Submission Category: Master's-level students and candidates for doctoral degrees

Anusha Alathur Rangarajan, BE, MS
ana92@pitt.edu

Department: Department of Bioengineering, Swanson School of Engineering
Affiliation: University of Pittbsurgh

Undergraduate: BE, Biomedical Engineering, Anna University
Graduate: MS, Biomedical Engineering, Carnegie Mellon Unviersity
Medical School:
PhD: Bioengineering, University of Pittsburgh

Research Interest Areas: Neuroimaging, image processing, machine learning

Research Title: Multimodal magnetic resonance imaging predicts regional amyloid deposition in the brain

Project Authors: Anusha Rangarajan, Jacob Reck, Helmet Karim, Charles Laymon, Minjie Wu, Dana Tudorascu, Beth Snitz, Annie Cohen, Chester Mathis, William Klunk, Howard Aizenstein

Abstract:
Alzheimer's disease (AD) is the most common form of dementia and identifying early markers of this disease is important for prevention and treatment strategies. Amyloid, the earliest detectable pathological change in AD is detected using positron emission tomography (PET) with the help of radio-labeled Pittsburgh compound B (PiB) but its use is restricted due to ionizing effect and cost. Having an imaging approach without exposure to ionizing radiation is especially important for studies where frequent or repetitive imaging is necessary. Developing a model to learn and predict PiB based on mulitmodal MRI can serve as an imaging tool to screen presence of amyloid. Multimodal MRI was performed in Cognitively healthy participants (N=23, Aß -ve: 15, Aß +ve: 8). T1 weighted, T2 weighted, T2 FLAIR, susceptibility weighted imaging and proton density imaging were used. PET was acquired on all subjects, which served as ground truth amyloid measurement. Imaging features based on the intensity and local information were extracted from each modality voxel-wise. Subject demographic features like gender; race, education, age and weight were extracted for subject-level analysis. We used lasso regression model to learn voxel-wise relationships between multiple MR modalities and PiB retention and then generalize multivariate regression (MVR) by learning across subjects using demographic information.The preliminary studies show feasibility of amyloid prediction. The voxel level correlation (concordance correlation coefficient) with original PiB retention was found to be (0.39±0.12); mean regional correlation (intra class correlation) was 0.88 when using leave one out cross validation. Future work will involve optimizing the prediction model and validate its robustness.

Submission Category: Master's-level students and candidates for doctoral degrees

Anusha Alathur Rangarajan, PhD
ana92@pitt.edu

Department: Department of Bioengineering/Swanson School of Engineering
Affiliation: University of Pittsburgh

Undergraduate: Anna University, Chennai
Graduate: Carnegie Mellon University
Medical School:
PhD: University of Pittsburgh

Research Interest Areas: Image Processing, Neuroimaging, Machine Learning

Research Title: Dorsal Anterior Cingulate Cortical Thickness Associated with Improvement in Worry Severity Following Treatment in Late-Life Generalized Anxiety Disord

Project Authors: Anusha Rangarajan, Helmet Karim, Howard Aizenstein, Carmen Andreescu

Abstract:
Generalized anxiety disorder (GAD) is most prevalent in older adults, however the structural and functional neuroanatomy is not well studied. We previously reported that older GAD participants have lower cortical thickness in anterior cingulate cortex, orbitofrontal cortex, and right frontal cortex (pars triangularis and opercularis) than healthy controls. The structural traits associated with improvement to treatment have yet to be studied. This study investigated whether pre-treatment volumes were associated with improvement in worry severity. Twelve older GAD participants received 12 weeks of treatment with citalopram. We measured pre/post treatment worry and anxiety using the Penn State Worry Questionnaire (PSWQ) and Hamilton Anxiety Rating Scale (HARS). We performed segmentation and extracted cortical thickness using Freesurfer. Normalized baseline cortical thickness was correlated (Pearson's correlation coefficient) to the difference in PSWQ scores. Multiple comparison correction was performed to control the false discovery rate (FDR) at $a<0.05$, and in significant regions paired-t-tests were conducted to identify volume changes post-treatment. All participants remitted following treatment (HARS, $t(11)=10.658$, $p<0.0001$; PSWQ, $t(11)=3.573$, $p=0.004$). Greater normalized baseline cortical thickness in left dorsal ACC was significantly associated with improvement in the PSWQ($r(11)=0.765$, $pFDR=0.024$), but the cortical thickness did not significantly change following treatment ($t(11)=-0.386$, $p=0.7$). Dorsal ACC is involved in explicit emotional regulation, which is affected in severe worry. We believe dACC might play a key role in worry severity response to pharmacotherapy and further validation can make this a target region for neuromodulation treatments.

Submission Category: Post-Doctoral Researchers and Fellows

Francis Amrit, PhD
francis.gandhi@chp.edu

Department: Medicine
Affiliation: University of Pittsburgh

Undergraduate: Bangalore University
Graduate: Sheffield Hallam University
Medical School:
PhD: University of Birmingham

Research Interest Areas: Aging, Reproduction and Stress

Research Support Sources: Arjumand Ghazi - R01

Research Title: The Coordination of Reproductive Success and Stress Resilience by TCER-1/TCERG1

Project Authors: Francis RG Amrit, Carter Mason, Mainpal Rana, Judith Yanowitz and Arjumand Ghazi

Abstract:
Reproduction and stress tolerance are crucial life-history traits that determine evolutionary success of all organisms. These processes share a dynamic relationship and the molecular underpinnings of these interactions are poorly understood. Here, we report a role for TCER-1, the worm homolog of human transcription elongation and splicing factor, TCERG1, in regulating reproductive ability in the face of pathogen attack. In C. elegans, eliminating germline stem cells (GSCs) increases lifespan and elevates stress tolerance. Previously, we showed that TCER-1 specifically promotes the longevity of germline-less C. elegans and is critical for reproductive health in normal, fertile animals. Many genes that promote the longevity of GSC-less adults also enhance their stress tolerance. Surprisingly, we have discovered that TCER-1 inhibited stress tolerance in adult worms. tcer-1 mutants exhibited elevated resistance against multiple biotic and abiotic stressors, including thermal stress, oxidative stress, ER stress and infection by the opportunistic pathogen Pseudomonas aeruginosa. TCER-1 impairs stress resistance by inhibiting PMK-1, a conserved innate immunity-promoting kinase. PMK-1-target genes are up-regulated in tcer-1 mutants and the immunoresistance of tcer-1 mutants is dependent upon PMK-1. Overall, our data suggest that TCER-1, promotes reproductive fitness and represses stress resilience under normal conditions. Under stressful conditions, TCER-1 is repressed resulting enhanced stress resilience and reduced reproductive capacity. Unlike most pro-longevity genes, TCER-1 appears to have distinct regulatory effects on lifespan, stress resistance, and fertility, suggesting that the protein may function as a molecular rheostat for coordinating major life-history traits.

Submission Category: Master's-level students and candidates for doctoral degrees

Yashar Aucie
yaa21@pitt.edu

Department: Bioengineering
Affiliation: University of Pittsburgh

Undergraduate: Bioengineering
Graduate:
Medical School:
PhD:

Research Interest Areas: Motor learning, adaptation

Research Title: Innovative shoes induce locomotor learning correcting step asymmetry

Project Authors: Yashar Aucie, Xunjie Zhang, Randy Sargent, Gelsy. Torres-Oviedo

Abstract:
Promising studies have shown that stroke survivors can correct gait asymmetry limiting their mobility after walking on a split-belt treadmill that moves their legs at different speeds. However, the transfer of gait improvements to over ground walking is limited. We hypothesize that gait improvements would be more general if locomotor learning induced by split- belt treadmills was induced while walking over ground. Thus, we developed a set of motorized shoes, called Nimbus, that can move the legs at different speeds while walking over ground. In this study we compared walking kinematics between subjects wearing the Nimbus shoes on a regular treadmill (n=6) vs. walking on a split-belt treadmill (n=7) to determine if locomotor learning was similar with both devises. Both groups experienced an adaptation period when the legs move at different speeds. Positions from the ankle and the hip were collected bilaterally and used to compute step length, step position, and step time asymmetry, which are known to adapt during split-belt walking. These parameters were used to contrast between groups 1) the extent of adaptation (i.e., changes in gait from early to late adaptation) and 2) the magnitude of after-effects (i.e., changes in gait before and after the adaptation period). Overall the Nimbus group exhibited locomotor adaptation and after-effects similar to the split-belt group. Both groups had same extent of adaptation (p>0.153) and same after-effects (p>0.071). In sum, our results indicate that the Nimbus shoes are portable devices that can induce error-based locomotor learning as split-belt walking, which is holds the great promise of inducing locomotor learning in patients that will improve their gait during real-life situations beyond the clinic.

Submission Category: Medical Student

Gina Bao
hlr26@pitt.edu

Department: Physical Medicine and Rehabilitation
Affiliation: Safar Center for Resuscitation Research

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Traumatic brain injury rehabilitation

Research Title: Intermittent administration of the antipsychotic drug haloperidol does not reduce the efficacy of neurorehabilitation

Project Authors: Gina Bao, Peter Niesman, Kileigh Nassau, Jody Wellcome, Isabel Bleimeister, Abigail Vipperman, Jeffrey Cheng, Corina Bondi, Anthony Kline

Abstract:
Background: Traumatic brain injury (TBI) results in impaired motor and cognition and induces agitation. It is difficult to assess and treat agitated patients in the clinic and thus haloperidol (HAL) is used to manage the maladaptive behavior. Past research has found that the chronic use of HAL impedes recovery. However, APDs may not be provided every day, so whether intermittent administration is also detrimental to recovery is still unknown. Hypotheses: Intermittent HAL to standard (STD) housed controls will be less detrimental to recovery than chronic administration in STD rats and will not reduce the efficacy of EE. Methods: TBI and Sham groups receiving intermittent or chronic HAL (0.5 mg/kg, i.p.) or vehicle (saline 1 mL/kg, i.p.) were housed in EE (6 hr per day) or STD conditions. Motor and cognitive performance was assessed. Results: Rats that received TBIs and HAL performed worse in the motor and cognitive tests than those who received TBIs with no HAL ($p < 0.05$). Rats given HAL intermittently performed better than those given HAL continuously ($p < 0.05$). Furthermore, rats exposed to EE performed better compared to STD ($p < 0.05$). Conclusions: The results support the hypothesis that HAL administered intermittently is less detrimental than once daily administration and that EE supports recovery. Moreover, if HAL was administered continuously in EE, these rats still performed better than those housed in STD conditions, indicating the significant role that EE has in aiding recovery. Significance: HAL may be used in rehabilitation to control TBI-induced agitation without negatively affecting outcome or the efficacy of rehabilitation, but only when provided intermittently.

Submission Category: Medical Student

Deaven Berry
dpb38@pitt.edu

Department: Physical Medicine and Rehabilitation
Affiliation: Safar Center for Resuscitation Research

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Traumatic brain injury rehabilitation

Research Title: Abbreviated EE and galantamine synergize to promote cognitive recovery after experimental brain trauma.

Project Authors: Deaven Berry, Jody Wellcome, Elisabeth Sharkey, Peter Niesman, Kileigh Nassau, Hannah Radabaugh, Jeffrey Cheng, Corina Bondi, Anthony Kline

Abstract:
Introduction: Galantamine (GAL) enhances learning after traumatic brain injury (TBI). Environmental enrichment (EE) has also been shown to improve performance after TBI when provided daily for 6-hrs or greater. However, neither 2-hr nor 4-hr of EE was sufficient to confer benefits. Hence, the goal of this study was to determine whether limited EE could be an effective therapy when augmented with GAL. Hypothesis: Abbreviated EE (2-4 hr) will provide significant benefits when combined with GAL. Additionally, the groups receiving combined EE (2-4 hr) and GAL will perform comparably to continuous EE (24-hr day) and better than the GAL only group. Methods: Anesthetized rats received TBI or sham injury and then were assigned to GAL (2 mg/kg) or saline vehicle (VEH; 1 mL/kg) beginning 24-hr after surgery and once daily for 21 days while also receiving daily EE for 2, 4, 24-hr. Motor and cognitive assessments were conducted on post-operative days 1-5 and 14-19, respectively. Results: Sham controls were better vs. all TBI groups. Motor function was improved in the TBI+EE (24-hr) group vs. the TBI+STD+VEH and TBI+STD+GAL groups [$p<0.05$]. Cognitive performance was increased in the continuous EE group, as well as in the TBI+STD+GAL and the 2-hr EE and 4-hr EE GAL-treated groups vs. TBI+STD+VEH [$p < 0.05$]. Moreover, the 2-hr EE and 4-hr EE groups that also received GAL did not differ from the continuous EE group [$p>0.05$] and performed better than the GAL alone group [$p<0.05$], which support the hypothesis. Conclusion: Overall, the data show that sub-therapeutic doses of EE can become effective when combined with an appropriate pharmacotherapy. Significance: The findings have significant clinical relevance as often times only a brief amount of rehabilitation may be available.

