal cortex (PFC) controls top-down regulation and disruptions to this network produce the core symptoms characteristic of several neuropsychiatric disorders (ADD, schizophrenia, drug addiction). Our previous research, utilizing both traditional microdialysis and a more novel enzyme-based biosensor, demonstrated that stimulating NMDA receptors within the NAc shell (NAcsh) increases release of ACh and glutamate in the PFC and facilitates cognition by increasing the resistance to distraction in a sustained attention task (top-down regulation mechanism). We further analyzed this system by measuring the response to increasing prefrontal glutamate and ACh on neurochemical levels in the ipsilateral NAcsh. In all animals two microdialysis probes were implanted, one into the PFC and one into the NAcsh. We stimulated cortical activation through reverse dialysis of S-ESBA, a KAT-II inhibitor. This decreased levels of KYNA, the endogenous negative modulator of the alpha7 nicotinic receptor. Increased KYNA levels are seen in the PFC of schizophrenic patients and produce cognitive deficits in animal models. Transmitter levels were measured using ultra-HPLC in 20 min intervals. Local perfusion in the PFC with S-ESBA (5mM) increased PFC ACh (100% above baseline), DA (150%), and 5-HT (90%) levels. This increased NAc glutamate (60%), Ach (90%), DA (50%), and 5-HT (50%) levels. Collectively, this demonstrates the effect of endogenous KYNA levels on the inhibition of a wide range of prefrontal neurotransmitters. This reciprocal relationship between the NAcsh and the PFC is theorized to contribute to top-down regulation of the neural system mediating cognitive control.
Abstract: Hemangiomas, a type of endothelial cell (EC) tumor, are the most common soft-tissue tumors in infants, where 10% obstruct ears, eyes, noses, or airways and 1% threaten lives. Pharmacological treatments for hemangiomas have high-risk side effects. The purpose of this work was to identify how a safe natural berry extract (NBE) can inhibit EC tumor growth. Multidrug resistance protein 1 (MRP1) is a protein that pumps toxic products, including chemotherapy agents, out of cells and is overexpressed in cancers and this tumor. We have previously shown mouse hemangioendothelioma endothelial cells (EOMA) injected subcutaneously into syngeneic (129P/3) mice as a valid model for generating EC tumors. Non-tumor murine aortic endothelial cells were used as controls. To analyze the effects NBE on MRP1 expression and function, immunohistochemistry, calcein exclusion test, and western blot were performed. Results indicated that EOMA cells treated with NBE significantly inhibit the activity of MRP1 because the cells accumulated nuclear oxidized glutathione (GSSG) leading to apoptotic EOMA cell death. Mice injected with EOMA cells treated with NBE produced smaller tumors with longer survival compared to the control group, untreated EOMA cell tumors. These findings are the first to report that a berry extract can interfere with MRP1 expression and function, resulting in apoptotic cell death from the accumulation of GSSG in the nucleus of EOMA cells. NBE inhibition of MRP1 should be examined further as a therapeutic treatment and considered as a possible application for other cancers with high activity of MRP1.
Abstract: Medical nutrition therapy with the gluten-free diet (GFD) is the only treatment for Celiac Disease (CD). Adequate education and training is critical for patients with Celiac Disease, as long-term compliance has demonstrated improved health outcomes in this population. It is essential that CD patients receive appropriate education about the GFD, as educational level and perceived knowledge of the GFD have been associated with higher rates of adherence. To evaluate the types of education patients received at the time of diagnosis, current information sources, and information of perceived importance, we surveyed individuals attending a regional celiac conference. This study used a cross-sectional survey design with a sample of convenience. The survey was developed based on the current literature and was validated by content experts. It was distributed after receiving exempt IRB approval on November 2, 2016 (Study ID 2016 0652). Ninety-nine surveys were returned to the researchers; 97 contained usable data. Results indicate the majority of CD patients received a verbal description of CD and the GFD at diagnosis, and most received written materials. However, less than half of respondents reported education about meal planning tips, grocery shopping, or eating out. Information identified as being the most helpful to receive at diagnosis included the following: grocery shopping, budget-conscious meal planning, and information about local restaurants. Post-diagnosis, the majority of respondents rely on online resources (87%), while a small percentage of individuals go to their Physician (31%) or Registered Dietitian (22%) for guidance. The outcomes of this study will be used to create improved CD education materials for patients at Wexner Medical Center. Additionally, the results provide insight into the types of information Celiac patients wish to receive, which will assist Registered Dietitians and other healthcare professionals when planning health education for this population.
Abstract: The objective of this study is to determine what factors best predict Augmentative & Alternative (AAC) use in school-age AAC users with Developmental Disabilities (DD). Augmentative and alternative communication (AAC) includes all forms of communication (other than oral speech) that is used to express thoughts, needs, wants, and ideas (Beukelman & Mirenda, 2013). Although the purpose of AAC systems is to increase an individual’s quality of life by enabling them to communicate with others, at times individuals reject/abandon their AAC systems for various reasons (Johnson, Inglebret, Jones, & Jayant, 2006). In this study, caregivers and teachers of AAC device users will complete a questionnaire that investigates variables hypothesized, based on previous research, to influence AAC use including: competency with the AAC system (i.e., the ability to program the device), AAC system buy-in (i.e., understanding that the device will act as the child's "voice"), and the amount of communication opportunities presented at home and at school. Device use is tracked using the data logging feature on the AAC devices and then will be extracted from an online tool to examine device use across three randomly chosen dates. The data is currently in the process of being collected and analyzed. By identifying how these predictor variables relate to the rate of communication in AAC users, we will be able to assist speech-language pathologists in developing more effective clinical interventions and AAC trainings for users, caregivers, and teachers.
Abstract: Preeclampsia (PE), a hypertensive disorder of pregnancy, has adverse consequences for pregnant women who experience the disorder and for their offspring. Infants born to women with PE are of lower birth weight due to prematurity. Additionally, PE has a 20% reoccurrence rate—creating a need for further research and intervention. A clinical trial was conducted in which pregnant women who had PE in a previous pregnancy were randomized to a walking intervention (n=42) or to an attention-control group (n=46). The trial’s goal was to reduce the recurrence of preeclampsia; however, there were no differences in the rate of reoccurrence of preeclampsia for those randomized to walking compared to controls. The purpose of our secondary analysis is to (1) examine the infant birth weight born to women with or without PE recurrence relative to other known PE risk factors, and (2) explore the effects of the walking intervention on birth weight. Eighty-eight women were included in the clinical trial, with 79 (89.7%) women experiencing no reoccurring PE and 9 (10.2%) women experiencing a reoccurrence of PE. Infants born to women with PE were born earlier (36.33 ±0.98 weeks compared to 38.53 ±0.18 weeks in uncomplicated pregnancy, p=0.003) and had a lower birth weight (2660.75 grams ± 3469.16 ± 56.30 in uncomplicated pregnancy, p=0.04). Furthermore, there was a significant correlation between weeks gestation at birth and birth weight (r=0.72, p=.00), indicating that the weights were appropriate for gestational age and consistent with expectations. This study demonstrates that the walking intervention did not have detrimental effects on offspring. The benefits of exercise on the mother’s health and wellbeing cannot be understated. Although the overall results of this trial were negative in preventing PE, a larger trial testing other forms of exercise might be warranted.
Abstract: An infant's ability to reach provides a means for physical interaction with the world around them. When very young infants present with muscle impairment it is often a goal of providers to facilitate reaching so that this interaction process may begin. However, current methods of measuring this motor development have limited efficacy among very young infants and infants with severe impairment. The current project will evaluate the clinical utility of two different methods of measuring upper extremity motor development: kinematic analysis and behavioral coding. N=11 healthy infants were seen once a month for three months beginning within the first six months of life (median age at first visit = 2.1 mos). Bayley-III gross and fine motor scores were taken. Infants laid supine and were allowed free movement of the arms for six, 30-second trials. For each trial a toy was presented to the hand, the foot, or not at all. For behavioral analysis, sessions were taped and analyzed for reaches by three trained raters. For kinematic analysis, reflective markers were placed on the infants' hands and tracked by the Vicon Nexus 3D motion capture system. Taping was synchronized between behavioral and kinematic analysis platforms. Preliminary kinematic and Bayley-III analysis is reported here. Bayley-III combined motor scores and fine motor scores were found to significantly predict movements per minute ($p=.042, d=.485$; $p=.002, d=1.36$), maximum movement length ($p=.041, d=1.11$; $p=.006, d=2.86$), and arc mean ($p=.046, d=.826$; $p=.023, d=1.86$). Gross motor score also significantly predicted maximum movement length ($p=.05, d=2.07$). Preliminary data appears to support the idea that kinematic data can be clinically relevant to practitioners. Data from behavioral coding is in the process of evaluation.
Abstract: Bruton agammaglobulinemia tyrosine kinase (BTK) has emerged as an attractive therapeutic target in B cell malignancies due to its role in B cell receptor signaling and other pro-survival pathways. Ibrutinib is an effective BTK inhibitor for treatment of chronic lymphocytic leukemia (CLL), but acquired resistance occurs in a subset of patients when a mutation (C481S) occurs at ibrutinib's binding site. In order to address the issue of acquired ibrutinib resistance, the reversible BTK inhibitor, SNS-062, was characterized in CLL B cells isolated from blood of consented patients and resistant cell lines. SNS-062 demonstrates dose-dependent inhibition of BTK and downstream B cell receptor proteins in patient CLL cells comparable to ibrutinib via immunoblot. Annexin V and propidium iodide flow cytometry was performed to measure patient CLL cell viability, which elucidated that the survival of CLL cells treated with SNS-062 for 48 hours decreased dose-dependently. Additionally, SNS-062 reduced viability of CLL cells in the presence of HS5 stromal protection as measured by 7-AAD flow cytometry, indicating that SNS-062 diminishes protection from the microenvironment. Measurement of kinase activity in recombinant WT BTK or C481S BTK was performed in a FRET kinase assay. The IC50 of SNS-062 against WT BTK was found to be 4.6nM and C481S BTK to be 1.1nM, suggesting that SNS-062 retains activity against the mutated BTK variant. Immunoblots of XLA cells transfected with WT or C481S BTK demonstrated that SNS-062 inhibition is comparable to that of ibrutinib in WT BTK and that SNS-062 remains efficacious in C481S BTK. Unlike ibrutinib, SNS-062 inhibits BTK signaling in the presence of C481S mutation and may address acquired resistance to covalent BTK inhibitors like ibrutinib. SNS-062 decreases B cell receptor signaling, viability, and stromal cell protection in primary patient CLL cells. These data support further investigation of SNS-062 and advancement into clinical trials.
Abstract: The purpose of this study was to examine learning, short-term memory, long-term memory, and general development including cognitive, motor, and language domains in infants with Complex Congenital Heart Defects (CCDH). Ten infants with CCHD (4 males, 6 females) and 14 infants with typical development (TD) were examined at 3 months of age. The mobile paradigm, where an infant’s leg is tethered to an overhead mobile, was used to evaluate learning and short-term memory. The Bayley Scales of Infant Development 3rd edition (Bayley-III) was used to evaluate general development in cognitive, motor, and language domains. Infants with CCHD and infants with TD both showed learning with significant increase in kicking rate ($p = 0.017$) in the mobile paradigm. We expect that neither group of infants will demonstrate long-term memory between 3 months and 6 months of age. There were no differences on cognitive, motor, and language development between infants with CCHD and infants with TD on the Bayley-III. Early assessment is necessary to guide targeted treatment in infants with CCHD. One-time assessment may fail to detect potential cognitive impairments during early infancy in infants with CCHD. Supportive intervention programs for infants with CCHD that focuses on enhancing short-term memory are recommended.
Title: The relationship between lateral trunk control during landing and lower extremity muscle strength in young athletes after ACL reconstruction