Submission Category: Clinical practitioners doing quality or practice improvement

Maureen Bieltz, PharmD
bieltzmm@upmc.edu

Department: Community Provider Services
Affiliation: UPMC

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Geriatrics, antipsychotic drugs, and dementia

Research Support Sources: Aging Institute of UPMC Senior Services and the University of Pittsburgh; Kane Regional Centers

Research Title: RAVEN Initiative: Implementation of an Intervention to Reduce Antipsychotic Use in the Nursing Home Setting

Project Authors: Maureen Bieltz, PharmD; Kerry Tiesi DNP, CRNP, FNP-BC; Suzanne Whyte-Nagel BSN, RN; Kristen Zeigler, PharmD, CGP, CCP; Stacey, Lantz, RPh

Abstract:
Background: Antipsychotic drugs are associated with serious adverse effects including an increased risk of death when used in elderly patients for the treatment of dementia. Despite this risk, they remain a commonly prescribed drug in the nursing home (NH) setting. It has been reported that 22% of NH Medicare claims for antipsychotics are not administered in accordance with the standards regarding unnecessary drug use and, in 2015, long-stay antipsychotic use rate was added to the 5-Star Quality rating system as a measure to evaluate NH care. The RAVEN initiative has collaborated with Kane Regional Centers-Ross Township (KRCRT) to implement an interdisciplinary team meeting (IDT) to address unnecessary antipsychotic drug use in elderly residents.
Purpose: We examined the reduction of long-stay antipsychotic use rate following the implementation of an IDT meeting to address unnecessary antipsychotic drug use.
Methods: From 01/2016–01/2017 the IDT met once monthly to review NH residents prescribed an antipsychotic drug, with the goal of ensuring appropriate dosing and rationale for use. Recommendations for drug changes were addressed by the nurse practitioner, physician, or psychiatrist.
Results: A total of 97 reviews were conducted, resulting in 25 antipsychotic dose reductions and 5 discontinuations. KRCRT long-stay antipsychotic use rate was reduced approximately 31%, when comparing the average rate 6-months prior to implementation (18.2%) to the rate as of 01/2017 (12.4%). Moreover, KRCRT has achieved a rate below both the reported state (PA (15.7%)) and national averages (16.1%).
Conclusion: Our results suggest that IDT meetings may be a valuable tool to help NHs address unnecessary antipsychotic drug use and thereby reduce their long-stay antipsychotic use rate.

Submission Category: Master's-level students and candidates for doctoral degrees

Lynn Boucek, MSN, CRNP
lyb7@pitt.edu

Department: School of Nursing
Affiliation: University of Pittsburgh

Undergraduate: University of Pittsburgh
Graduate: University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Alcohol use in older adults

Research Title: SBIRT Education of Residential Care Nursing Staff: Impact on Alcohol Use in Older Adults

Project Authors: Lynn Boucek, Ann Mitchell, Irene Kane, Dawn Lindsay, Holly Hagle, Kim Salvio

Abstract:
Full Title: Screening, Brief Intervention, and Referral to Treatment (SBIRT) Education of Residential Care Nursing Staff: Impact on Alcohol Consumption in Older Adult Residents and Knowledge and Attitudes of Nursing Staff
Methods: The nursing staff (n=56) at a southwestern PA, personal care home were trained in Screening, Brief Intervention, and Referral to Treatment (SBIRT). Residents (n=40) completed the Alcohol Use Disorders Identification Test (AUDIT) to measure alcohol use pre and post training. Staff completed SBIRT screening and brief intervention (BI) knowledge surveys and Alcohol and Alcohol Problems Perception Questionnaires (AAPPQ) pre and post training. A new question was added to the electronic health record (EHR) to measure SBIRT implementation rates.
Results: Resident AUDIT scores decreased from a mean of 1.34 to 1.09 pre-post training (p=0.33). Nursing staffs' screening and BI knowledge scores increased (p<0.01). Four AAPPQ subscales increased significantly: role adequacy, role legitimacy, role support, and work satisfaction (p<0.05). SBIRT was documented in the EHR 231 times during 3 months post training.
Conclusion: Resident AUDIT scores trended down but were not statistically significant. SBIRT training significantly increased staff knowledge, attitudes, and implementation rates.
Significance: Older adults living in person care homes are a vulnerable population at risk for alcohol use related problems, especially for those age 65 years and older who are taking medications, have health problems, and have risky alcohol consumption. SBIRT is an evidence-based, low cost program that can be used by nursing personnel to provide needed alcohol use care to older adults.

Submission Category: Post-Doctoral Researchers and Fellows

Andrea Braganza, PhD
acb80@pitt.edu

Department: School of Medicine
Affiliation: Vascular Medicine Institute

Undergraduate: Rochester Institute of Technology
Graduate:
Medical School:
PhD: University of Pittsburgh

Research Interest Areas: Healthy and Diseased Aging

Research Title: The Role Of Parkin In Age-Dependent Platelet Mitochondrial And Thrombotic Dysfunction

Project Authors: Andrea Braganza, Catherine Corey, Michael Jurczak, Sruti Shiva

Abstract:
Aging is one of the greatest risk factors for thrombosis and gives rise to conditions such as deep vein thrombosis, myocardial infarction and stroke. However, the mechanisms underlying age-related increased thrombosis remain unclear. Platelets are anucleate circulating cells that when activated play an important role in aggregation and thrombosis. Studies have shown age-dependent platelet dysfunction including increased platelet activation, decreased protein turnover, and a decline in the ubiquitin-proteasome system (UPS). However, the molecular mechanisms by which these changes are related or contribute to thrombosis is unknown. We hypothesize that changes in the UPS lead to mitochondrial dysfunction, which stimulates platelet activation leading to thrombosis. Herein, we demonstrate that protein expression of Parkin (PARK2), a key E3 ubiquitin ligase that ubiquitylates proteins for UPS degradation and regulates mitochondrial function, is decreased in the platelets of healthy aged (>60 years) versus young subjects and this is associated with changes in platelet mitochondrial function, including increased ROS production. Ongoing studies are examining whether decreased PARK2 directly leads to ROS production and whether these changes result in platelet activation.

Submission Category: Medical Student

Lucas Brane, BS
lub19@pitt.edu

Department: Dept of Physical Medicine and Rehabilitation
Affiliation: University of PIttsburgh School of Medicine

Undergraduate: Hunter College
Graduate:
Medical School: University of PIttsburgh School of Medicine
PhD:

Research Interest Areas: Education

Research Title: Changing Perception Outcomes from a Physical Medicine and Rehabilitation Medical Student Interest Fair

Project Authors: Lucas Brane, Ross Carson, Adam Susmarski, Adam Lewno, Brad Dicianno

Abstract:
Exposure to the field of Physical Medicine and Rehabilitation (PM&R) is limited in the curricula of many medical schools. As a result, many students lack awareness of the field and may therefore ultimately choose different careers. A medical student PM&R career fair was held on October 13th, 2015 at the University of Pittsburgh, and several local medical schools were invited to participate. Seven stations were deployed to highlight various aspects of PM&R careers. A total of 57 medical students attended, representing five different campuses across three states, with 29 of the reported medical students still within their first or second year of medical education. The attendees' Self-reported interest of PM&R significantly increased compared to baseline, from a mean score of 3.80 (SD = 1.01, range 2-5) before attending the fair to a mean score of 4.00 (SD = 0.79, range 2-5) after attending the fair ($P < 0.0001$). Understanding of the field also significantly increased from a mean score of 2.91 (SD = 1.21, range 1-5) before attending the fair to a mean score of 4.05 (SD = 0.68, range 3-5) after attending the fair ($P < 0.0001$). Nearly half of the students in attendance requested further opportunities for faculty mentorship. These results indicate that PM&R interest fairs may be a means to further student understanding and awareness of PM&R while providing an opportunity to become more involved in the field.

Kadir Carruthers, MD
carruthersk@upmc.edu

Department: Physical Medicine and Rehabilitation
Affiliation: UPMC

Undergraduate: Morehouse College
Graduate:
Medical School: Case Western Reserve University
PhD:

Research Interest Areas: Neurological Rehabilitation

Research Support Sources: UPMC Department of Physical Medicine and Rehabilitation

Research Title: Claude Syndrome: An Unusual Stroke Syndrome

Project Authors: Kadir Carruthers, MD; Mary Ann Miknevich, MD

Abstract:
STUDY: Claude syndrome is characterized by ipsilateral oculomotor nerve palsy and contralateral cerebellar ataxia due to a lesion of the oculomotor and red nuclei of the midbrain and superior cerebellar peduncle. The infrequency with which this entity is encountered may lead to misdiagnosis.
METHODS: A 58-year old left-handed male presented with reduced arousability, slurred speech, and inability to open left eye.Physical exam was notable for left third nerve palsy and ptosis, bilateral vertical gaze palsy, right-sided ataxia, right lower facial weakness, and moderate dysarthria. Patient was initially assessed to have Benedikt syndrome. MRI brain showed a faint signal abnormality on the left thalamus. Transthoracic echocardiogram revealed a patent foramen ovale. The patient was started on anticoagulation due to concern for possible cardioembolic etiology and transferred to inpatient rehabilitation. Functional goals were for independent management of self-care and mobility prior to returning home.
RESULTS: The patient progressed from moderate assistance for ambulation with wheeled walker to contact-guard assist with improved maintenance of posture by the second month of rehabilitation. At four months, dysphagia and performance of activities of daily living showed considerable improvement although left ptosis persisted.
CONCLUSIONS: Discernment between midbrain stroke syndromes affecting the oculomotor nerve can be challenging. Most involve a component of hemiataxia and hemiparesis. Small midbrain nuclei are not easily identified on neuroimaging. Prominent contralateral hemiataxia present in this patient is most consistent with Claude's syndrome.
SIGNIFICANCE: Accurate diagnosis of Claude syndrome may lead to refinement of rehabilitation goals and improved outcomes.

Submission Category: Post-Doctoral Researchers and Fellows

Santosh Chandrasekaran, MS, PhD
santosh@pitt.edu

Department: Department of Physical Medicine and Rehabilitation
Affiliation: Department of Physical Medicine and Rehabilitation

Undergraduate: University of Pune, India
Graduate: University of Pune, India
Medical School:
PhD: Carnegie Mellon University

Research Interest Areas: Neuroprosthetics, Sensory feedback

Research Title: Electrical stimulation of the cervical dorsal spinal cord and rootlets for sensory restoration in upper-limb amputees

Project Authors: Santosh Chandrasekaran, Ameya C Nanivadekar, Eric R Helm, Michael L Boninger, Jennifer L Collinger, Robert A Gaunt, and Lee E Fisher

Abstract:
Introduction: Electrical stimulation of the peripheral and central nervous system is being studied as a means to provide sensory feedback which could enhance the embodiment and ease of use of a prosthesis. While peripheral nerve stimulation could result in off-target activation, cortical stimulation is an extremely invasive procedure. In contrast, we targeted the dorsal spinal cord and rootlets (DSCR) to provide sensory feedback. The DSCR provide a clear separation between the sensory and motor pathways thereby avoiding off-target activation. Also, DSCR can be accessed by minimally invasive surgical techniques. Here, we present observations from human psychophysics experiments wherein we stimulated the C5-C8 DSCR in two upper-limb amputees using FDA-approved Spinal Cord Stimulator (SCS) leads.
Methods: All procedures were approved by the University of Pittsburgh Institutional Review Board and the US Army Human Research Protection Office. Study participants with high-level unilateral upper-limb amputations were implanted with three percutaneous SCS leads (Boston Scientific) in the epidural space of the cervical spinal cord. Stimulation was delivered using a customized setup for up to 4 weeks, after which the electrodes were removed. Information regarding the perceived sensations was provided by the subject using a structured reporting system.
Results: Sensations reported included stable focal percepts localized to the amputated arm, hand, and fingers. The focality of the sensory percepts could be improved by current-steering effects. Although most sensations were reported to be paresthetic, some percepts were described as touch, pressure and movement of fingers and the arm.
Conclusion: DSCR stimulation can generate focal sensory percepts in the missing limb in amputees.

Submission Category: Junior Faculty

Becky Clarkson, PhD
bdc29@pitt.edu

Department: Medicine/Medicine/Geriatrics
Affiliation: University of Pittsburgh

Undergraduate: MPhys University of Manchester UK
Graduate: MSc Medical Physics University of Leeds UK
Medical School:
PhD: Newcastle University

Research Interest Areas: Incontinence

Research Title: Functional Brain Connectivity In Older Women With Urgency Urinary Incontinence

Project Authors: Becky Clarkson, Helmet Karim, Neil Resnick, Derek Griffiths

Abstract:
Study
Urgency urinary incontinence (UUI) is burdensome among older adults, and brain control mechanisms have traditionally been ignored. We analyzed fMRI obtained during urgency in women with UUI, before and after behavioral therapy, and examined 'functional connectivity' of brain regions involved in continence.
Methods
54 women > 60 years with UUI >5x/week, and 11 without, had fMRI during full-bladder urgency provocation before and after therapy. Women were 'responders' (>50% UUI reduction) and 'non-responders'. Regions of interest (ROI) were: right insula, medial prefrontal cortex (mPFC), and dorsal anterior cingulate cortex (dACC). Generalized psycho-physiological interaction (gPPI) was used to calculate 'effective connectivity' between ROIs. Analyses: 1-way ANOVA pre-treatment (continent/responders/non-responders); 2-way mixed ANOVA (responders/non-responders, pre-/post-therapy, false discovery rate (FDR) corrected). Voxel-wise connectivity was calculated between ROIs and the rest of the brain, using statistical non-parametric mapping and cluster-wise family-wise error (FWE, $p<0.05$).
Results
gPPI: No significant connectivity differences between ROIs after FDR; trends ($p<0.05$) were seen between responders and non-responders (dACC-insula and mPFC-dACC).
Voxel-wise: Significant regions associated with a priori ROIs were primary visual and motor cortex, middle cingulate, caudate, thalamus and cerebellum.
Conclusion
After therapy, connectivity values in responders tended towards continent levels whereas non-responders had little/inconsistent change from continent levels, adding to evidence that those who respond to therapy have different incontinence mechanisms.
Significance
This improves characterization of the continence mechanism and suggests two UUI phenotypes.

Submission Category: Master's-level students and candidates for doctoral degrees

Jessica Cole
jpc79@pitt.edu

Department: University of Pittsburgh School of Pharmacy
Affiliation: Senior Care Institute of UPMC Shadyside

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Pharmacy Services at a Geriatric Patient-Centered Medical Home

Research Support Sources: Christine M. Ruby, PharmD, BCPS

Research Title: Access to Care for a Predefined High-Risk Patient Population at a Geriatric Outpatient Clinic

Project Authors: Jessica Cole, Elyse Tomaszewski, Kelsey Collett, Carly Parris, Christine M. Ruby, PharmD, BCPS

Abstract:
Study: This study aimed to describe access to clinical pharmacy services for patients with a high-risk (HR) for re-hospitalization at a geriatric outpatient clinic.
Methods: The access to care of a HR patient population cohort was evaluated through a retrospective electronic medical record review over a 13-month period. HR patients were identified using criteria set by the clinic. Demographic information and medication use patterns were collected. The number of office/ED visits with healthcare professionals was assessed. After UPMC QI Subcommittee approval, data was analyzed using descriptive statistics.
Results: HR patients (n=14) at the Senior Care Institute (SCI) were mostly female (64.3%) and averaged 84.2 years. The most common disease states were chronic pain (71.4%) and depression (57.1%). They used on average 13.3 medications (9.2 Rx medications, 2.1 OTC, and 1.9 supplements). These patients averaged nearly 5 emergency department visits and 5 hospitalizations at a UPMC facility. Thirteen (92.9%) had at least one office visit at SCI, and 57.1% had pharmacy interactions (with 4 HR patients having face-to-face encounters and 7 having telephonic encounters).
Conclusions: HR patients possess complex medication regimens and multiple comorbidities which may negatively impact adherence and appropriate self-care. While nearly 60% of this sample used clinical pharmacy services, there is opportunity for increased patient acceptance of clinical pharmacy interventions, especially following transitions of care.
Significance: Adequate access to healthcare providers including pharmacists is integral to improving patient outcomes. The data collected from this project will be used to identify opportunities to increase SCI HR patients' use of clinical pharmacy services.

Submission Category: Master's-level students and candidates for doctoral degrees

Kelsey Collett,
kmc149@pitt.edu

Department: University of Pittsburgh School of Pharmacy
Affiliation: Senior Care Institute of UPMC Shadyside

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Pharmacy Services at a Geriatric Patient-Centered Medical Home

Research Support Sources: Christine M. Ruby, PharmD, BCPS

Research Title: Access to Care and Drug Use Patterns for Geriatric Patients Enrolled in a Pilot Chronic Care Management (CCM) Cohort

Project Authors: Kelsey Collett, Carly Parris, Jessica Cole, Elyse Tomaszewski, Christine M. Ruby, PharmD, BCPS

Abstract:
Study:In January 2015, Medicare authorized billing for non-face-to-face care coordination services furnished to enrolled Medicare beneficiaries with multiple chronic conditions.This project aimed to 1) describe access to medical and clinical pharmacy services for patients enrolled (as of October 2016) in the pilot CCM cohort at Senior Care Institute (SCI), and 2) describe medication use patterns in this CCM cohort.
Methods:After UPMC QI Subcommittee approval, a retrospective chart review was performed.Demographic information (including age, gender, and comorbidities) were collected.The number of office/telephonic/ED visits with physician and non-physician team members was assessed. Number and classes of medications used was also collected and analyzed to determine drug use patterns. Data was analyzed using descriptive statistics.
Results:CCM patients (n=23) at SCI were mostly female and averaged 84 years old.The two most common disease states were chronic pain and depression.They used on average 14.7 medications.The top 3 medication classes were: CV100, CN101, & CN103.Over the collection period (10/2015-12/2016), these patients averaged 3 ED visits that led to hospital stays, and 5 office visits to Senior Care. Only 4/23 CCM patients were referred to the clinical pharmacist and 6 had visits with the social worker.
Conclusions:CCM patients possess complex medication regimens and multi-morbidity.A small number (17.3%) of this pilot patient cohort utilized clinical pharmacy services, so there is opportunity for increased patient referrals by SCI team members and patient acceptance of pharmacy interventions.
Significance:The data on top medication classes and disease states will inform SCI team members to increase CCM patient referrals to to clinical pharmacy services.

Submission Category: Master's-level students and candidates for doctoral degrees

Catherine Corey
cgc9@pitt.edu

Department: Medicine/Medicine/Vascular Medicine Institute
Affiliation: Vascular Medicine Institute and University of Pittsburgh Graduate School of Public Health, Department of Epidemiology

Undergraduate: Grove City College
Graduate:
Medical School:
PhD:

Research Interest Areas: Changes in mitochondrial function with aging

Research Title: The Effects of Aging on Platelet Bioenergetics

Project Authors: Corey CG, Santanasto AJ, Goodpaster BH, Glynn NW, Newman AB, and Shiva SS

Abstract:
Aging leads to a decline in physical function and increased fatigability. Numerous studies suggest that alterations in mitochondrial function contribute to age-related loss of physical function. As part of the national Health Aging and Body Composition (Health ABC) study, venous blood was taken from a subset of the cohort to measure bioenergetics in platelets, a minimally invasive source of mitochondria. We compared the Health ABC participants (n=32, 88±2 yrs) to a race, gender and body mass index matched younger cohort (n=32, 26±5 yrs) to identify differences in bioenergetics that could be attributed to aging. Older adults showed 228.2 ± 20.39 pmolO2/min maximal respiration (a marker of the cells' capacity to respond to stress) and 39.15 ± 2.849 pmolO2/min proton leak (oxygen consumption not linked to ATP production), both significantly higher (p=0.044; p=0.044) than in younger adults (177.4 ± 15.01 pmolO2/min; 31.48 ± 2.39 pmolO2/min). In addition, we observed a significantly lower (p=0.049) baseline oxygen consumption rate in older adults (107.4 ± 5.294 pmolO2/min older; 123.6 ± 6.083 pmolO2/min younger) with a trend towards higher basal glycolytic rate as compared to the younger cohort. Notably, bioenergetic changes in older adults did not significantly correlate with physical function, as measured by the 400m Long Distance Corridor Walk (LDCW; p=0.07), however there was a significant positive correlation (R=0.39; p=0.03), between basal glycolytic rate and fatigability in the Health ABC cohort (measured using the Pittsburgh Fatigability Scale). These data demonstrate that systemic alterations in aged adult mitochondrial function could contribute to fatigability. Future studies will determine the association of these changes with alterations in platelet function.

Submission Category: Post-Doctoral Researchers and Fellows

Patricia de la Tremblaye, PhD
prt25@pitt.edu

Department: UPMC
Affiliation: Physical Medicine & Rehabilitation

Undergraduate:
Graduate:
Medical School:
PhD: University of Ottawa

Research Interest Areas: Traumatic Brain Injury

Research Title: Long-term effects of adolescent chronic stress on TBI cognitive and emotional impairments in adult male rats

Project Authors: de la Tremblaye PB, Radabaugh H, Nassau K, Wellcome J, Bondi C, Kline A.

Abstract:
Introduction: Exposure to early life stress has lasting effects on behavior and brain function due to dynamic plasticity occurring in the developing adolescent brain. However, it is yet to be determined how stress exposure in this developmental period influences functional recovery post traumatic brain injury (TBI) later in life. Thus, we hypothesize that stress in adolescence will confer deleterious effects on behavioral impairments post TBI in adulthood. Methods: Adolescent male Sprague-Dawley rats (n=40) were exposed to 4 weeks (postnatal day, PND, 30-60) of chronic unpredictable stressors (CUS) or no stress, and after a 1-month resting period (PND 60-90), were anesthetized and received a cortical impact of moderate severity (2.8 mm tissue deformation at 4m/s) or sham injury. After one week of recovery, anxiety-like behavior in the open field test (OFT) and elevated plus maze (EPM), and cognitive performance in the novel object recognition NOR) task and, Morris water maze (MWM) were measured, and the brains collected 25 days post TBI for histological analysis. Results: Preliminary results show increased time spent in the anxiogenic zones of the OFT and EPM, and improved NOR memory after a 24 h delay, and reduced time to reach the platform in the MWM for CUS groups compared to no-stress groups, although TBI rats remained significantly more anxious and cognitively impaired compared to sham controls. Conclusion: These results suggest that in adolescence induces adaptive behavioral responses in TBI rats, albeit, without leading to full functional recovery. Significance: This study will determine whether aversive environmental conditions exposed in the developmental period of adolescence may have long-lasting effects on the brain that may interfere with TBI recovery in

Submission Category: Undergraduate Student

Dominic DiSanto
jdd65@pitt.edu

Department: Physical Medicine & Rehabilitation
Affiliation: Department of Physical Medicine & Rehabilitation University of Pittsburgh; Department of Physical Medicine & Rehabilitation, University of Pittsburgh; Medical Center, University of Texas-Southwestern; Traumatic Brain Injury Clinical Research Laborat

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Public Health - Epidemiology

Research Title: "Characterizing factors related to employment stability in the first 5 years after traumatic brain injury"

Project Authors: Dominic DiSanto, Raj Kumar, Shannon Juengst, Tessa Hart, Nathan Zasler, Therese Pirozzi, Tom Novack, Amanda Rabinowitz, Christina Dillahunt-Aspillaga,

Abstract:
Each year, there are 1.1 million Americans treated in emergency departments for traumatic brain injury (TBI), including 235,000 hospitalizations. Studies estimate that 43.1% of acutely hospitalized TBI patients develop a related long-term disability. Return to employment is one measure of chronic disability following rehabilitation. Over 50% of pre-injury employed patients are unable to hold a job at 5 years post-injury. The objective of this study was to examine employment stability in the first 5 years post-TBI. Current research compares aggregate post-injury employment status, but employment stability may serve as a better proxy for chronic disability and general outcome measurement. Employment stability was categorized as stable, unstable, or delayed employment versus unemployed. Specifically we identified the demographic and clinical factors associated with employment stability. We performed a multinomial regression model to identify significant variables that influence odds for employment stability categories. The regression model identified pre-injury employment, ability to drive, and younger age as significant predictors of being employed stably, unstably, and delayed in comparison to unemployed. Additionally having a less severe injury or being white (in comparison to black) are positive predictors of stable and unstable employment but not delayed employment, when compared to unemployment. In sum, this study identified a set of risk factors associated with stability of employment after TBI. Identifying significant predictors of employment stability allow providers to more efficiently allocate resources, such as vocational rehabilitation and support (e.g. transport) services, to at risk populations to improve employment stability after TBI.

Submission Category: Master's-level students and candidates for doctoral degrees

Ayushi Divecha, MPT MPH(ongoing)
aad88@pitt.edu

Department: Graduate School of Public Health
Affiliation: Department of Epidemiology

Undergraduate: Sardar Patel University, Gujarat, India
Graduate: Rajiv Gandhi University of Health Sciences, Bangalore, India
Medical School:
PhD:

Research Interest Areas: Aging, Neurodegenerative Diseases, Injury

Research Support Sources: None

Research Title: Is postural instability associated with Dementia in community dwelling older individuals?