Student Presenter: Conor Fryer

Faculty Advisor: Schmitt, Laura

Abstract: An anterior cruciate ligament (ACL) tear is a devastating injury that is typically treated with ACL reconstruction (ACLR). Our previous work shows that young athletes continue to demonstrate asymmetrical lower extremity biomechanics during landing tasks even after rehabilitation and return-to-sport (RTS), and these asymmetries are related to muscle strength deficits and increase the risk of re-injury. However, less is known about lateral trunk control during single-leg landing (SLL). The purpose of this study was to test the hypothesis that lateral trunk instability during SLL would be greater in those with ACLR compared to healthy controls and would be associated with quadriceps femoris (QF) and hip abduction (HA) muscle strength deficits. 131 individuals (72% female, mean age: 17.2 y) cleared for RTS following unilateral, primary ACLR and 56 healthy controls (73% female, mean age: 17.2 y) participated. Biomechanical data were collected using 3D motion analysis during a SLL task to calculate frontal plane trunk excursion (FPTE; measure of lateral trunk control). QF and HA strength were measured using an isokinetic dynamometer, and limb symmetry indices (LSI) were calculated [(involved/uninvolved) x100%]. FPTE was compared between the involved ACLR limb and the non-preferred control limb using independent t-tests. Within the ACLR group, linear regression examined the relationship between involved FPTE and QF (involved peak torque; LSI) and HA strength (involved peak torque; LSI) (a=0.05). The ACLR group demonstrated increased FPTE compared to the control group (ACLR: 15.61±4.47°; Control: 12.91±3.61°; p2: 11.3%, p2: 12.7%, p2: 4.6%, p=0.015; respectively). Individuals who had undergone ACLR demonstrated increased lateral trunk instability, which was related to QF strength deficits and, to a lesser extent, hip strength deficits. Further research is needed to determine the impact of lateral trunk instability on the risk of re-injury after ACLR.
Abstract: The roles and responsibilities of a respiratory therapist have evolved and expanded significantly since the start of the profession. With these expanding roles and the overall shortage of healthcare workers, it is more important than ever that respiratory therapists are prepared for these expanded roles. With both associate’s and bachelor’s degrees in respiratory therapy still prevalent nationwide, it is important to understand how much education is needed to provide safe, effective, and quality patient care. The purpose of this study is to describe respiratory therapy department directors’ preferences regarding educational preparation and background of staff respiratory therapists, as well as their current and anticipated hiring practices. A one-shot case study will be conducted using a descriptive survey to obtain data for analysis. Survey questions include information regarding the educational background of staff therapists, preferences of hiring managers, and reasons for these preferences. Members of the respiratory therapy network within Vizient, the nation’s largest member-owned health care services company, will be surveyed. A link to the survey will be sent in an email that invites the respiratory therapy department directors to participate. Preliminary results indicate that respiratory therapy department directors prefer to hire graduates with bachelor’s degrees, and they anticipate that they will continue to prefer to hire graduates with bachelor’s degrees in the future. Data collection is ongoing. It is anticipated that results will indicate that the educational preparation of respiratory therapists for entry into the profession will need to move beyond the associate’s degree in the near future in order to meet the needs of respiratory therapy departments and the patients they serve.
Abstract: Patients newly diagnosed with acute leukemia experience an array of different symptoms throughout their chemotherapy treatments in the hospital. Aromatherapy, the use of essential oils through diffusion, is often used to alleviate some of these symptoms. The purpose of this study was to: (1) determine if these essential oils would improve the patients' overall wellbeing during their hospitalizations and help with their symptom management and (2) determine if there is a difference between the three scents and between age and gender of the participants. This randomized, cross-over, wash out trial included fifty acute leukemia patients in the hospital for their initial chemotherapy treatments. These patients were all at least eighteen years of age and were offered a choice between three different scents of aromatherapy: lavender, peppermint, or chamomile. Patients were randomized to receive either aromatherapy or placebo during week one. During the second week, nothing was diffused, and during the third week the opposite intervention was given. Major outcome variables include sleep quality measured by the Pittsburgh Sleep Quality Index and other common cancer side effect symptoms measured by the Edmonton Symptoms Assessment Scale. Patients completed a Final Evaluation of Aromatherapy to evaluate their experience with the aromatherapy. Our results showed us that aromatherapy as a whole had a positive impact on patient experience and managed symptoms well. There was no statistically significant difference between males and females or within the various age groups. The lavender scent was most commonly chosen and was found to relieve symptoms most effectively. Aromatherapy has a positive impact on acute leukemic patients receiving chemotherapy in the hospital. It has decreased the common symptoms associated with chemotherapy such as insomnia, pain, and anxiety and has increased the patients' overall wellbeing. This form of therapy is noninvasive and less expensive than most other options.
Abstract: The impact of hearing impairment on situational awareness, cognitive workload, and driving behavior is not well known. Lack of knowledge about these interactions may negatively impact the safety of all drivers, as distractions become more prevalent by the day. The few previous studies related to hearing impairment and driving have included primarily elderly individuals, confounding whether driving behaviors are due to aging, hearing impairment, or an interaction of these factors. The present study attempted to separate these variables. Forty participants (10 younger (18–35 years old) normal hearing, 10 older (55–75 years old) normal hearing, 10 younger hearing impaired, 10 older hearing impaired) were asked to drive a simulated course in a 6-degree-of-freedom motion base driving simulator while performing concurrent listening and situational awareness distractor tasks. The situational awareness task consisted of identifying an object (4x4x4 meter red/white checkerboard cube) randomly located in the scenario. The listening task required individuals to repeat the last word for each of 50 high-predictability and 50 low-predictability sentences, presented in controlled background noise. The study also compared performance in mechanics of driving (speed, lane-keeping, safe following) across groups. Testing is currently in progress, but preliminary results suggest that situational awareness in object identification is decreased in all groups while performing the simultaneous listening task, and that older normal-hearing individuals performed more poorly on the listening task than younger normal-hearing participants. Results are discussed in terms of how to best design in-vehicle systems to assist elderly and hearing-impaired drivers.
Abstract: Depression, Sleep, and Quality of Life in Cancer Survivors Who Participated in Mind Body Movement Classes The project goal of this study was to examine depressive symptoms, sleep quality, and quality of life among cancer survivors who participated in mind-body movement exercise (MBME) classes. Depression is one of the most common mental health disorders in the United States, and is more prevalent in cancer survivors. The estimated prevalence of depression among cancer survivors is between 15% and 29%. Topics important to cancer survivors include sleep quality and quality of life. This was a one group repeated measures design with cancer survivors who could speak and read English and were enrolled in MBME classes (Yoga, Tai Chi, and Qigong) for 10 weeks. Data was collected in person at baseline and with a mailed survey at 6 months after class completion. Data measurement included: sociodemographics, Center for Epidemiologic Studies Depression Scale (CES-D), Pittsburgh Sleep Scale (PSQ1), and Functional Assessment of Cancer Therapy-General (FACT-G) (quality of life). Thirty-three cancer survivors were enrolled in the study and provided data at baseline. Twenty-four participants provided data at 6 months. The majority (n=17) screened positive for depressive symptomatology at baseline. At 6 months, 10 participants screened positive for depressive symptomatology. The percentage of participants with sleep problems was less at 6 months compared to baseline (40% vs. 27%, respectively). QOL scores were similar at both time points. Eighty-three percent of participants reported having practiced Yoga, Tai Chi, or Qigong during the 6 months following class completion. Cancer survivors participate in MBME, and continue exercising after class completion. Cancer survivors with depressive symptoms may benefit from MBME. Future research using MBME as an intervention to improve depressive symptomatology, sleep quality, and quality of life should be examined.
Abstract: Thrombosis, or the aggregation of platelets causing blood vessel blockage, is a leading cause of morbidity and mortality seen in cerebrovascular, cardiovascular, and peripheral vascular disease. Current therapy involves the use of recombinant tissue plasminogen activator (rTPA) to break up the occlusive thrombus by altering the platelet activation pathway. Although effective in improving outcomes, rTPA has significant drawbacks due to its low efficacy, irreversibility, and potential to generate hemorrhage. Von Willebrand Factor (VWF) interacts with glycoprotein IIb-IIIa causing platelet adhesion and thrombus formation, while binding to coagulation factor VIII for protection against proteolytic destruction and expulsion during plasma circulation. We have identified RNA aptamers that bind to and inhibit VWF and have designed antidote-oligonucleotides able to reverse aptamer activity within minutes. Initial data demonstrates that anti-VWF aptamer is a favorable substitute for rTPA as it has the ability to lyse blood clots, without an increased risk of hemorrhage. The purpose of this study is to evaluate the efficacy of anti-VWF aptamer and antidote in a murine thrombosis model. We hypothesized that anti-VWF aptamer would alleviate induced thrombosis, allowing physicians to treat stroke as effectively as rTPA but without the dangerous bleeding complications. Anesthetized mice were intubated and placed on a ventilator with intravenous access. Ferric chloride was then placed on the carotid artery to cause thrombosis and vessel occlusion. At specific time points after occlusion, either saline, anti-VWF aptamer, or a combination of aptamer and antidote were intravenously injected at varying concentrations. The results support the hypothesis that using aptamer after a thromboembolic stroke can reestablish blood flow. This study has the potential to provide tailored drug-antidote pairs in response to pathological thrombosis, improving patient outcomes.
Abstract: Renal cell carcinoma (RCC) is the most common type of kidney cancer in adults. The first line of treatment are tyrosine kinase inhibitors (TKIs), which inhibit vascular endothelial growth factors (VEGFRs), leading to inhibition of angiogenesis and delayed tumor growth. A commonly prescribed TKI known as Pazopanib inhibits VEGFRs 1-3 and platelet-derived growth factor receptors. This drug leads to serious cardiac side effects in 50% of patients, including hypertension, heart failure (HF), and myocardial ischemia. We believe that certain human populations are more susceptible to the cardiac side effects of Pazopanib and our goal is to gain a greater understanding of the mechanisms of these off-target effects as well as develop diagnostic tools to identify patients who would be more susceptible to this drug. We are currently using the murine mouse model to study the effects of Pazopanib in-vivo. Our data suggests that 8 week old mice treated with Pazopanib for 42 days have significantly increased blood pressure compared to control mice. Furthermore, our electrophysiological studies on isolated cardiomyocytes have revealed delayed after-depolarizations and prolonged action potentials, which are precursors to ventricular arrhythmias. These findings resemble the early side effects seen in humans and warrant further investigation. To observe TKI-induced HF we plan to repeat this experiment using two susceptible mouse populations. The first population will undergo transverse aortic constriction, a well-established procedure that has been shown to accelerate hypertension and HF. The second population will be null for a cardiac isoform of a cytoskeletal protein, beta-II spectrin in order to study the effects of this therapy in a structural heart disease model. These studies will allow us to unravel the mechanisms of Pazopanib cardiotoxicity and potentially lead to the development of novel diagnostic tools.
Abstract: The practice of stereotactic radiosurgery (SRS) dates back to 1951 with Swedish Neurosurgeon Lars Leksell. However, in an age where cancer diagnosis and treatment has become so prevalent, results from clinical techniques such as SRS have become more significant. The two most commonly used methods for performing SRS are Gamma Knife (GK) and External Beam Radiotherapy/Linear Accelerator (LINAC). While the two methods have been clinically performed independently, very few attempts to compare the applied treatment methods have been made. As each treatment method has its own advantage and disadvantage over the other, blindly selecting one treatment method will not be an optimum decision for patients, which may result in less treatment efficacy. In this study, we compare and evaluate these two treatment methods by simulating patient treatments using the patient's identical images, critical structures, and target volumes. The process of obtaining the results involves comparing the dosimetry and other quantities in the simulated treatment plans produced from Gamma Knife and LINAC methods, such as the dose distribution to the tumors and the organ at risks, the treatment time, and the patient's tolerance. A previous LINAC-based treatment data is sent to the GK system for Gamma Knife treatment simulation and vice versa, a Gamma Knife-based treatment data is sent to LINAC-based system for a side-by-side comparison. I have completed a portion of data sample which includes metastatic disease and acoustic schwannoma and obtained some preliminary results. Using the results, cancer health professionals can more confidently make the decision of what method of SRS to deliver, maximizing the cancer tissue treated and doing the least harm to the healthy tissue surrounding the malignancy. The implications of this research should lead to continued comparative examination of these SRS methodologies and their effectiveness to treat the patients' target volumes, leading to more patient benefits.
Abstract: Nearly 50% of U.S. adults report consuming one or more dietary supplements daily. Dietary supplements may have health benefits, but some interact negatively with certain medications. For example, vitamin E combined with NSAIDs increases bleeding time. The potential for supplement/drug interactions is increased in older adults who take multiple drugs for chronic diseases. However, little is known about supplement use in this population. This study's purpose was to describe dietary supplement use by older adults with chronic conditions. This descriptive, cross-sectional study analyzed data from a parent study about chronic wounds conducted at the OSU Clinical Research Center. At baseline, participants (n=40) completed a sociodemographic questionnaire and a questionnaire about dietary supplements (13 questions). Descriptive statistics were used to characterize the data. Twenty-five of the 40 participants (62.5%) reported taking ≥1 dietary supplement/day. The mean age of supplement users was 65 years (SD=8.51) and the majority were men (64.0%), Caucasian (68.0%), with at least some college education (72.0%) and an annual income SD= 6.46) prescription drugs/day and 21 (84.0%) had ≥2 chronic diseases. In summary, over half of this study's older adult sample consumed one or more dietary supplements/day. Supplement users reported having multiple chronic conditions requiring numerous prescription drugs (2-23/day). Given the risk for negative supplement/drug interactions, it is critical that clinicians assess for supplement use and provide patients with evidence-based information about potential interactions. Future studies using larger, more diverse older adult samples may clarify the extent of supplement use in this population.
Abstract: The number of chronically critically ill (CCI) [i.e. patients recovering from an extended intensive care unit (ICU) stay] is expected to reach 600,000 within a decade with associated hospital costs nearing $60 billion annually. Increasingly, these patients are discharged to long-term acute care hospitals (LTACHs) for ventilator liberation and rehabilitation. Few studies describing symptom burden in patients admitted to LTACHs have been undertaken. The purpose of this study is to identify symptoms experienced in patients who require mechanical ventilation in an LTACH. This prospective observational study of 5 mechanically ventilated patients admitted to an LTACH following an ICU stay was completed in Columbus, OH. Symptoms were assessed daily using Puntillo's Patient Symptom Survey. Delirium was assessed using the Confusion Assessment Method for the ICU (CAM-ICU). Sedation state was measured using the Richmond Agitation and Sedation Scale (RASS). Validity and reliability for these instruments have been established. We calculated frequencies and determined if sedated patients were able to participate in the symptom assessment. Five patients of an average age of 60.8 and of male and female sex were enrolled in the study and assessed between 5-27 days. Patients experienced pain for 46.7% (29/62), anxiety 56.5% (35/62), fatigue 88.7% (55/62), and delirium 46.7% (29/62) of the days measured. From the total days assessed, 61% (38/62) were spent at a goal RASS (i.e., -1 to +1), 37% (23/62) deeply sedated (i.e., -2, -3) 2% (1/62) in coma, and no days agitated. Excluding the one coma day, delirium occurred on 50% (31/62) of all days assessed. This is the first study to describe continued symptom burden in patients admitted to a LTACH and may lead to better symptom recognition and management in these patients. Further studies with a larger sample size are needed to determine relationships between delirium presence, sedation state, and symptom report.
Abstract: Critical care nurses are often distracted or interrupted in their daily work caring for seriously ill patients in the fast-paced, high-tech Intensive Care Unit (ICU) setting. Distractions can lead to poor patient outcomes if they result in mistakes in practice. Nurses respond to distractions in a number of ways, such as acknowledging the distraction, multitasking, or interrupting the task at hand. Much of the literature focuses on medication errors, but little is known about events and responses leading to the error or other distracted patient care tasks. The purpose of this project was to describe distraction and nurses' response to distractions during bedside care in the ICU. Specifically, we aimed to describe (1) tasks distracted/interrupted, (2) sources of distraction, (3) how distractions were managed, and (4) nurses' perceptions of distractions during bedside care. Four nurses, with 1-27 years' (mean=10.25 years) experience were observed during four 15-minute patient interactions in an ICU. Following these observations, the nurses were debriefed about what they found to be distracting and what they were thinking/feeling during the observation. These 16 observations (~4 hours total) and the debriefing interviews were coded and analyzed using basic qualitative description and constant comparison in Atlas.ti. Forty-four distractions were observed, half (22;50%) were interruptions. Tasks most commonly interrupted were patient assessment (n=24) and medication preparation/administration (n=12). Alarms and monitors were the most frequent sources of distraction (n=14), followed by coworkers (n=12). Nurses often reported distractions by coworkers to be beneficial to their practice and patient care, but identified missing or out-of-reach equipment and alarms and monitors as "true" distractions, which accounted for 4 and 14 distractions, respectively. These findings are consistent with the literature that medication preparation/administration is commonly disrupted. However, this study goes a step further to address disruptions of other important nursing tasks and nurses' perceptions of those distractions.
Category: Clinical Health Sciences