Project Authors: Ayushi Divecha, Andrea Metti Lynn, Andrea Rosso, Patrick Sparto, Oscar Lopez, Caterina Rosano

Abstract:
Study: Postural instability precedes increased fall risk and may be an earlier marker of Dementia. We hypothesized that greater postural instability, measured by standard balance tasks and a novel visual tracking task is associated cross-sectionally with worse cognitive status.
Methods: Postural control data for 179 participants(48% males, 41.6% black) were obtained. Postural sway was recorded on a force platform standing on a level and foam surface with eyes open and closed in antero-posterior(AP) and medio-lateral (ML) directions. Participants performed a novel visual frequency tracking task at 0.25 Hz. Association between cognitive status in cognitively normal(CN), mild cognitive impairment(MCI) and Dementia(DM) assessed by clinical adjudication was analyzed.
Results: During eyes open no foam task, those with dementia(0.2 cm) had more ML sway compared to MCI(0.1cm) and CN(0.1cm p=0.01) and more AP sway(0.5cm) compared to MCI(0.4cm) and CN(0.3cm p=0.05). There was no difference in the AP or ML direction for any other sway condition. During visual tracking, those with dementia performed greater errors than MCI and CN (p=0.001). Postural control with visual tracking was associated with MCI[OR 1.16 (0.87, 1.55)] and Dementia[OR 1.72 (1.25, 2.38)] after adjusting for demographics, BMI and time between assessments.
Conclusion: Addition of cognitive demands to postural control task in terms of visual tracking was strongly associated with cognitive status independent of other known contributors of cognitive function and postural control.
Significance: A simple test of frequency tracking could be a sensitive indicator of cognitive status in community dwelling older adults. Future studies to test the validity of this biomarker for risk of Dementia are warranted.

Submission Category: Junior Faculty

Elena Donoso Brown, PhD, OTR/L
donosobrowne@duq.edu

Department: Rangos School of Health Sciences
Affiliation: Duquesne University

Undergraduate: Duquesne University
Graduate: Duquesne University
Medical School:
PhD: University of Washington

Research Interest Areas: Physical Disability and Rehabilitation

Research Title: Music and adherence in home programs post-stroke

Project Authors: Sarah E. Wallace, Joanna Eskander, Lauren Matthews

Abstract:
Study Significance: Stroke may occur at any age; however, 66% of hospitalizations due to stroke occur in people over 65 years old. Upper extremity hemiparesis is persistent in 50% of people in the chronic phase of stroke recovery. One potential reason for the persistent impairment is limited access to and duration of therapeutic services. Home programs are designed to bridge this gap; however, adherence to these programs is low. The purpose of this pilot study was to measure adherence to an upper extremity home program with and without music designed for people post--stroke who also have the communication impairment, aphasia.
Methods: The study used a single--subject (ABAB) design with pre- and post-test measures. Participants were in the chronic phase of stroke recovery, with diagnoses of hemiparesis and aphasia. The researchers designed each home program based on upper extremity motor abilities and participant goals. Home program materials were modified to support the participants' language impairment. During designated weeks, participants practiced with a personalized music playlist compiled by a music therapist.
Results: Preliminary results from five participants indicate adherence to the number of repetitions by participants was at or above the number requested. Data from practice logs suggest variable practice performance across phases, participants, and tasks. Additionally, all participants reported perceived changes in functional upper extremity use, while four indicated gains in satisfaction.
Conclusions: Adherence to home programs designed with motor abilities and goals in combination with aphasia friendly materials in this sample was at or above recommendations. The effect of music on measures of adherence was inconsistent across participants and phases.

Submission Category: Resident Physicians and Clinical Fellows

Justin Dumont, DO, MS
dumontjd@upmc.edu

Department: UPMC Dept of PM&R
Affiliation: GME Office

Undergraduate: Houghton College
Graduate: Mercyhurst University
Medical School: Edward Via College of Osteopathic Medicine
PhD:

Research Interest Areas: Pain/MSK

Research Support Sources: None

Research Title: Use of Ultrasound for Management of Iliotibial Band Friction Secondary to Heterotopic Ossification of the Anterolateral Knee Capsule After TKA

Project Authors: Justin D. Dumont, DO, MS and Kentaro Onishi, DO

Abstract:
63 y/o previously avid tennis player with a history of bilateral total knee arthroplasties presents with chronic focal right lateral knee pain following a right total knee arthroplasty four years prior.
History
- Six months post-operatively, developed new right lateral knee pain constant in duration, 8/10 in severity, and worsened with weight-bearing and flexion of the knee from a fully extended position to 30 degrees of flexion.
- Multiple x-rays and CTs of right knee were read as normal. Previously evaluated by orthopedic, plastic, and pain management physicians. Numerous interventions performed up to and including placement of spinal cord stimulator.
Physical Exam/Ultrasound Findings
- Focal tenderness proximal to lateral tibiofemoral joint line. Positive noble compression test.
- Sonographic evaluation revealed an ossific mass within the anterolateral knee capsular tissue just deep to the IT band and superficial to lateral joint line.
- Dynamic flexion of the knee resulted in the differential motion of IT band with respect to deeper ossific mass resulting in friction and reproduction of pain.
Interventions
- Two sonographically guided lidocaine injections resulted in complete resolution of pain during the anesthetic period.
- Referred to orthopedics for surgical exploration, but the mass could not be identified in OR. Performed sonographically guided methylene blue dye injection of mass to aid surgical team. Mass identified in surgery and successfully resected resulting in complete resolution of pain.
Conclusion
1/300 TKA cases will present with pain of unclear etiology and unremarkable traditional imaging. MSK ultrasound is a cost-effective, readily-available imaging modality that is not affected by TKA hardware and can be used to diagnose and treat pain.

Submission Category: Post-Doctoral Researchers and Fellows

Micol Falabella, PhD
micolf@pitt.edu

Department: Department of Medicine
Affiliation: School of Medicine- VMI

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Mitochondrial biology

Research Title: The importance of mitochondrial DNA stability and G-quadruplexes in aging

Project Authors: M. Falabella, J. E. Kolesar, Y. V. Taguchi, C. Wang, I. M. Xiang, C. M. St. Croix, N. Sondheimer, L. A. Yatsunik, F. B. Johnson, B. A. Kaufman

Abstract:
STUDY
Age-dependent mitochondrial genome (mtDNA) instability is associated with oxidative phosphorylation (OXPHOS) defects. The cause of mtDNA instability is not understood. Mammalian mtDNA has asymmetric base composition, with enrichment of guanines (G) in the heavy strand, which has been suggested to cause strand-biased transcription and mutation. Interestingly, single-stranded G-rich DNA or RNA sequences can adopt non-canonical structures known as G-quadruplexes (G4), which in the nucleus are associated with genome instability and gene expression defects. Here we report mitochondrial G4 structure formation driving mtDNA instability and aberrant gene expression. The mitochondrial defects are magnified in the patient cells carrying mtDNA sequence with increased G4 formation potential.
METHODS
RT-qPCR; Immunoblotting; Circular Dichroism; Seahorse XF Analyzer
RESULTS
We identified RHPS4 in a screen for G4 ligand-mediated mtDNA depletion. RHPS4 is bona fide G4 stabilizing compound; it localizes to mitochondria inducing dose and time-dependent mtDNA depletion with replication pausing. Before mtDNA depletion occurs, the G4 stabilization impairs mitochondrial transcription and OXPHOS subunits expression. The Leigh's mutation T10191C, which we show increases the G4 formation potential, enhances sensitivity to RHPS4 exposure causing reduced OXPHOS activity.
CONCLUSION and SIGNIFICANCE
Our unprecedented observations suggest that G4 motifs may play a role in driving mtDNA instability and gene expression defects, particularly in presence of mitochondrial mutations, which tend to accumulate with age, that enhance the G4 potential formation.

Submission Category: Master's-level students and candidates for doctoral degrees

David Fine, BS
Dff21@pitt.edu

Department: Physical Medicine and Rehabilitation
Affiliation: Safar Center for Resuscitation Research

Undergraduate: Biochemistry, University of Vermont
Graduate:
Medical School:
PhD:

Research Interest Areas: Cognitive Rehabilitation, Experimental TBI, Dopamine Dysfunction

Research Title: Exploring Spatial Map versus Compensatory Strategy Formulation for Apparent Place-Learning in the Morris Water Maze after Experimental TBI

Project Authors: D. Fine, P. Ranganthan, E. Thiels, A.K. Wagner

Abstract:
Explicit learning/memory deficits after traumatic brain injury (TBI) have implications for learning and cognitive rehabilitation methods that use implicit networks compensatorily. Morris water mazes (MWM) assess these deficits through metrics like latency and target zone time allocation (TZTA), and uses extra-maze cues to make spatial maps of platform locations (place-learning). However, lower latencies can be achieved via other strategies without clear spatial map formulation. We hypothesized: MWM place-learning after TBI results primarily from acquiring non-spatial (Implicit-learning) strategies, and post-injury cognitive training (CT) on the MWM's implicit components facilitates further compensatory reductions (via implicit-learning networks) in platform latencies, and supports spatial strategy usage. Sprague-Dawley rats (n=50) underwent controlled cortical impact (CCI) injury or sham surgery. D8 post-surgery, CCI/Shams had 6 days of non-spatial CT or no-training (NT), acquisition trials [AC(D14-D18,D20-D24)], and short/long-term retention probe trials (PT). Latencies, peripheral zone time allocation (PZTA), TZTA, and search strategies were assessed. CCI-CT and CCI-NT groups improved latency, TZTA by D18 ($p<0.001$). PZTA improved by D24 ($p<0.01$). Shams improved latency, PZTA, and TZTA by D18 ($p<0.05$) and further reduced PZTA by D24 ($p<0.001$). CCI-CT had lower AC latencies than CCT-NT ($p<0.001$). CCI-CT also had higher TZTA ($p<0.01$) and lower PZTA ($p<0.01$) on long-term retention PTs, where CT-Shams also had lower PZTA than NT-Shams ($p<0.01$). CT groups used more spatial strategies than NT counterparts on long-term retention PTs. These data show MWM improvements can be achieved via implicit networks, and CT improves place learning and spatial map retention after TBI.

Submission Category: Clinical practitioners doing quality or practice improvement

Erin Flanagan, MSN
flanagane@upmc.edu

Department: UPMC Mercy
Affiliation: 12E Medical Progressive Care

Undergraduate: Duquesne University
Graduate: Robert Morris University
Medical School:
PhD:

Research Interest Areas: Delirium

Research Support Sources: Delirium

Research Title: Quality Improvement Project to Implement Nurse Driven Delirium Preventative Interventions at UPMC Mercy

Project Authors: Jusjit Lalli M.D. and Stasa D. Tadic, MD, MS

Abstract:
Aim:Nurse driven project, in collaboration with residency program, to prevent delirium or mitigate symptoms in hospitalized elderly. Methods: Project streamlines current care and applies evidence based delirium preventive measures in target population,elderly at risk for delirium. We use the CAM (Confusion Assessment Method) to assess. Intervention utilizes team approach engages both nurses and house staff in delirium prevention/management. Small pocket cards were developed with instructions on validated delirium prevention measures (Inoye) to reference by staff. Nurses use paging system to contact residents to begin interventions and collaboration. We engaged hospitalists, care management, IT and finance department to collect data for analysis. Outcome measures:length of stay,use of restraints,falls,cost of care,and medication usage. We will compare intervention group with clinically and demographically similar patients receiving regular care on other medical floors.Results:Intervention is set up and is ongoing;thus,results are pending. Analyses in preparation for the study included knowledge of nurses about delirium and CAM before and after education. Another analysis extrapolated and compared the costs of patients who were CAM positive vs.CAM negative (without delirium)Conclusions:Preliminary analyses show that:a)CAM+ patients have much higher costs vs.CAM-patients, and,b) nurses' knowledge of delirium and use of CAM has significantly improved. Based on these findings we expect our intervention will significantly reduce costs, use of restraints and falls. Significance: This is a first application of a nurse driven delirium preventive hospital protocol. It uses team and streamlined approach with potential for system wide replication and improvement in quality of care

Submission Category: Resident Physicians and Clinical Fellows

John Frampton, MD
framptonj@upmc.edu

Department: PM&R
Affiliation: UPMC

Undergraduate: Utah State University
Graduate:
Medical School: University of Oklahoma
PhD:

Research Interest Areas: Spina Bifida

Research Title: Comparing a novel, simplified classification system to established classification systems in adults with Spina Bifida

Project Authors: Annie Tita, M.D. and Brad E. Dicianno, M.D

Abstract:
Objective: Several systems exist to quantify motor impairment in Spina Bifida but are lengthy to administer and their functional correlation have not been compared. We developed a novel classification system and hypothesized that it would correlate strongly with an established classification system of determining neurological level (Broughton scale) and ambulation status (Hoffer scale), and that anatomic level of spinal lesion would not correlate strongly with either neurologic level or ambulation status.
Design: Data were collected from a retrospective chart review of 409 adults with SB seen in the UPMC Adult Spina Bifida Clinic. Anatomic level of spinal lesion, ambulation status based on the Hoffer classification and neurological level of injury based on the Broughton classification were assigned. A novel, simplified classification (Pitt Scale) was developed which estimated neurological level of injury based on Hip Flexion (HF) and Knee Extension (KE). Spearman Rho analyses determined correlations between the Pitt scale and Hoffer and Broughton scales. Anatomic level of injury was then compared to both Hoffer scale and Pitt scale.
Results: The Pitt scale was strongly correlated with both Broughton scale (rs=0.883/p=<0.001) and Hoffer scale (rs=-0.771/p=<0.001). Anatomic level was moderately correlated with both Hoffer (rs=-0.460/p=<0.001) and Pitt scale (rs=0.483/p=<0.001).
Conclusion: The Pitt scale may be useful as it is quick to administer and correlates strongly with established scales for quantifying neurological level and ambulation ability. Anatomic level is less accurate in predicting motor impairment or ambulatory ability. Future studies will be conducted to evaluate how motor level interacts with other factors in predicting ambulation.