Title: Evaluation of interrater reliability for coding of types of gazes in nurse-patient dyads

Student Presenter: Alexandria Martz

Faculty Advisor: Wills, Celia

Abstract: The purpose of this secondary analysis project was to describe and evaluate processes of interrater reliability assessment based on 13 videotapes of ICU nurse-patient dyads that were collected as part of a prior study (Happ et al., 2004). The videos were coded for four types of gazes (relating, assessing, technical doing, listening) during nursing care in the Medical (MICU) or Cardiothoracic Intensive Care Unit (CTICU). Interrater reliability is important to establish in research data collection, codebook development, and standardized nursing assessments in clinical practice. Steps described by Lombard et al. (2010) constituted the overall framework for interrater reliability assessment for the coding of gazes for the videotaped nurse-patient dyads. Raw percentage agreement for the four types of gazes was calculated by dividing the number of times the data collectors agreed by the total number of gazes per videotape within and across the videotapes. Overall, the coders agreed in the coding of the four visual gazes across the 13 videotapes 70% of the time, but with a substantial range of agreement from 58% to 90% for ratings of individual videotapes. The overall percentage was lower than the target goal of at least 75% agreement per videotape, with only one gaze, "relating," achieving a percentage agreement (90%) exceeding 75%. Sources of disagreement in coding arose from formative clarifications of the codebook definitions, but evolved over time to improved agreement for coding as the codebook was refined. As definitions were clarified during the coding process, fewer disagreements in coding of the gazes were found over the 13 videotapes. The raw percentage agreement could be improved by rating more training videos to better refine the codebook prior to the official coding of the videos. Further research could use the Kappa coefficient method of establishing interrater reliability, which adjusts for agreement that occurs by chance.
Category: Clinical Health Sciences

Title: Assessing cortical thickness in Tibiae using sonography: A pilot study

Student Presenter: Sundus Mohammad

Faculty Advisor: Evans, Kevin

Abstract: Skeletal fragility becomes more prevalent with age as individuals experience bone loss and microstructural deterioration. Fracture risk grows exponentially with age and the presence of bone disease, especially osteoporosis. Approximately 200 million people worldwide have osteoporosis and 8.9 million osteoporotic fractures occur each year. In recent literature, the thickness of cortical bone in long bones has increasingly gained attention due to its contributions to the resistance of bone fracture. As a result, it is imperative to explore a safe and cost-efficient modality that can accurately assess the cortical bone. Dual Energy X-ray Absorptiometry and Computer Tomography (CT) are the primary imaging modalities for evaluating bone quality. However, the existence of a non-ionizing imaging modality, equal in sensitivity to CT measurements, to assess cortical bone, is lacking. Therefore, the purpose of this study is to determine the efficacy of sonography to measure cortical bone thickness. A preclinical research approach will be used to evaluate a cohort of 5 cadavers (10 lower extremities). Tibial length was determined by measuring the distance between the distal tip of the medial malleolus and the medial tibial plateau and four measurement sites were defined from the medial malleolus (4, 38, 50, and 60%). Three measurements were taken at each site with CT and sonography to represent the anterior, medial, and lateral portions of the tibiae. Currently, Pearson correlation coefficients are being utilized to determine the strength of association between the two imaging methods (alpha = 0.05). Data processing is underway and will be completed before the 2017 forum. Since the sample size is small, these comparisons will be used as pilot data to warrant further research. With osteoporosis on the rise, and thereby fracture risk, it is essential to explore imaging modalities that can accurately determine cortical bone thickness in a safe and efficient manner.
Title: Application of Novel Targeted RNAseq assay, OSU SpARKFuse, for gene fusion detection in Cholangiocarcinoma

Student Presenter: Karan Naik

Faculty Advisor: Roychowdhury, Sameek

Abstract: The genetic footprint of cancer has provided critical insights into effective treatment options for patients. Kinase gene fusions, such as ALK rearrangements in non-small cell carcinoma, have been treated successfully with kinase inhibitors in the clinical setting. Therefore, novel sequencing assays identifying driver fusions in cancers can expand opportunities for treatment in patient populations. To achieve this, we designed OSU-SPARKFuse (SPanning Actionable RNA Kinase Fusion), a targeted RNA sequencing assay for the detection of kinase gene fusions. We hypothesize that our targeted RNAseq approach will enable us to discover novel fusions in cancer. We chose cholangiocarcinoma as a pilot cohort as previous research has implicated fibroblast growth receptor factor (FGFR) as a recurrent gene fusion in this disease. We extracted genetic material from 36 archived formalin-fixed paraffin-embedded tumor samples of the cholangiocarcinoma subtype. Upon extraction of RNA and appropriate quality control analysis, cDNA libraries were prepared, hybridized to custom probes, and sequenced on the IlluminaTM HiSeq platform. Bioinformatics analysis was performed using Bowtie and STAR for sequence alignment while employing ChimeraScan and TopHat-Fusion for fusion detection. Our initial analysis of 36 samples, identified 2 known fusions, FGFR2-CCDC6 (chr10:123243211-chr10:61612459) and BICC1-FGFR2 (chr10:60422069-chr10:123239434) along with various putative novel fusions such as FGFR2-LRRCC1 (chr10:123243211-chr8:86042153). Further verification will elucidate the validity of these potentially novel translocations, laying the foundation for characterization. This will be performed both in vitro and in vivo models to assess effects on proliferation, gene expression, and sensitivity to FGFR inhibitors. OSU SpARKFuse is a novel, clinical-grade assay developed to enhance fusion detection capabilities in both fresh and archived samples. This work will pave the way for better understanding of driving mechanisms of oncogenesis and enhanced development of targeted cancer therapies.
Category: Clinical Health Sciences

Title: Long-term recovery of knee function and muscle strength in young individuals after anterior cruciate ligament reconstruction

Student Presenter: Rhema Nicoll

Faculty Advisor: Schmitt, Laura

Abstract: Anterior cruciate ligament (ACL) tears are debilitating injuries typically treated with ACL reconstruction (ACLR) to restore joint stability. While a significant number of individuals after ACLR demonstrate decreased knee function and muscle strength at the time of return-to-sport, less is known regarding long-term recovery of function and strength. The purpose of this study was to: 1) examine the proportions of individuals 5 years post-return-to-sport after ACLR that met recommended cutoffs for quadriceps femoris (QF) strength, single-leg (SL) hop tests, and self-reported functional recovery, and 2) determine if meeting cutoffs for QF strength and hop tests would predict self-reported functional recovery. 23 participants (78% female; mean age: 22.3 ± 2.3 years) were tested 5 years post-return-to-sport after ACLR. The following SL hop tests were performed: single-hop (SH); triple-hop (TH), crossover-hop (CH); and timed-hop (TiH). QF strength was assessed using an isokinetic dynamometer. Limb-symmetry indices (LSI) were calculated for hop and strength measures as follows: (involved/uninvolved) * 100%. Self-reported function was measured using the Knee injury and Osteoarthritis Outcome score (KOOS) subscales. Recommended cutoffs from the literature for hop and strength measures were LSI ≥ 90%. Functional recovery was defined from the literature as the following KOOS scores: > 90-Pain, > 84-Symptoms, > 91-ADL, > 80-Sport, and > 81-Quality-of-Life. The association between meeting cutoffs for strength and hop tests and reporting functional recovery were examined using logistic regression (α = 0.05). Proportions of participants reporting functional recovery on the KOOS subscales were as follows: Pain: 78%; Symptoms: 70%; ADL: 96%; Sports: 74%; QOL: 70%. Proportions of participants meeting the cutoffs for LSI on hop and strength tests were as follows: SH: 100%; TH: 96%; CH: 100%; TiH: 96%; QF strength: 96%. There were no associations between meeting cutoffs for QF strength and hop tests and functional recovery on any KOOS subscale. Although a high proportion of participants met cutoffs for hop and QF strength tests, less reported functional recovery. Further study is needed to understand factors related to long-term functional recovery after ACLR.
Category: Clinical Health Sciences

Title: Kinematic analysis of infants' reaching patterns to identify cerebral palsy

Student Presenter: Brooke Ott

Faculty Advisor: Heathcock, Jill

Abstract: Neonatal stroke (NS) affects one in 4,000 infants. These strokes occur between 28 weeks before and 4 weeks after birth and are a leading cause of hemiplegic cerebral palsy (CP), which affects one side of the body more than the other and makes motor development and movements difficult. Infants are not typically diagnosed with CP until 18-24 months, when they begin to present obvious symptoms or a delay in gross motor skills. Our hypothesis was that the kinematic reaching data would have identifiable differences that could contribute to the diagnosis of CP earlier. In this study, the arm movements of participants between 8 to 12 weeks of age were recorded using a 10-camera motion capture (Vicon) system. The participants were placed in an infant chair that allowed free movement of the arms. Reflective markers were placed on the infants' hand to detect movements in 3D space. In some trials, participants were encouraged to reach for a toy or were talked to in order to encourage movement. The Vicon camera data was analyzed using MatLab in order to calculate kinematic data. No differences were observed in arc length and number of reaches. Since these infants were studied at 8-12 weeks, it is possible that it is too early to identify symptoms of CP at this age. In addition, infants with NS often show periods of neurological asymptomatology and it might be difficult to detect group differences. In the future, this study plans to look at differences between unilateral trials, bilateral trials and lack of a toy.
Abstract: Medication adherence of antiretroviral therapy (ART) is a critical factor of the quality of life in people living with HIV/AIDS. Near perfect levels of medication adherence is needed to optimally suppress viral load, though they are not frequently achieved. African American women constitute as the biggest group of women living with HIV/AIDS. Currently, the relationship between medication adherence and African American HIV-positive women is not clearly understood, but is vital to the livelihood of this population. We performed a systematic review in order to understand what factors influence medication adherence in African American HIV-positive women. We examined peer-reviewed studies published between 2006 and 2016 using a variety of databases. An initial search yielded 808 studies, of which 14 studies met our inclusion criteria. Conspiracy beliefs, medical mistrust, social support, stigma, and depression appear to impact medication adherence in this population. Healthcare providers must foster trusting relationships with their patients, be able to identify barriers of emotional support, and address mental health in their treatment plans.
Abstract: Dementia is a leading cause of dependence and a common comorbidity in older women who are also diagnosed with breast cancer. This project is significant in that many older breast cancer patients are also diagnosed with dementia, which can impact diagnosis and treatment of the malignancy. The purpose of this research is to enhance the care of the older person with cognitive deficits. The aims of this project are to describe the incidence, demographic characteristics and identify the types of cognitive deficits in older breast cancer patients as detected by the clock-drawing test (CDT). This prospective, descriptive study included women aged 70 years and over with a diagnosis of breast cancer. Any stage of breast cancer and type of treatment were included. Patients were consented and surveyed during a medical oncology provider visit. Participants completed the CDT in approximately 5 minutes. The CDT is a screen for cognitive disabilities which considers the size of the clock, graphic difficulties, stimulus-bound response, conceptual deficit, spatial and/or planning deficit and perseveration. Data were qualitatively analyzed by organizing into groups of similar errors. The mean age (n=42) was 78 years. Approximately, 25 (59.5%), were diagnosed with infiltrating ductal carcinoma with 11% metastatic. 71.4% (30) patients scored abnormal on the CDT. Ten (10) people (23.8%) exhibited distorted perceptions of clock size. Six (6) people (14.3%) showed conceptual deficits and 22 (52.4%) had spatial/planning deficits. Five (5) people were found to have perseveration deficits (11.9%). Only one patient showed stimulus bound responses and one exhibited graphical difficulties. Nine (21.4%) participants were found to have two or more abnormalities in the categories. Many older patients diagnosed with breast cancer exhibit some abnormality on the CDT. Most abnormalities were spatial/planning difficulties. Dementia screening should be part of the comprehensive physical assessment of the older person diagnosed with cancer.
Category: Clinical Health Sciences

Title: Relationship between previous lower extremity injury history and functional performance in high school athletes

Student Presenter: Alex Popken

Faculty Advisor: Onate, James

Abstract: Research has shown an association between previous injury history and increased risk of lower extremity (LE) musculoskeletal (MSK) injury; however, the cause of this potential relationship is unknown. Asymmetry resulting from MSK injury is one potential cause of this association. The purpose of this study was to determine if functional performance symmetry differs among individuals with/without a history of LE MSK injury. Prior to the start of their competitive sports season, 3,765 male (age=15.65±1.23 years, height=1.77±0.09m, weight=74.34±16.38kg) and 1,874 female (age=15.51±1.17 years, height=1.65±0.07m, weight=60.26±9.94kg) high school athletes completed a health history questionnaire and a series of functional assessments as a part of the Functional Pre-participation Physical Evaluation. Assessments consisted of an anterior single leg hop for distance (SLHOP), single leg anterior reach (SLAR), weight-bearing dorsiflexion lunge (DF), and the impression landing error scoring system (iLESS). These tests were used as assessments of LE power generation, postural control, range of motion, and neuromuscular control respectively. Limb symmetry indices (LSI) were calculated for DF, SLAR, and SLHOP. iLESS was scored as high or low-risk landing pattern. Mann-Whitney U tests were used to analyze differences between individual with/without previous injury for DF, SLAR, and SLHOP LSI. A chi-square test was used to determine if iLESS risk category was associated with previous injury. Statistical significance was determined a priori at 0.05. There were no statistically significant differences for SLHOP (p=0.77), SLAR(p=0.603), and iLESS (p=0.32). DF LSI was significantly different between groups (p=0.019). The Cohen’s d effect size associated with this difference was 0.11, indicating this difference was not clinically meaningful. No other relationships were significant or meaningful. Additional factors that may contribute to the potential relationship between previous and future injury include lack of proper rehabilitation and uncorrected poor functional mechanics.
Abstract: Bias affects everyone, including respiratory therapists. Lung cancer patients as a population are often stigmatized and treated differently due to negative associations with smoking and poor lifestyle choices. This is a problem in healthcare when lung cancer patients are not given a higher standard of care due to biases held against them. The purpose of this study is to examine explicit and implicit bias respiratory therapists may hold towards lung cancer patients, and to complete an intervention to help manage bias. This descriptive study will measure lung cancer implicit and explicit bias in currently practicing respiratory therapists both before and after the participants have engaged in an unconscious bias management workshop. The goal of the workshop is to help respiratory therapists acknowledge their bias, and to help them improve thoughts and behaviors in future encounters with lung cancer patients. The workshop facilitator is certified through the Cook-Ross Unconscious Bias Learning Lab, and previous results indicate that unconscious bias can effectively be managed through intervention. Preliminary results indicate that participants have strong or moderate implicit associations between LCA and negative words on pre-workshop measures of implicit bias. In addition, most participants do not feel implicit bias has an effect on patient interactions. Additional data collection and analysis will occur following the unconscious bias management workshop. Based on previous research, it is expected that awareness of the negative effect of implicit bias on patient care will improve, and that participants will indicate an intention to change their patient care behaviors following the unconscious bias management workshop.
Identifying gait patterns that minimize impact forces on the knee while improving forward momentum, an indicator of running efficiency, may be beneficial for practitioners interested in optimizing running performance. The purpose of this study was to determine how tibial angle at initial contact (TA-IC) impacts knee joint loading and change in forward momentum during running (anterior-posterior ground reaction force impulse; APImp). We hypothesized that landing with a posteriorly directed TA-IC would result in greater knee joint loading and reduced APImp. Eight healthy female division 1 collegiate cross-country runners (age=19.5±1.07 years, height=1.65±0.08 meters, weight=55.66±4.36 kilograms) participated in this study. Participants performed running trials at a self-selected 5k race pace while 3D kinematics and kinetics were recorded using a Vicon Mx40 camera system (Vicon Motion Systems; Oxford, UK) and Bertec 4060 force platforms (Bertec Corp; Worthington, OH) embedded in the floor. Spearman's rho correlations were performed to determine relationships between the independent variable TA-IC at initial contact, and dependent variables APImp, peak knee abduction moment (PKAbM), peak knee extension moment (PKEM), and peak tibial compressive force (TibCompF) during the stance phase of running. Statistical significance was determined a priori at p≤0.05. TA-IC was significantly related to APImp for both dominant (ρ=-0.76, p=0.04) and non-dominant (ρ=-0.86, p=0.006) limbs. No significant correlations were found for either dominant or non-dominant limbs between TA-IC and PKEM (ρ=-0.31, p=0.462; ρ=-0.43, p=0.299), PKAbM (ρ=-0.48, p=0.243; ρ=-0.45, p=0.268), TibCompF (ρ=0.00, p=1.000; ρ=0.19, p=0.665). Landing with a forward tibial angle at initial contact may improve forward momentum without concurrently increasing knee joint loads associated with overuse running injuries. Focusing on gait adaptations such as shorter, faster strides, and increased forward lean may help to optimize running performance by improving tibial forward lean at foot contact.
Category: Clinical Health Sciences