Submission Category: Resident Physicians and Clinical Fellows

Kristin Hart, PharmD
hartkm@upmc.edu

Department: Senior Care Institute at UPMC Shadyside
Affiliation: UPMC and University of Pittsburgh Schools of Pharmacy and Medicine

Undergraduate: B.S. Biology, SUNY College at Geneseo
Graduate: PharmD, University at Buffalo
Medical School:
PhD:

Research Interest Areas: Geriatrics

Research Title: A geriatric pharmacist's clinical and educational activities during weekly interprofessional team meetings

Project Authors: Kristin Hart, PharmD, Amelia Gennari, MD, Christine Ruby, PharmD, BCPS, FASCP

Abstract:
Purpose: Acute Care for the Elderly (ACE) rounding is a unique weekly experience where the interprofessional health care team (medicine, pharmacy, nursing, nurse case management, social work, nutrition, and physical, occupational, and speech therapy) meets to round on one complex patient case. The primary objective is to describe the clinical interventions of a geriatric pharmacist (PharmD) during weekly team meetings via retrospective analysis using a newly developed documentation template. The secondary objective is to enumerate the PharmD's education provided to the team.
Methods: A retrospective chart review of the patients discussed on team meetings between 11/2016 and 5/2017 will be conducted. A newly devised template recording the PharmD's clinical and educational activities will be utilized and signed into the EMR. This project was approved by the UPMC QI Committee.
Results: Data collection will finish 5/2017. Analyses of preliminary data from 11/1/2016 to 4/5/2017 found that of 16 patients, 75% were female with an average age of 82.8 yrs. The most common medication classes that the PharmD provided education to the team on were antibiotics, antidepressants, and OTCs, whereas the PharmD provided most education to the patient and/or family at bedside on prescription pain medications, antidepressants, and OTCs. The PharmD found >30 medication discrepancies and clinically significant drug-drug interactions in 13 of 16 rounds.
Conclusions: The preliminary results provide insight into both the clinical and educational activities of the geriatric PharmD during ACE rounds.
Significance: Results from this project will be used to enhance future educational endeavors provided by the PharmD.

Submission Category: Medical Student

Michael Helkowski
hlr26@pitt.edu

Department: Physical Medicine and Rehabilitation
Affiliation: Safar Center for Resuscitation Research

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Traumatic brain injury rehabilitation

Research Title: Refining environmental enrichment to advance rehabilitation based research after experimental brain trauma

Project Authors: Michael Helkowski, Isabel Bleimeister, Gina Bao, Hannah Radabaugh, Megan LaPorte, Patricia de la Tremblaye, Corina Bondi, Anthony Kline

Abstract:
Introduction: The typical environmental enrichment (EE) paradigm, which consists of continuous exposure after traumatic brain injury (TBI), promotes behavioral and histological benefits. However, rehabilitation is often abbreviated in the clinic and administered in multiple daily sessions. While recent studies have demonstrated that a once daily 6-hr bout of EE confers benefits comparable to continuous EE, breaking the therapy into shorter sessions may increase novelty and enhance recovery. Hypothesis: Functional and histological outcomes will be significantly improved by daily EE consisting of two 3-hr periods vs. a single 6-hr session. Methods: Anesthetized adult male rats received a controlled cortical impact of moderate-to-severe injury (2.8 mm tissue deformation at 4 m/s) or sham surgery and were then randomly assigned to groups receiving standard (STD) housing, a single 6-hr session of EE, or two 3-hr sessions of EE daily for 3 weeks. Motor function and acquisition of spatial learning were assessed on post-operative days 1-5 and 14-19, respectively. Cortical lesion volume was quantified on day 21. Results: Both EE conditions improved motor function and acquisition of spatial learning, and reduced cortical lesion volume relative to STD housing ($p < 0.05$), but did not differ from one another in any endpoint ($p > 0.05$). Conclusion: The findings replicate previous work showing that 6-hr of EE daily is sufficient to confer behavioral and histological benefits after TBI and extend the findings by demonstrating that the benefits are comparable regardless of how the 6-hrs of EE are accrued. Significance: The relevance of the finding is that it can be extrapolated to the clinic and may benefit patients who cannot endure a single extended period of neurorehabilitation.

Submission Category: Resident Physicians and Clinical Fellows

Geoffrey Henderson, MD
hendersongv@upmc.edu

Department: PMR
Affiliation: UPMC

Undergraduate: University of Southern California (USC) / SUNY Geneseo
Graduate:
Medical School: University of California at Los Angeles (UCLA) / Charles Drew University (CDU)
PhD:

Research Interest Areas: Spinal Cord Injury

Research Support Sources: PMR department; no funding sources

Research Title: New Onset Upper Extremity Weakness in a Woman with Pre-Existing Paraplegia: A Case Report

Project Authors: Geoffrey Henderson, Amanda Harrington

Abstract:
Setting: Spinal cord injury clinic at UPMC
Patient: A 42 year old female with T9 ASIA A paraplegia from a SCI that occurred in her mid-twenties
Case Description: The patient, who has a history of depression and past inpatient psychiatric admission, presented with progressive left arm weakness. A few months prior, the patient had a fall from a stair glide resulting in left upper extremity myofascial pain but no motor changes. The patient underwent physical therapy and was noted to have progressive left upper extremity weakness to the point where she was unable to push her manual wheelchair. On presentation to the clinic, the patient's left arm was non-functional and plegic. The patient did not appear distressed or even fazed by the weakness. She denied new trauma or illness. Her acute on chronic pain was well controlled. On exam, the right upper extremity was normal. Left upper extremity strength was trace throughout with diminished light touch sensation in all dermatomes. Reflexes were intact bilaterally. Hoffman's was negative. An EMG showed no evidence of neuropathic changes. Blood work was unremarkable. MRI of the cervical spine was negative for pathology.
Assessment/Results: The working diagnosis is conversion disorder and the patient has been referred to psychiatry for further evaluation. She continues to undergo physical therapy.
Discussion: This is one of the first reported cases of possible conversion disorder in a patient with long-standing paraplegia from a SCI. Patients with conversion disorder should be treated with therapy and supportive treatment. Psychiatric evaluation may be beneficial.
Conclusion: Conversion disorder should be considered in persons with chronic disability and new onset weakness which is not explained through diagnostic work-up.

Submission Category: Junior Faculty

Andrea Hergenroeder, PT, PhD
lockeal@upmc.edu

Department: Department of Physical Therapy
Affiliation: University of Pitsburgh

Undergraduate: BS, The Pennsylvania State University
Graduate: MPT, Gannon University
Medical School:
PhD: PhD, Exercise Physiology, University of Pittsburgh

Research Interest Areas: Exercise Interventions for Older Adults

Research Title: Accuracy of Activity Monitors for Counting Steps in Older Adults

Project Authors: Andrea Hergenroeder, PhD, PT, Bethany Barone Gibbs, PhD, Mary P. Kotlarczyk, PhD, Subashan Perera, PhD, Jennifer S. Brach, PhD, PT

Abstract:
Study: Walking is the most common mode of physical activity in older adults and is often the target of physical activity interventions. Various monitors are used in research to measure walking by counting steps. Despite this, monitor accuracy for counting steps is not well known in older adults who walk slowly or use an assistive device. The purpose of this study was to evaluate the accuracy of three physical activity monitors (Actigraph, ActivPAL, and Stepwatch) to measure steps in older adults with varying walking abilities.
Methods: The accuracy of each monitor to record 100 steps was assessed across two walking trials in 44 participants (age 87.0 ± 5.7 years, mean ± SD) who used a cane (n=4), wheeled walker (n=17), or no device (n=23) in independent living.
Results: The Stepwatch had the highest step count accuracy (99.0% ± 1.5), followed by ActivPAL (93.7% ± 11.1), and Actigraph (50.9% ± 35.5). Accuracy differed by gait speed category (<.6, .6-.79, .8-1.0, >1.0 m/s) with increased accuracy at speeds >1.0 m/s (all p<.05). Accuracy also differed based on assistive device use with the Stepwatch being most accurate across all conditions (no device: 99.1% ± 1.0, cane: 97.7% ± 4.3, wheeled walker: 99.1% ± 1.0) followed by activPAL (no device: 96.3% ± 7.0, cane 80.6% ± 27.3, wheeled walker 92.7% ± 10.2) and Actigraph (no device 67.3% ± 35.6, cane 43.0% ± 26.4, wheeled walker 31.5% ± 30.3).
Conclusion: The Stepwatch and ActivPAL are reasonably accurate (>80%) in counting steps in older adults who walk slowly and/or utilize assistive devices compared to Actigraph, which is accurate only in those who walk faster than 1.0 m/s.
Significance: When selecting an activity monitor to measure steps in older adults, researchers should consider their walking characteristics.

Submission Category: Master's-level students and candidates for doctoral degrees

Angelica Herrera, BS
ajh146@pitt.edu

Department: Swanson School of Engineering
Affiliation: PhD Student

Undergraduate: Johns Hopkins University
Graduate:
Medical School:
PhD: University of Pittsburgh

Research Interest Areas: Brain-Computer Interfaces

Research Support Sources: PI Grant

Research Title: Neural tuning properties of the primary motor and somatosensory cortices during cursor and hand tasks

Project Authors: A.Herrera, J. Downey, Jeffrey M. Weiss, Michael Boninger, Robert Gaunt, J. Collinger

Abstract:
Brain-computer interfaces (BCIs) can restore lost limb function through control of a prosthetic arm via signals from motor cortex (M1). Neurons in somatosensory cortex (S1) have also been found to be tuned to cursor and hand movements. M1 shows stronger tuning in general, but S1 is more strongly tuned to hand movements. We examine these temporal aspect, predicting that M1 will lead and S1 will lag kinematics.
Two 88- and two 32-channel intracortical microelectrode arrays were implanted in a human subject with tetraplegia in M1 and S1, respectively. Neural data was collected during 5 sessions while the subject performed a 2D cursor control and a 2D robotic hand-shaping task. Data was collected under 2 conditions: (1) the subject attempted the tasks while they were controlled by the computer; (2) the subject executed the task while the computer attenuated command signals orthogonal to the target direction.
Examining the distribution of the encoding model fits for different lags, neurons in M1 and S1 appeared to be most tuned to kinematics when no lag shift was implemented. In the observed data for both tasks, no significant difference was found among the arrays for different shifts. For the constrained BCI, both recording arrays were found to have significantly different fits for 0 and 50ms lag compared to others tested. For both sensory arrays, a zero lag yielded the best fit. The sensory arrays were seen to have a slightly better fit than the recording arrays in the hand task; however, they were not statistically significant.
We saw that M1 and S1 activity was predicted by movement; however, this relationship was strongest with zero lag between neural activity and kinematics. This result may be because the participant was attempting movement rather than overtly moving.

Submission Category: Master's-level students and candidates for doctoral degrees

Barbara Hopkins
blh63@pitt.edu

Department: Department of Human Genetics
Affiliation: Women's Cancer Research Center

Undergraduate: Cal Poly
Graduate: University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Redox Signalling Pathways

Research Title: A PRDX1-FOXO3 Signaling Pathway Acts As a Redox Sensor Controlling FOXO3 Subcellular Localization and Transcription in Breast Cancer

Project Authors: John Skoko, Monica Nadler, Andrea Pelosi, Roya Khosravi-Far, Carola Neumann

Abstract:
Precision in redox-signaling is attained through post-translational protein modifications such as oxidation of protein thiols. The peroxidase peroxiredoxin 1 (PRDX1) regulates signal transduction through changes in thiol oxidation of its cysteines. We demonstrate here PRDX1 is a binding partner for the tumor suppressive transcription factor FOXO3 that directly regulates the FOXO3 stress response. Heightened oxidative stress evokes formation of disulfide-bound heterotrimers linking dimeric PRDX1 to monomeric FOXO3. Absence of PRDX1 enhances FOXO3 nuclear localization and transcription that is dependent on the presence of Cys31 or Cys150 within FOXO3. Notably, FOXO3-T32 phosphorylation is constitutively enhanced in these mutants, but nuclear translocation of mutant FOXO3 is restored with PI3K inhibition. Here we show that upon H_2O_2 exposure, transcription of tumor suppressive miRNAs let-7b and let-7c are regulated by FOXO3 or PRDX1 expression levels and that let-7c is a novel target for FOXO3. Conjointly, inhibition of let-7 microRNAs increases let-7-phenotypes in PRDX1-deficient breast cancer cells. Altogether these data ascertain the existence of an H_2O_2-sensitive PRDX1-FOXO3 signaling axis that fine-tunes FOXO3 activity toward the transcription of gene targets in response to oxidative stress.