Title: Exploring self-efficacy and leadership using peer learning in interprofessional clinical simulation: exploration of respiratory therapy, medical dietetics and pharmacy

Student Presenter: Shelby Russell

Faculty Advisor: Sergakis, Georgianna

Abstract: Interprofessional (IP) clinical simulation has become a major component to education among the various healthcare professions. IP education is required of medical dietetic, pharmacy, and respiratory therapy programs as part of their accreditation standards. Although the specifics of fulfilling the IP requirement are not standardized, many programs use IP clinical simulations in order to prepare their students for patient care experiences as part of the healthcare team. Several studies have illustrated the beneficial impact of IP education, IP simulation, peer-teaching and preceptor training on student learning, self-efficacy, teamwork dynamics, and communication. Questions remain if this success will translate to peer teaching within an IP simulation model. This study explored the effects of peer-teaching during IP clinical simulation among respiratory therapy, medical dietetics, and pharmacy students to assess their perceptions and self-efficacy in the peer teaching and learning roles before and after the standardized IP clinical simulation. Open-ended questions were also used to further evaluate the simulation experience. Eighty-three students participated: 43 Medical Dietetics, 11 Pharmacy, and 29 Respiratory Therapy. Changes in self-efficacy ratings were assessed via paired t-tests. Differences in self-efficacy by program were also examined. No significant differences were found among peer teachers' self-efficacy ratings, but a statistically significant difference did exist among peer learners for some items. Qualitative data suggests that both groups gained confidence as well as received encouragement in their skills through this experience. Findings suggest that this model is beneficial and viewed as a positive experience by both the peer teacher and the peer learner. Pharmacy, Medical Dietetics, and Respiratory Therapy students noted an increase in self-efficacy for their professional roles and leadership abilities that will be essential in future professional interactions.
Abstract: Cochlear implants (CIs) are a technology thirty years young. Their transformation throughout this time has made them more precise, common, and effective. However, there are still many unanswered questions surrounding these devices, particularly the broad variability of speech recognition outcomes in cochlear implant users, which continues to frustrate patients, clinicians, and researchers alike. While some users have speech recognition abilities comparable to normal hearing individuals, other users can recognize less than 10% of words in quiet. To investigate the variability of CI outcomes, we studied speech recognition and the cognitive abilities of those who use an implant in comparison to their age-matched normal hearing (NH) counterparts, using a test battery of both verbal and non-verbal tests of cognition in a non-auditory fashion. Speech recognition was assessed for words and sentences (in quiet for CI users, noise-vocoded versions for NH controls). The cognitive test battery consisted of tasks of rapid word and nonword reading, vocabulary, working memory, perceptual organization, and nonverbal IQ. Preliminary findings suggest that better performance on tasks of word and sentence recognition are associated with better rapid word and nonword reading, better perceptual organization of visually degraded sentences, and nonverbal IQ in both groups, along with working memory in the NH controls. Interestingly, CI users demonstrated better group mean performance than NH peers on a task of working memory of visual symbols, but poorer performance on nonverbal IQ. Findings from this study will assist us in developing a more comprehensive understanding of how cognitive factors influence outcomes for individuals with CIs.
Category: Clinical Health Sciences

Title: Effects of fish oil supplementation on protease levels in the microenvironment of chronic venous leg ulcers: a randomized clinical trial

Student Presenter: Michelle Sales

Faculty Advisor: McDaniel, Jodi

Abstract: In the U.S. alone, the average annual incidence of chronic venous leg ulcers (CVLUs) in individuals aged 65+ is 2.2% with payer burden reaching $15 billion. Adjunct therapies may reduce rising prevalence rates. High levels of neutrophil-derived proteases in CVLU microenvironments are associated with nonhealing. Components of fish oil, (eicosapentanoic acid [EPA] and docosahexanoic acid [DHA], reduce neutrophil activity, but have not been tested in CVLU patients. The purpose of this randomized, controlled study conducted at the OSU Clinical Research Center was to determine effects of EPA+DHA therapy on neutrophil-derived protease levels in CVLUs. For 8 weeks, Active Group participants (n=16) consumed EPA+DHA supplements and Control Group participants (n=19) consumed placebos. Wound fluid was collected at 0, 4 and 8 weeks to quantify proteases: matrix metalloproteinase-8 (MMP-8), human neutrophil elastase (HNE). Sociodemographic and body mass index (BMI) data were collected. Descriptive statistics, t-tests and Spearman's Rho were used to analyze data. On average, the group's age was 60.60 years (SD=11.96); BMI was 41.65 (SD=11.51). The majority were male (60%), Caucasian (74%), and lived alone (51%). No significant differences in age or BMI emerged between groups. Significant negative relationships were detected between MMP-8 and healing at Week 8 (p=0.040), and HNE and healing at Week 4 (p=0.024) and Week 8 (p=0.015). There were no significant differences in protease levels within or between groups. In summary, the data indicates that higher levels of neutrophil-derived proteases are associated with slower healing. They also suggest that 1) EPA+DHA therapy may not alter neutrophil activity locally, or 2) the study dose was insufficient, or 3) the sample size was inadequate. High BMIs suggest that interventions to help CVLU patients reduce weight may improve their overall health. Additional studies are needed to test higher EPA+DHA doses for longer intervals in larger, diverse samples of CVLU patients.
Abstract: Debilitating anterior cruciate ligament (ACL) injuries among the skeletally immature population continue to increase. Consequently, innovative pediatric ACL reconstruction (pACLR) surgical techniques specifically designed to avoid growth plate disturbance in children and adolescents with this injury have recently been developed. However, very little is known regarding function and muscle strength recovery early after pACLR. The purpose of this preliminary study was to examine muscle strength and self-reported knee function for young individuals between 3 and 9 months post-pACLR. 11 young males (mean age: 11.5±2.1 years) after unilateral, epiphyseal-sparing pACLR (mean time post-surgery 5.1±2.2 months; 73% iliotibial band autograft pACLR, 27% hamstring tendon autograft pACLR) participated in this study. Isometric quadriceps and hamstring strength data were collected using an isokinetic dynamometer. Limb symmetry indices (LSI) were calculated for all strength measures using the following equation: \[(\text{involved value/}\text{uninvolved value})*100\%\]. Self-reported knee function was assessed using the 5 subscales of the Child-Knee Injury and Osteoarthritis Outcome Score (KOOS) and the pedi-International Knee Documentation Committee (IKDC) subjective knee form. To evaluate recovery, the following cutoffs were used to represent normalization of muscle strength and knee function, based on literature: LSI on quadriceps and hamstring strength tests≥90%, pedi-IKDC score≥90, and Child-KOOS subscales scores≥90. The proportions of participants meeting these cutoffs were as follows: quadriceps strength: 27%, hamstring strength: 46%, pedi-IKDC: 36%, Child-KOOS pain: 64%, Child-KOOS symptoms: 36%, Child-KOOS activities of daily living: 91%, Child-KOOS sport: 46%, and Child-KOOS quality of life: 27%. Although a larger sample size is needed, the preliminary findings from this study demonstrate that children from 3 to 9 months post-pACLR exhibit deficits in muscle strength and knee-related function. Further study and additional participants will provide insight into strength and functional recovery after pACLR in order to help guide rehabilitation in this unique patient population.
Abstract: The roles and responsibilities of a respiratory therapist have evolved and expanded significantly since the start of the profession. With these expanding roles and the overall shortage of healthcare workers, it is more important than ever that respiratory therapists are prepared for these expanded roles. With both associate’s and bachelor’s degrees in respiratory therapy still prevalent nationwide, it is important to understand how much education is needed to provide safe, effective, and quality patient care. The purpose of this study is to describe respiratory therapy department directors’ preferences regarding educational preparation and background of staff respiratory therapists, as well as their current and anticipated hiring practices. A one-shot case study will be conducted using a descriptive survey to obtain data for analysis. Survey questions include information regarding the educational background of staff therapists, preferences of hiring managers, and reasons for these preferences. Members of the respiratory therapy network within Vizient, the nation’s largest member-owned health care services company, will be surveyed. A link to the survey will be sent in an email that invites the respiratory therapy department directors to participate. Preliminary results indicate that respiratory therapy department directors prefer to hire graduates with bachelor’s degrees, and they anticipate that they will continue to prefer to hire graduates with bachelor’s degrees in the future. Data collection is ongoing. It is anticipated that results will indicate that the educational preparation of respiratory therapists for entry into the profession will need to move beyond the associate’s degree in the near future in order to meet the needs of respiratory therapy departments and the patients they serve.
Abstract: Re-injury after anterior cruciate ligament reconstruction (ACLR) and return-to-sport (RTS) occurs in approximately one in four young athletes. Elastic storage of energy in connective tissue, including the ACL, contributes to energy dissipation during dynamic tasks and could increase injury risk if energy absorption exceeds tissue capacity. The purpose of this study was to determine whether the energy dissipation strategy during landing differed among individuals who underwent primary ACLR and suffered 2nd ACL injury, individuals who underwent primary ACLR and did not suffer 2nd ACL injury, and healthy controls (HC). 169 participants at RTS after primary ACLR, and 57 HC, without history of lower extremity injury, completed a drop vertical jump (DVJ) maneuver measured using 3D motion capture. Hip, knee, and ankle energy dissipation of both limbs were calculated during the landing phase of the DVJ. ACLR participants were tracked over time to determine if 2nd ACL injury occurred (RETEAR Group). A 2x3 MANOVA was performed to examine interaction effects of side (uninvolved vs. involved for ACLR; preferred vs. non-preferred for HC) and group (HC, ACLR, RETEAR) for energy dissipation at the hip, knee, and ankle (Alpha level =0.05). An interaction was found at the knee, where both ACLR groups dissipated significantly less energy on the involved side than the uninvolved side, compared to the control group, which showed no difference between limbs (HC=65.3 vs 72.1, ACLR=59.2 vs 83.8, RETEAR=61.5 vs 83.9, p=0.003). Participants in both ACLR groups dissipated more energy with the hip than HC (HC=6.8, ACLR=17.2, RETEAR=14.7, p<0.001). After ACLR, patients adopt a side dominant energy dissipation strategy during landing compared to healthy controls. However, this may not be related to 2nd injury risk. Future work should investigate how lower extremity energy dissipation in each plane relates to 2nd injury risk, as opposed to cumulative energy dissipation.
Category: Clinical Health Sciences

Title: Gastric residual characteristics in the NICU: a systematic review

Student Presenter: Lauren Siebenaler

Faculty Advisor: Steward, Deborah

Abstract: For premature infants in the neonatal intensive care unit (NICU), it is common practice to check gastric residuals before each enteral feeding due to immaturity of the gastrointestinal (GI) tract. Gastric residuals are monitored to assess for developing feeding intolerance or necrotizing enterocolitis. For those NICUs who practice routine monitoring, there is variability in defining what specific characteristics are critical when deciding whether the obtained gastric residual is clinically significant. Decisions are typically based on color, consistency, and volume of the gastric residual in conjunction with the infant's abdominal assessment. Interpretation of the gastric residual color is subjective in nature compared to other characteristics of the gastric residual. Enteral feedings may be withheld based on the findings of this assessment and prolong the reliance on parenteral nutrition. The purpose of this systematic review was twofold: (1) to determine when the color of a gastric residual is deemed clinically significant in the NICU and (2) to highlight the subjective nature of determining gastric residual color. Research from the last 10 years was reviewed related to gastric residuals in premature infants. Databases searched included PubMed and CINAHL. Search terms included gastric residual, color, bile/bilious, NICU, feeding intolerance, necrotizing enterocolitis, and premature infant. Preliminary results suggest that terms such as bilious and hemorrhagic are used to describe clinically significant gastric residuals. However, when NICU healthcare workers are asked to identify bilious gastric aspirates from simulated gastric residuals, colors such as dark green and black are consistently selected but there is significant variability when selecting among gradations of yellow and green. The subjectivity associated with determining a clinically significant gastric residual by color can result in clinical decisions to slow or withhold an enteral feeding. This has important ramifications for the overall nutritional intake and growth of premature infants.
Title: Exploring self-efficacy and leadership using peer learning in interprofessional clinical simulation: exploration of respiratory therapy, medical dietetics and pharmacy

Student Presenter: Kaylee Siffert

Faculty Advisor: Sergakis, Georgianna

Abstract: Interprofessional (IP) clinical simulation has become a major component to education among the various healthcare professions. IP education is required of medical dietetic, pharmacy, and respiratory therapy programs as part of their accreditation standards. Although the specifics of fulfilling the IP requirement are not standardized, many programs use IP clinical simulations in order to prepare their students for patient care experiences as part of the healthcare team. Several studies have illustrated the beneficial impact of IP education, IP simulation, peer-teaching and preceptor training on student learning, self-efficacy, teamwork dynamics, and communication. Questions remain if this success will translate to peer teaching within an IP simulation model. This study explored the effects of peer-teaching during IP clinical simulation among respiratory therapy, medical dietetics, and pharmacy students to assess their perceptions and self-efficacy in the peer teaching and learning roles before and after the standardized IP clinical simulation. Open-ended questions were also used to further evaluate the simulation experience. Eighty-three students participated: 43 Medical Dietetics, 11 Pharmacy, and 29 Respiratory Therapy. Changes in self-efficacy ratings were assessed via paired t-tests. Differences in self-efficacy by program were also examined. No significant differences were found among peer teachers' self-efficacy ratings, but a statistically significant difference did exist among peer learners for some items. Qualitative data suggests that both groups gained confidence as well as received encouragement in their skills through this experience. Findings suggest that this model is beneficial and viewed as a positive experience by both the peer teacher and the peer learner. Pharmacy, Medical Dietetics, and Respiratory Therapy students noted an increase in self-efficacy for their professional roles and leadership abilities that will be essential in future professional interactions.
Category: Clinical Health Sciences

Title: Exploring sugar sweetened beverage consumption and body composition among Appalachian teens

Student Presenter: Katie Skinner

Faculty Advisor: Smith, Laureen

Abstract: A factor gaining increased attention in research and clinical practice regarding adolescent obesity prevalence is sugar sweetened beverage (SSB) consumption and its role in health outcomes. Adolescents residing in rural Appalachia have the highest consumption rate of SSBs when compared to other adolescent populations. The purpose of this study was to explore SSB consumption patterns among adolescents residing in rural Appalachia. Obesity-related health outcomes - body mass index (BMI) and body fat percentage - and their relationship to SSBs were also examined. This cross-sectional study was a secondary data analysis of a sub-sample of high school aged participants enrolled in a larger randomized controlled trial. For this study, Wave 1 and Wave 2 baseline data from subjects at 11 schools was analyzed (n= 361). Descriptive and inferential statistics were conducted. Bivariate Pearson correlations, Spearman correlations and independent t-tests were conducted with a p = .05. Over one-third of subjects were classified as either overweight (21.5%) or obese (16.3%). Nearly five percent were classified as morbidly obese with a BMI over 40. Girls had a higher body fat percentage (32.8%) when compared to boys (21.3%), indicating a gender difference (t = 12.1, df = 331, p = .000). More than half of the subjects reported consuming SSBs at least four days per week, with 30% consuming SSBs seven days per week. The mean SSB servings per day was 2.8 (SD = 2.76). BMI was related to the number of SSB servings per day (r = .11, p = .05), while body fat percentage was related to the number of days per week that SSBs were consumed (r = .10, p = .05). Although this study was exploratory in nature, promoting a reduction of SSB consumption may improve obesity related health outcomes in a population that still suffers from pervasive obesity.
Category: Clinical Health Sciences

Title: The current supply, demand and future needs of the respiratory therapy workforce in Ohio hospitals