Submission Category: Post-Doctoral Researchers and Fellows

Hye Jin Hwang, PhD
hyh6@pitt.edu

Department: Departments of Pediatrics, Developmental Biology and Cell Biology
Affiliation: University of Pittsburgh School of Medicine

Undergraduate: Yonsei University
Graduate:
Medical School:
PhD: Michigan State University

Research Interest Areas: Aging, Reproduction, and Metabolism

Research Support Sources: NIH

Research Title: Spatio-Temporal Regulation of Lipid Desaturation in Long-Lived Germline-less Animals

Project Authors: Hye Jin Hwang and Arjumand Ghazi

Abstract:
Traditionally, increased fat has been considered detrimental to health. However, emerging evidence from animal models suggests that lipid composition, rather than quantity alone, has a major impact on aging and specific lipids may promote longevity. Human studies have shown association of increased mono-unsaturated fatty-acid (MUFA) levels with familial longevity. In Caenorhabditis elegans, removal of germline-stem cells (GSCs) is associated with increased fat storage and lifespan extension, mediated by a group of conserved transcription factors. Previously, we demonstrated that GSC-less, long-lived mutants exhibit increased MUFA levels compared to saturated fatty acids (SFA). We discovered that the enhanced desaturation is caused by increased expression of multiple 'fat' genes, encoding fatty-acid desaturases, through the activity of transcription factors DAF-16 (homolog of human FOXO3A) and NHR-49 (functional homolog of PPAR-?). However, little is known about the spatial regulation of fatty-acid desaturation. In this study, we are examining the temporal and spatial differences in up-regulation of different 'fat' genes and their regulation by DAF-16/FOXO3A and NHR-49/PPAR-?. Using transgenic strains expressing GFP-tagged FAT-5 and FAT-6 desaturase proteins, we have found distinct spatio-temporal patterns of induction. Our data suggest that FAT-5 expression is strongly enhanced in intestinal cells of GSC-less animals by DAF-16/FOXO3A and maintained during adulthood, whereas, FAT-6 expression is temporally restricted to early adulthood and likely DAF16/FOXO3A independent. Overall, our data suggest that precisely controlled spatio-temporal upregulation of desaturase-enzymes in germline-less animals may lead to tissue-specific lipidomic profiles that promote longevity.

Submission Category: Master's-level students and candidates for doctoral degrees

Taya Irizarry, PhDc, RN
tai19@pitt.edu

Department: School of Nursing
Affiliation: Acute and Tertiary Care

Undergraduate: University of Pittsburgh
Graduate: University of Colorado Denver
Medical School:
PhD: University of Pittsburgh

Research Interest Areas: Information & Communication Technology for Patient Engagement

Research Title: Temporal Patterns in Personalized Intervention Tailoring and Exercise Adherence and Their Correlates among Older Adults with Osteoarthritis of the Kne

Project Authors: Taya Irizarry, PhDc, RN; Susan M. Sereika, PhD; Annette DeVito Dabbs, PhD, RN; Elizabeth A. Schlenk, PhD, RN

Abstract:
Background: Little is known about the relationship between the extent of personalized tailoring of exercise goals and trends of exercise adherence among older adults with osteoarthritis of the knee and hypertension(OAK/HTN).
Objectives: To identify trajectory groups for extent of tailoring of exercise goals, adherence to lower extremity exercise(LEE), and adherence to fitness walking(FW); to explore associations between tailoring and exercise trajectory groups; to explore sample characteristics (e.g., demographics, self-efficacy, outcome expectancy, extent of tailoring) as predictors of exercise adherence trajectory.
Methods: Group-based trajectory modeling was used to identify latent trajectory groups. Associations between tailoring and adherence trajectories were evaluated. Multinomial logistic regression was used to identify potential predictors of adherence group membership.
Results: Three distinct trajectories were identified for LEE tailoring and adherence. Four distinct trajectories were identified for FW tailoring and adherence. A moderate association was observed between tailoring and exercise adherence trajectories for LEE, but not FW. Regarding predictors of LEE adherence, younger participants were more likely to belong to the "quick decline" or "steady decline" groups; participants in the "remained highly tailored" group were more likely to belong to the "quick decline" group. Regarding predictors of FW adherence, participants in the "slight rise/remained highly tailored" trajectory group were more likely to belong to the "quick decline" group.
Conclusions: Patterns of tailoring explained some variation in adherence; however, more work is needed to identify additional tailoring strategies to improve efficacy of OAK/HTN exercise interventions.

Submission Category: Resident Physicians and Clinical Fellows

Jeff Kandt, MD
kandtja@upmc.edu

Department: Physical Medicine and Rehabilitation
Affiliation: University of Pittsburgh

Undergraduate: University of Michigan
Graduate:
Medical School: Wayne State
PhD:

Research Interest Areas: Pain Medicine

Research Title: Bilateral infarcts of thalamus resulting in decreased wakefulness

Project Authors: Jeff Kandt, MD, Jennifer Shen, MD, Hejab Imteyaz, MD

Abstract:
Case Description: This case series involves two patients who were initially found unresponsive at home. Patients A and B had an NIHSS of 20 and 21 on presentation, respectively. Each patient underwent an MRI, which revealed acute infarcts in the bilateral thalami. On day three of hospitalization both patients were started on modafinil. Patient A received two separate 100 mg doses at 7:00A/11:00A and Patient B received a single 200 mg dose at 7:00A. Both patients were found to be more alert within 24 hours of starting the medication. Patient A became less alert as we decreased her modafinil dose on day 7. Patient B was minimally responsive for most of the day prior to being started on modafinil and had complete resolution of impaired wakefulness once modafinil was started. Patient A was older than Patient B by 43 years and had an additional infarct in the right midbrain on MRI. Both patients were discharged home on a decreased dose of modafinil.
Discussion: Modafinil is FDA approved for the treatment of narcolepsy, but we also see it used as an off-label medication to increase alertness in stroke and TBI patients. The exact mechanism of this medication is still unknown, but we do know about some of it's actions in the thalamus. In this region, modafinil occupies NE transmitter sites and increases glutamate release while not increasing GABA. We also know the thalamus plays a key role in wakefulness. Our two patients suffered bilateral thalamic infarcts causing them to struggle with alertness, which improved when modafinil was administered.
Conclusions: Patients suffering from decreased wakefulness following bilateral thalamic infarcts may benefit from modafinil. This medication has been shown in our two patients to improve their participation in therapy, which led to

Submission Category: Master's-level students and candidates for doctoral degrees

Helmet Karim, BSc
hek26@pitt.edu

Department: Bioengineering
Affiliation: University of Pittsburgh

Undergraduate: BSc
Graduate:
Medical School:
PhD:

Research Interest Areas: Neuroimaging, Late-Life Disorders, Prediction

Research Title: Association between change in brain gray matter volume, cognition, and depression severity: pre- and post- antidepressant pharmacotherapy for late-lif

Project Authors: Droppa K, Karim HT2, Tudorascu DL, Karp JF, Reynolds CF III, Aizenstein HJ, Butters MA

Abstract:
Late-life depression (LLD) is associated with cognitive impairments and reduced gray matter volume (GMV); however the mechanisms underlying this association are not well understood. The goal of this study was to characterize changes in depression severity, cognitive function, and brain structure associated with antidepressant treatment for LLD. We administered a detailed neurocognitive battery, structural magnetic resonance imaging (MRI) on 26 individuals with LLD, pre-/post- a 12-week treatment trial with venlafaxine. After calculating changes in cognitive performance, GMV, and depression severity, we calculated Pearson's correlations, performed permutation testing, and false discovery rate correction. We found that loss of GMV over 12 weeks in the superior orbital frontal gyrus was associated with less improvement in depression severity and that increased GMV in the same was associated with greater improvement in depression severity. We detected no associations between changes in cognitive performance and improvements in either depressive symptoms or changes in GMV.

Submission Category: Master's-level students and candidates for doctoral degrees

Jessica Kersey, MOT, MHA, OTR/L
JMK286@pitt.edu

Department: Department of Occupational Therapy
Affiliation: University of Pittsburgh

Undergraduate: Bachelor of Health Science, University of Florida
Graduate: Master of Occupational Therapy, University of Florida
Medical School:
PhD:

Research Interest Areas: Acquired Brain Injury

Research Support Sources: NIH

Research Title: Self-Awareness Improves After Stroke

Project Authors: Jessica Kersey, MOT, MHA, OTR/L and Elizabeth Skidmore, PhD, OTR/L

Abstract:
Background: Self-awareness, the ability to acknowledge functional impairments, is often impaired following neurological insult, and can impede recovery. Strategy training, a metacognitive intervention, may increase self-awareness through structured self-assessment. We conducted a secondary analysis of data from a pilot randomized trial in stroke rehabilitation to see if self-awareness improved over time, and if changes in self-awareness were greater over time with strategy training.
Methods: We randomized 39 participants to 10 sessions of strategy training or direct skill training. Strategy training focused on identifying performance problems, initiating problem solving, and generalizing strategies. Direct skill training focused on specific instructions for task completion. The Self-Awareness of Deficits Interview was used at baseline, 3 months and 6 months. A one-way ANOVA was used to analyze change in self-awareness over time. A two-way ANOVA was used to examine differences in self-awareness between groups over time.
Results: Self-awareness improved over time [$F_{(2, 93)}= 4.56$, p=.01]. There were no differences in change over time between groups [$F_{(2, 24)}=.06$, p=.94].
Conclusions: Self-awareness improved regardless of intervention type. Both interventions may be useful in improving self-awareness. Alternatively, self-awareness may improve naturally over time after stroke.
Significance: Impaired self-awareness influences recovery, and is significantly disabling in the resumption of meaningful activities following stroke or other neurological insults. It is important to understand the potential for recovery and the effect of different treatment approaches.

Submission Category: Master's-level students and candidates for doctoral degrees

George Kimmel
gmk29@pitt.edu

Department: University of Pittsburgh, Graduate School of Public Health, Department of Epidemiology
Affiliation: University of Pittsburgh, Graduate School of Public Health, Department of Epidemiology

Undergraduate: BS, Slippery Rock University
Graduate: MPH (expected summer 2017), University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Peripheral nerve function, knee osteoarthritis, aging

Research Title: Sensory Peripheral Nerve Function in Total Knee Replacement Patients

Project Authors: George Kimmel, Mary E. Winger, Robert M. Boudreau, Paolo Caserotti, Adrienne DiFiore, M. Beatriz Catelani, Sara Piva, Nancy W. Glynn, Elsa S. Strotmey

Abstract:
Knee osteoarthritis (OA), the most common form of arthritis in the US, carries a lifetime risk of 45% in older adults. Knee OA has been associated with neuropathic symptoms, such as pain and loss of sensation, and reduced sensory peripheral nerve function (PNF). However, the relationship between knee OA and peripheral nerves remains poorly understood. We examined PNF using monofilament detection (insensitivity: unable to detect 3/4 touches of 1.4-g, 4-g and 10-g at dorsum of right and left big toe) in patients aged =60 years with knee OA who had unilateral total knee replacement (TKR). Patients (N=126) were 63.5% women; age 69.8±6.5 years; 2-4 months post-surgery, and had a mean Western Ontario and McMaster Universities Arthritis Index (WOMAC) score: 20.1±7.8. Conditional logistic regression was used to compare between knee differences of patients' TKR and non-surgical knee (NSK) in separate models for 1.4-g, 4-g and 10-g monofilament insensitivity. Monofilament insensitivity was similar in the TKR knee compared to NSK: 1.4-g (31.8% vs. 29.4%), 4-g (15.9% vs. 15.1%), and 10-g (8.7% vs. 10.3%), all NS. In conditional logistic regression models, monofilament insensitivity was not different for 1.4-g (OR=1.3; 95% CI: 0.57-3.0), 4-g (OR=1.2; 95% CI: 0.39-3.5) or 10-g (OR=0.50; 95% CI: 0.09-2.7) in patients' TKR vs. NSK. Although light touch monofilament insensitivity was highly prevalent in TKR patients, lack of differences for TKR vs. NSK suggests that knee OA rather than surgery may be responsible for PNF impairments. Future studies should include more sensitive tests of PNF in TKR patients to further elucidate the relationship.

Submission Category: Resident Physicians and Clinical Fellows

Karthik Kota, MD MPH
kotakj@upmc.edu

Department: Geriatric Medicine
Affiliation: Resident

Undergraduate: Cornell University
Graduate: New York University (MPH)
Medical School: State University of New York - Upstate
PhD:

Research Interest Areas: Deprescribing

Research Support Sources: Grant to the Geriatric Division

Research Title: Do Internal Medicine Resident Know How to Deprescribe?

Project Authors: Kota KJ, Pruskowski J, Wright RM, Handler S

Abstract:
Background: Physician trainees do not routinely deprescribe medications in older patients. Deprescribing—the process of stopping medications when harms outweigh benefits—is a skill teachable via structured processes. This study's goal was to assess internal medicine (IM) residents' attitudes and knowledge about deprescribing

Methods: Over 3 months, UPMC Presbyterian IM residents completed an anonymous, online survey on deprescribing in older adults. 10 vignettes were presented to residents, allowing them to deprescribe in situations ranging from remaining life expectancy to time-until-effectiveness and asking them to rank barriers to deprescribing

Results: The response rate was 48.5% (98/202). 33% felt unable to deprescribe, 39% felt they needed supervision, and 27% felt able to deprescribe alone. Likert scales (1, strongly disagree; 5, strongly agree) showed preference for primary care provider (PCP) deprescribing than non-PCP (mean 4.5 vs 4, $p<0.01$) and for PCPs to discontinue another provider's medications if timely communication occurred vs non-PCPs (mean 3.73 vs 3.23, $p<0.01$). More felt comfortable deprescribing a PPI or statin than insulin (means 4.29, 3.99, and 3.60, $p<0.01$). 80% did not deprescribe in the last year, with the top 3 cited barriers being clinical complexity (39%), uncertainty of benefits and harms (37%), and incomplete information on past rationales/tolerance of medications (30%); these first 2 were also the most cited considerations when answering vignettes, and all 3 were knowledge-based uncertainties, not systems-based issues (e.g., time constraints) or patient attitudes

Conclusions: This study shows IM residents have trouble deprescribing in older adults, and require building confidence and more concrete decision aides (like STOPP-START)

Submission Category: Post-Doctoral Researchers and Fellows

Mary Kotlarczyk, PhD
mpk38@pitt.edu

Department: Department of Medicine, Division of Geriatric Medicine
Affiliation: University of Pittsburgh

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Function and mobility in older adults

Research Title: Accuracy and Acceptability of Commercial Activity Monitors in Older Adults

Project Authors: M.P. Kotlarczyk, B. B. Gibbs, S. Perera, J. S. Brach, A. L. Hergenroeder

Abstract:
Study: Commercial activity monitors with step counting features can serve as an important tool for encouraging walking behavior. However, the accuracy of these monitors has not been tested in older adults who often walk slower and use assistive devices. We evaluated the accuracy of seven commercially available activity monitors to measure steps in older adults with varying walking abilities. We also assessed monitor acceptability and usability.
Methods: Forty-four older adults (age 87.0 ± 5.7 years, mean ± SD) completed two trials of 100 steps each to measure monitor accuracy. Questionnaires were used to assess acceptability and usability.
Results: Overall, the Fitbit Charge had the lowest accuracy (38.2% ± 40.3), while the Accusplit AX2710 pedometer had the highest (93.8% ± 13.8). Device accuracy ranged from 64.1% ± 33.0 to 97.2% ± 7.4 in those not utilizing an assistance device (n=22), 29.2% ± 44.4 to 97.2% ± 1.6 in those using a cane (n=4), and 5.9% ± 24.3 to 88.4% ± 19.7 in those using a wheeled walker or rollator (n=17). Accuracy of all monitors varied across gait speeds (all $p<0.01$) with lowest accuracy at speeds <0.6 m/s and highest accuracy at speeds >1.0 m/s. Acceptability evaluations revealed monitor accuracy as the most important feature and ability to interface with a smart device as the least important feature. Common barriers to usability were inability to put monitor on and difficulty accessing the step display.
Conclusion: Commercial activity monitors have reduced accuracy in older adults. Monitor design features can limit acceptability and usability.
Significance: Our results highlight the current lack of accurate and acceptable commercial monitors to measure steps in older adults.

Submission Category: Clinical practitioners doing quality or practice improvement

Amy Kowinsky, RD, LDN
kowinskyam@upmc.edu

Department: UPMC Mercy 10E
Affiliation: Wolff Center

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Improving Care for Dementia Patients Through Implementation of a Dementia Activities Room

Research Title: Improving Care for Dementia Patients Through Implementation of a Dementia Activities Room

Project Authors: Stasa Tadic, MD, MS; Laura McNally, BS, MSN, RN, CMSRN, Unit Director 10E

Abstract:
Study: Patients with dementia are at risk of decline and adverse outcomes during hospitalization and may need additional support that is lacking in current hospital care. To prevent this, we have implemented the Dementia Activities Room on an inpatient medicine unit at UPMC Mercy.
Methods: For patients with dementia, the activities room provides additional supervision and stimulation in a dementia-friendly environment. The room is staffed by a care attendant trained in communication and engagement techniques for dementia patients. The goal of the room is to keep patients stimulated, safe, and calm through conversation, music, art, games, and activities. Special focus is given to meals, adequate hydration, and activities of daily living. The focus of the environment is on helping patients be successful with tasks, through providing support, rather than "doing it for them," which is all too often the approach taken in current hospital care. We defined outcome measures to better evaluate effect of dementia room on dementia patients during hospital stay.
Results include decreased agitation measured by the Agitated Behavior Scale - from 21.1 avg for dementia patients not in the room to 15.76 avg for patients with dementia in the room, increased meal intake of 35.1% more lunch and 16.1% more dinner for dementia patients using the room, and a greater percentage of dementia patients admitted and discharged to the same level of care: 66.7% vs. 44.4% of patients who were not using the activities room.
Conclusion: The Dementia Activities Room helps to increase intake and reduce agitation in dementia patients. They are also more likely to be discharged to the same level of pre-hospital care.
Significance: This new concept for hospital dementia care improves care and outcomes.

Submission Category: Clinical practitioners doing quality or practice improvement

Emily Kryger, PharmD, BCGP
krygere@upmc.edu

Department: Medical Education
Affiliation: UPMC St. Margaret

Undergraduate:
Graduate: University of Pittsburgh School of Pharmacy
Medical School:
PhD:

Research Interest Areas: Transitions of Care, Medication Reconciliation, Controlled Substance Provision, Antibiotic Stewardship

Research Support Sources: None

Research Title: Patients In Pain: Providing Scripts for Controlled Substances at Discharge

Project Authors: Sheree Lichtenstein, PharmD and Heather Sakely, PharmD, BCPS

Abstract:
Study: CMS regulations require skilled nursing facilities to provide timely access to pharmaceuticals, and pain management specifically is a publically displayed quality measure for each facility. However, a study by the Quality Care Coalition for Patients in Pain found that 65.4% of nearly 900 clinicians across 46 states reported experiencing delays in getting controlled substances to their patients in nursing facilities. An underlying cause is conflict between practices designed to ensure timely access to medically necessary medications and DEA rules intended to minimize risk of diversion. Because SNFs do not register with the DEA like hospitals, a valid script must be obtained by the pharmacy before dispensing controlled substance medications. Under current laws and enforcement, nurse agents and chart orders are not valid for controlled substances in nursing facilities. This ongoing study aims to identify the impact of three interventions designed to increase the provision of scripts for controlled substances for patients discharging from UPMC hospitals to nursing facilities.
Methods: Three interventions are being developed to increase compliance with sending scripts for controlled substances: (1) alert reminding the prescriber to send a script, (2) educational computer screen saver, and (3) visual differentiation of controlled substances.
Results: The number of orders for controlled substances without a prescription printed will be monitored to evaluate the efficacy of interventions.
Conclusions/Significance: Ensuring scripts are provided at the point of discharge for all controlled substances will prevent treatment delays that can lead to avoidable readmissions, costs, and patient suffering.

Submission Category: Resident Physicians and Clinical Fellows

Michael Kryger, MD, MS
krygerm@upmc.edu

Department: Physical Medicine & Rehab
Affiliation: Department of Physical Medicine and Rehab

Undergraduate: Northwestern University, Bachelor of Science in Biomedical Engineering
Graduate: Northwestern University, Master of Science Engineering
Medical School: Northwestern University Feinberg School of Medicine
PhD:

Research Interest Areas: Spinal Cord Injury Medicine

Research Title: Use of the iMHere Mobile Health Platform to Improve Outcomes in Spinal Cord Injury

Project Authors: Michael Kryger, MD MS, Matthew Kwon, BA, Theresa Crytzer, DPT, ATP, Andrea Fairman, PhD, OTR/L, CPRP, Bambang Parmanto, PhD, Brad Dicianno, MD

Abstract:
In the constant effort to improve compliance, personalized health apps have opened up new avenues to improve patient engagement and outcomes. In a previous study, a mobile health app called iMHere was developed to help Spina Bifida patients with self-care tasks related to bowel training, urinary catheterization, mood, medications and skin checks. High usage of the system resulted in positive changes in self-management skill, and decreasing UTIs and ED visit trends. The purpose of this investigation was to determine if iMHere could result in better health outcomes in persons with spinal cord injuries (SCI).
Methods
Thirty-eight subjects with SCI were randomized to either an intervention group who were given the app or the control group, who were not given the app but received standard of care (n=19 in each group). Health outcomes including number of urinary tract infections (UTI), wounds, emergency department (ED) visits, and hospitalizations were collected. Wilcoxon Signed Ranks tests were performed to evaluate for changes in health outcomes.
Results
A statistically significant decrease in UTIs occurred in the intervention group (p=.034). Based on these data, for every 2.13 people who use the app, one UTI would be prevented. Both ED visits and hospitalizations from UTIs or wounds trended towards significant reductions. Other outcomes, including wounds, ED visits due to wounds or UTIs, and general unplanned or planned hospital stays did not change during the study period.
Conclusion & Significance
Use of iMHere was associated with a significant reduction in UTIs in persons with SCI. A reduction of ED visits & hospitalizations may also occur in a larger sample. This shows that personalized mobile health may offer a new pathway to improve outcomes in persons with SCI.

Submission Category: Master's-level students and candidates for doctoral degrees

Raj Kumar, MPH
kumarr4@upmc.edu

Department: School of Medicine
Affiliation: Physical Medicine and Rehabilitation

Undergraduate: BS
Graduate: MPH
Medical School:
PhD:

Research Interest Areas: Epidemiology

Research Support Sources: Graduate Student Researcher

Research Title: Using Classification Regressions Trees to Evaluate Clinical and Systemic Biomarker Risk Factors for Traumatic Brain Injury Mortality

Project Authors: 1Kumar RG., 1Wang Z., 1Ranganathan P., 1,2Wagner AK.

Abstract:
TBI associated mortality risk, thereby limiting how to apply reliable baseline risk stratification methods to clinical trials. This knowledge gap may partially explain historical failures with identifying effective TBI neuroprotective agents with previous clinical trials. Classification Regression Trees (CRT) utilize decision-learning to determine optimal variables, and corresponding cut-points that are hierarchically ordered according to their prognostication capacity to discriminate clinical outcomes. We leveraged CRT to determine demographic, clinical (head/non-head injury severity), and acute systemic biomarkers known previously associated with mortality [estradiol (E2), testosterone (T), E2:T ratio, tumor necrosis factor-a (TNFa)], and the CNS marker S100ß, to predict 6-month mortality among N=188 individuals with severe TBI. A preliminary CRT showed the strongest mortality predictor was age±42; therefore, primary analyses included two age-stratified CRT for those above (N=73) and below (N=115) age 42. S100ß was the strongest predictor (cut-point: 10.9pg/mL), with higher levels increasing mortality risk. Among those with high S100ß, high E2 (cut-point: 109.5pg/mL) was associated with greater mortality risk. Whereas those with lower S100ß (<10.9pg/mL), high TNFa (cut-point: 21.2pg/mL) and less non-head injury severity was associated with mortality. GCS above/below 6 was the strongest predictor. Among those with GCS<6, more men died than women. CRT generated strong mortality baseline mortality risk models. However, mortality risk captured by systemic and CNS biomarkers varies considerably by age. Similar methodologies may be considered for early assessment of baseline mortality risk to facilitate pre-randomization cohort stratification with clinical trials.