Student Presenter: Tricia Tan

Faculty Advisor: Varekojis, Sarah

Abstract: Shortages of healthcare providers have been a threat to many hospitals. This shortage dilemma might be a situation faced by the Respiratory Therapy departments in Ohio, even though the demand of RTs is forecasted to increase by 19% from the year 2012 to 2022. In 2009, Logsdon and Douce evaluated the demand and future needs of RTs in Ohio. However, between 2009 and now, there were many changes implemented into the Respiratory Care field in Ohio and there is not a current study to evaluate the demand and future needs of RTs in Ohio. Thus, this study will try to determine if Ohio is facing a RT shortage crisis and if Ohio is facing a crisis, what are the factors that contribute to these issues. The survey instrument used in this study was adapted from the 2009 study by Logsdon and Douce. Survey questions include information on departmental turnover, vacant positions, and projected staffing needs. The electronic survey was sent to a database of managers and directors of RT departments in Ohio. Standard survey methodology was utilized, including sending several reminders. Preliminary results indicate respiratory therapy departments in Ohio do have current vacancies, and managers and directors of these departments expect some additional growth in staff FTEs in the next few years. Additional data collection and analysis will occur following additional reminders to complete the survey. It is expected that results will indicate that current vacancies are related to an aging workforce and economic forces.
Abstract: Hand hygiene is recognized as the most important measure to prevent the transmission of infection. Despite evidence that infections can be transferred from contact with a patient's skin or the environment, little research has been directed toward patient-centered hand hygiene. The purpose of this study is to analyze the relationship between patient characteristics and the presence of pathogens on patients' hands. This cross-section, observational study collected bacterial samples and demographic data from 40 adult medical-surgical patients at The Ohio State University Wexner Medical Center East. Bacteria were collected using glove juice sampling procedures. Samples were then serially diluted, plated, and incubated. Aerobic colonies were counted using standard counting procedures and were statistically analyzed. Pathogen specific confirmation was performed using appropriate confirmatory tests, such as gram staining and selective media. Patient demographic data, such as sex, age, length of stay, admitting diagnosis, and isolation precautions, were abstracted from the electronic health records. Results show that 75% (21/28) of patients were positive for S. aureus, 27% (9/33) were positive for MRSA, 70% (23/33) were positive for C. difficile, 15% (5/33) were positive for C. difficile using UV light analysis, and 32% (6/19) were positive for VRE. The average number of colony forming units per mL of solution was 2.04 x 10^3, with a median of 6.63 x 10^2. Analysis of bacterial load by patient demographics is ongoing. Patients' hands harbor pathogens that are associated with healthcare-associated infections. Patient hand hygiene protocols could decrease the transmission of infection, resulting in better patient outcomes and a decrease in healthcare costs.
Abstract: Poly(methyl methacrylate) PMMA is the preferred polymer to fabricate denture base materials. However, the current processing conditions result in unpolymerized methyl methacrylate in the final denture base. This can result in lower mechanical and physical properties and potential biocompatibility issues. The current processing technique is a one cycle heat-curing: the PMMA resin is heated gradually to 75oC and remains at that temperature for 9 hours. In the new method, after initial heating, the denture base is cooled down to room temperature followed by an additional step with 120oC and 15psi. The degree to which the two-cycle method would change the denture base material remains unknown. The overall hypothesis is that this new process will improve the mechanical and physical properties of the denture base material by reducing residual monomer. The object of this study is to compare the differences in the physical properties of materials processed by two methods and assess the effectiveness of the new method. The control group is processed by one-cycle method and experiment group was processed using the two-cycle method. The hardness, color stability, solubility in water and flexural strength were measured. The specimens were immersed in the beverages for a month and then color stability is measured via a spectrophotometer. The samples were thermo-cycled for 3000 cycles and the mass differences were decided. For flexural strength and hardness, the samples were stored in water before the measurement. My current data has shown that the experimental group is harder and less soluble than the control group. The result confirms that the second cycle increases the degree of polymerization. This suggests that we can improve some properties of denture base material by using two-cycle method, which is environmentally friendly and low-cost.
Abstract: Optimal performance in runners has previously been associated with positive impulse force during foot contact with the ground, and asymmetries in impulse may result in running inefficiency. Screening of functional movement is often used to identify potential dysfunctions and asymmetries which may impact biomechanics, however there is little research to link asymmetries during screening tasks and during running. This study aimed to assess the association between asymmetries in anterior single leg hop for distance (SLHOP), thoraco-pelvic rotation (TPRot), and anterior-posterior impulse (AP impulse) during running. Anterior-posterior ground reaction forces, power (SLHOP), and pelvic range of motion (TProt) were collected for a group of seven collegiate Division I female distance runners (age=19±1.07 years, height=1.65±0.08 meters, mass=55.66±4.36 kg) using a Vicon Mx40 camera system (Vicon Motion Systems; Oxford, UK) synchronized with 6 embedded Bertec force plates (Bertec Corp; Worthington, OH). The AP impulse was calculated by taking the mean area under the curve of the average AP ground reaction force from five running trials. Mean asymmetries of 0.71 ±0.13, 0.94 ±0.32, and 0.58 ±0.25 were observed for AP impulse, SLHOP, and TProt, respectively. Spearman's rho correlations were used to assess if SLHOP and TProt asymmetries were related to AP impulse asymmetry. Statistical significance was determined a priori at p
Abstract: Longer ischemic time (IT) is associated with mortality and graft loss in heart transplant (HTx) patients. However, little is known regarding high IT predictors. Determining predictors may allow physicians to make more informed decisions regarding organ offers. Pediatric HTx between 2005 and 2015 were included in this retrospective study (N = 3,815). Possible risk factors of high IT were analyzed, including diagnosis, prior cardiac surgery, region, volume of HTx center, and distance between donor and HTx center. An equation to predict IT was created by inserting coefficient values from the multivariate regression into the standard linear regression equation. Patients from 2015 were excluded from multivariate regression and used to validate the linear equation. 67% of pediatric HTx had an IT less than 4 hours. Patients with congenital heart disease had a lower likelihood of receiving a HTx with an IT less than 4 hours compared to other cardiac diagnoses (p^2 = .527, all p
Category: Clinical Health Sciences

Title: Associations among antioxidant intake and cardiovascular health in women

Student Presenter: Patricia Woellert

Faculty Advisor: Anderson, Cindy

Abstract: One in three American women have hypertension, a disease with modifiable risk factors. One preventative measure is a diet high in vitamin C and vitamin E found through fruits and vegetables. We aimed to determine if higher intake of vitamin C and/or E was associated with lower blood pressure and improved vascular function, providing preliminary data regarding the potential effectiveness of dietary antioxidant intake on cardiovascular health among women. Using a cross-sectional design, women (n=11) completed the diet history questionnaire (DHQ), assessing nutrient intake over the previous 30 days. Blood pressure was measured based on standard procedures. Reactive hyperemic index (RHI) \( r = .7085, p = .015 \). However, vitamin C intake was not significantly associated with SBP (\( r = -.2567, p = .446 \)), DBP (\( r = .0878, p = .797 \)), or RHI (\( r = .2975, p = .374 \)). Associations among vitamin E intake and SBP (\( r = -.2932, p = .382 \)), DBP (\( r = .0137, p = .968 \)), and RHI (\( r = .5154, p = .105 \)) were not statistically significant. Although not statistically significant, there was a trend for increased vitamin C and E intake in lowering SBP and improving vascular function. With the small sample, future studies exploring the correlation between dietary vitamin C and E intake on BP/vascular function in a larger population may suggest a positive effect of these antioxidants on cardiovascular health.
Abstract: Constraint-induced movement therapy (CIMT) is a highly effective nonsurgical treatment for children with cerebral palsy (CP). However, there is limited evidence that CIMT is effective for infants and toddlers and although several randomized controlled trials (RCT) currently are underway, these results are not yet available. The BabyCHAMP (Children with Hemiparesis Arm Movement Project) Study is a RCT of CIMT for children with unilateral (hemiparetic) spastic CP or asymmetrical CP between 6 and 24 months of age. The purpose of this study is to test the efficacy of ACQUIREc, an intensive therapy designed to improve UE function in children with CP, across 3 different constraint conditions (continuous - full time cast; part-time - splint; and no constraint) as measured by change in the child's UE motor performance. In addition to standardized observational measures of motor performance (Bayley Scales of Infant and Toddler Development and the Mini-Assisting Hand Assessment), kinematic assessments of a standardized reaching protocol are performed. Assessments include 30-second trials of various scenarios to induce unilateral and bilateral reaching. A toy was held to prompt these reaching patterns and movements were recorded using reflective markers and a VICON MX - F40 motion-capture system. Preliminary analyses revealed that participants move their affected UE fewer times (10.57) than their unaffected (16.14) when a toy was present and both arms were available. Additionally, restraining the unaffected arm encouraged movement of the affected arm: the affected arm moved an average of 19.33 times with a toy present. This is one of the first quantified comparison of amount of reaching in infants and toddlers with hemiplegia.