Submission Category: Resident Physicians and Clinical Fellows

Adam Lewno, DO
lewnoa2@upmc.edu

Department: Department of PM&R
Affiliation: PM&R Residency

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Sports Medicine

Research Title: Ultrasound Correlated Electrodiagnostic Diagnosis of Neuralgic Amyotrophy in a Collegiate Swimmer After Rapid Practice Intensity Change: A Case Report

Project Authors: Adam Lewno, DO, Wendy Helkowski, MD

Abstract:
Case Description: A 20 year old collegiate male swimmer presented with 1 month history of left shoulder pain and progressive weakness after rapid increase of practice intensity during the 1st practice of a training trip. Physical examination was notable for left infraspinatus atrophy, no active external shoulder rotation, supraspinatus and teres minor strength of 4/5, and medial scapular winging. MRI of the left shoulder revealed a posterior infraspinatus tendon partial tear while atrophy and edema within the teres minor suggested acute on chronic denervation. Electrodiagnostic studies (EDX) were significant for severe left suprascapular neuropathy of axonal nature with active denervation to the supraspinatus and infraspinatus. There was no evidence of teres minor denervation despite MRI findings and clinical exam correlation.
Results: EDX with ultrasound localization of the teres minor confirmed normal motor units and muscle fiber appearance while the infraspinatus and supraspinatus demonstrated significant denervation. There was no suprascapular nerve entrapment during static and stroke specific sonography.
Discussion: Neuralgic Amyotrophy is most commonly seen in volleyball players and pitchers after sustained high intensity play. Rarely does it develop solely in the suprascapular nerve after a single intense practice within swimmers. Ultrasound localization during EDX improved needle examination while allowing for dynamic assessment of both muscular function and nerve entrapment during sport specific motions.
Conclusion: Rapidly developing shoulder pain with lasting weakness after practice intensity changes in swimming should be concerning for Neuralgic Amyotrophy. Ultrasound correlated EDX significantly improved diagnostic capabilities in clinically divergent cases

Submission Category: Medical Student

Mengchi Li, BSN(c)
mel120@pitt.edu

Department: University of Pittsburgh
Affiliation: School of Nursing

Undergraduate: University of Pittsburgh School of Nursing
Graduate:
Medical School:
PhD:

Research Interest Areas: Geriatric

Research Title: Correlates of cognitively impaired older adults' willingness to participate in research

Project Authors: Mengchi Li, Melissa Knox, Jennifer Lingler, Lisa Tamres, Judith Erlen

Abstract:
Background:Unique factors may influence cognitively impaired older adults' willingness to participate in research. Understanding of such factors is needed for effective communication during informed consent. This study explores relationships between this population's willingness to participate in a clinical trial and demographic, psychological/perceptual, and clinical factors.
Methods and Sample: Fifty-two older adults (M=75 yrs, SD=10) with mild to moderate cognitive impairment were presented with two hypothetical treatment studies involving differing levels of invasiveness: 1) a drug trial, and 2) neurosurgery. Participants rated their likelihood of enrolling in a similar study and completed a short battery of surveys and cognitive testing. Nonparametric correlations between the individual's likelihood of participating and their demographic, clinical, and psychological/perceptual factors were calculated.
Results:Participants were 55% female, 84% white, and averaged 16 years education (SD=3). For the drug trial, likelihood of participating was positively associated with two psychological/perceptual factors: trust in medical researchers (rs=.31, p<.05), and hopefulness (rs=.29, p=.05). For the neurosurgery study, willingness to participate was inversely associated with level of education (rs=-.34, p<.02), ability to understand the study (rs= -.31, p<.04) and letter fluency (rs=-.34, p<.02).
Conclusion:In this sample, individuals with greater trust in medical researchers and more hopefulness are more willing to participate in a moderate-risk treatment study. Alternately, individuals who are more willing to participate in an invasive, high-risk treatment study tend to be less educated, have more impaired language skills, and have less understanding of the study.

Submission Category: Resident Physicians and Clinical Fellows

Mark Linsenmeyer, MD
mlinsenmeyer@gmail.com

Department: Physical Medicine and Rehabilitation
Affiliation: UPMC

Undergraduate: Stanford University
Graduate:
Medical School: Rutgers Robert Wood Johnson Medical School
PhD:

Research Interest Areas: Rehabilitation

Research Support Sources: UPMC PM&R

Research Title: Disorders of Consciousness due to Anoxic Brain Injury: a Case Series of 8 Patients

Project Authors: Mark Linsenmeyer MD, Shanti Pinto MD, Gary Galang MD

Abstract:
Study:
The goal of our study is to characterize common medical complications, treatments, and recovery in patients with disorders of consciousness (DOC) due to anoxic brain injury (ABI).
Methods:
Retrospective case series at an academic inpatient rehabilitation facility. Inclusion criteria: admitted to inpatient rehabilitation (IPR) with DOC due to ABI from 2015-2016. Exclusion criteria: associated head trauma. UDS data was used to determine FIM scores.
Results:
On admission to IPR, 5 patients were vegetative and 3 had recently emerged from minimally conscious state (MCS). During IPR course, 2 vegetative patients emerged, 1 became minimally conscious, and 2 remained vegetative. FIM scores on admission were 18 or below for all patients and improved in 4 patients by an average of 40 points. All patients were given neuropharmacologic medications for arousal and attention. PSH affected 6/8 patients. 6/8 patients had spasticity, resolving in 3 by discharge. 5/8 patients exhibited movement disorders, primarily myoclonus. 7/8 patients developed urinary tract infections. No patients had evidence of seizures during IPR admission. Overall, 6/8 patients were discharged home.
Conclusions:
In IPR, patients with DOC due to ABI presented with prominent neurological deficits, for which they were prescribed neuropharmacologic agents in conjunction with therapies. Common limitations to rehabilitation include severe deficits in arousal and cognition, PSH, spasticity, movement disorders, and a high rate of infection; however, many patients were frequently discharged to the home setting.
Significance:
Research focused on DOC due to ABI is limited. Further investigation into predictors of outcome and optimal medical management for this population is warranted.

Submission Category: Post-Doctoral Researchers and Fellows

Misagh Mansouri Boroujeni, PhD
m.masnouri@pitt.edu

Department: Medicine
Affiliation: Physical Medicine and Rehabilitation

Undergraduate:
Graduate: University of Tennessee
Medical School:
PhD: University of Tennessee

Research Interest Areas: Biomedical Engineering, Biomechanics, Neuromusular Control

Research Title: USING BIOMIMETIC MODELS AND INTRAMUSCULAR EMG FOR CONTROL OF MYOELECTRIC PROSTHESES

Project Authors: Misagh Mansouri, Sergiy Yakovenko, Valeriya Gritsenko, Michael L Boninger, Lee E Fisher, Jennifer L Collinger, Robert A Gaunt

Abstract:
Commercial myoelectric prostheses often use pattern recognition or map the activity of a muscle to specific movements while largely ignoring the underlying biomechanics. Here, we use a detailed musculoskeletal model to relate the activity of EMG signals. and movements. In addition, we used data-driven approaches to investigate the relationships between coordinated hand muscle activity, recorded using intramuscular EMG in able-bodied subjects and an amputee.
We recorded EMG from 16 extrinsic hand muscles in nine able-bodied subjects and one trans-radial amputee . The open-loop data collection experiments included 45 movement trials that included individual finger and wrist movements in different wrist postures. The real-time forward dynamic simulations were implemented in MuJoCo physics engine. Principal component analysis and hierarchical clustering analysis were applied to the movement trials to compare EMG activity variance across all the different subjects.
Simultaneous control of 3-4 DOFs (wrist, thumb, index finger and coupled middle-ring-pinky fingers' flexion/extension) was achieved in able-bodied subjects. We found a major difference in the number of principal components (PCs) required to explain 90% of the variance in the EMG data between the amputee (5 PCs) and able-bodied subjects (10-11 PCs). The differences in the number of PCs between able-bodied subjects and the amputee could be explained by the reduced muscle set in amputees, or changes in the ability to voluntarily make certain movements as a result of the chronic limb loss. The biomimetic approach to controlling myoelectric prostheses can improve our understanding of the basic biomechanical functions of hand and has the potential to improve prosthetic control performance in amputees.

Submission Category: Master's-level students and candidates for doctoral degrees

Megan Marron, MS
mmm133@pitt.edu

Department: Department of Epidemiology, Graduate School of Public Health
Affiliation: University of Pittsburgh

Undergraduate: Rochester Institute of Technology
Graduate: University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Aging

Research Title: A healthy blood pressure phenotype is associated with better cardiovascular health and neuropsychological performance in the Long Life Family Study

Project Authors: Megan M. Marron, Robert M. Boudreau, Kaare Christensen, Stephanie Cosentino, Mary Feitosa, Ryan L. Minster, Nicole Schupf,..., Anne B. Newman

Abstract:
Hypertension tends to run in families and has both genetic and environmental determinants. We assessed the hypothesis that a novel healthy blood pressure phenotype is also familial and sought to identify its associated factors. We developed a healthy blood pressure phenotype in the Long Life Family Study, a cohort of two-generation families selected for longevity. Participants from the offspring generation (n=2211, ages 32-88) were classified as having healthy blood pressure if their age- and sex-adjusted systolic blood pressure z-score was between -1.5 and -0.5. Offspring on anti-hypertensive medications were classified as not having healthy blood pressure. Families with =2 offspring (n=419 families) were defined as meeting the healthy blood pressure phenotype if =2 and =50% of their offspring had healthy blood pressure. Among 2211 offspring, 476 (21.5%) met the healthy blood pressure phenotype. When examining the 419 families, only 44 (10.5%) families met the criteria for the healthy blood pressure phenotype. Both offspring and probands from families with healthy blood pressure performed better on neuropsychological tests that place demands on complex attention and executive function when compared to offspring and probands from remaining families. Among families with the healthy blood pressure phenotype compared with families without, a higher proportion of offspring met the American Heart Association definition of ideal cardiovascular health (10.8% versus 3.8%, respectively). In this cohort of familial longevity, few families had a novel healthy blood pressure phenotype in multiple members. Families with this healthy blood pressure phenotype may represent a specific pathway to familial longevity.

Megan Marron, MS
mmm133@pitt.edu

Department: Department of Epidemiology, Graduate School of Public Health
Affiliation: University of Pittsburgh

Undergraduate: Rochester Institute of Technology
Graduate: University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Epidemiology of aging

Research Title: Racial Differences in Mortality Risk in the Health, Aging, and Body Composition (Health ABC) Study

Project Authors: Megan M. Marron, Diane Ives, Douglas C. Bauer, Robert M. Boudreau, Tamara Harris, Suzanne Satterfield, Ronald I. Shorr, Anne B. Newman

Abstract:
U.S. blacks have a higher risk of death than whites. This varies by cause of death; stroke, kidney disease and some cancers are higher in blacks. We evaluated cause-specific mortality risk factors in the Health ABC study to determine whether specific risk factors are more important for these causes of death in blacks than whites. Potential risk factors included: demographics, smoking, body mass index, chronic disease, physical function, and cognition. Among N=3075 participants ages 70-79 (41.7% black), average follow-up was 11.9 years. Underlying cause of death was adjudicated by committee and categorized as: cardiovascular disease, stroke, cancer, dementia, pulmonary, infection, kidney, and other cause. Median survival (95% confidence interval) among black men, white men, black women, and white women was 10.6 (10.0, 11.5), 12.8 (12.4, 13.4), 13.4 (12.6, 14.6), and 15.3 (14.8, 16.2) years, respectively. Adjusting for age and sex, blacks had higher risks of dying from: any cause (hazard ratio=1.32 (1.21, 1.44)), kidney disease (HR=2.10 (1.17, 3.78)), cancer (HR=1.35 (1.13, 1.62)), and stroke (HR=1.32 (0.97, 1.75)). Higher all-cause mortality risk among blacks was attenuated by further adjustment for gait speed (black race adjusted HR=1.06 (0.95, 1.17)) or digit symbol substitution test (black race adjusted HR=1.01 (0.91, 1.12)), but minimally by prevalent diseases (black race adjusted HR=1.25 (1.13, 1.38)). Gait speed also attenuated higher risk of kidney and stroke deaths among blacks, but not cancer deaths. Factors contributing to poorer physical and cognitive function in similarly aged community-dwelling ambulatory black men and women could be targets to reduce disparity and excess mortality.

Submission Category: Master's-level students and candidates for doctoral degrees

Daniel Mason, MS
masond@duq.edu

Department: School of Pharmacy
Affiliation: Duquesne University

Undergraduate: Biochemistry
Graduate: Pharmaceutical Sciences
Medical School:
PhD:

Research Interest Areas: Parkinson's Disease

Research Title: Impact of aging and gender on olfactory function in a model of early Parkinson's disease

Project Authors: Daniel M Mason, Negin Nouraei, Deepti B Pant, Kristin M Miner, Kelvin C Luk, John F Stolz, and Rehana K Leak

Abstract:
Parkinson's disease is characterized by Lewy bodies containing aggregated, fibrillar proteins such as a-synuclein. Lewy pathology emerges first in olfactory structures in Parkinson's patients, and this may contribute to the development of smell loss years before the onset of motor symptoms. Here we injected a-synuclein fibrils into the olfactory bulb of wild-type mice. Three months later, we observed dense Lewy-like inclusions containing pathologically phosphorylated a-synuclein (pSer129) in the piriform and entorhinal cortices, amygdala, and hippocampus, all of which share anatomical connections with olfactory structures. Injections of the retrograde tracer FluoroGold confirmed the existence of first-order afferent neurons at each of these sites. Areas near the injection site that do not project into olfactory areas remained free of inclusions, suggesting a lack of nonspecific uptake of fibrils. The amyloid stain Thioflavin labeled cellular structures at the infusion site and some, but not all inclusions contained ubiquitin, a hallmark of mature Lewy pathology. Young and aged mice exhibited largely similar patterns of a-synucleinopathy, and aging did not exacerbate olfactory function. Instead, aged animals exhibited superior olfactory function in some tests. Furthermore, female mice were less likely to develop fibril-induced smell loss than males, consistent with superior olfaction in women and higher rates of Parkinson's disease in men. Our results are consistent with the olfactory vector hypothesis of Parkinson's disease and support the views that 1) Lewy pathology is transmitted through neuroanatomical connections, 2) Lewy pathology transmission is not dependent on age, but female and old mice have better olfaction than young males.

Submission Category: Resident Physicians and Clinical Fellows

Robyn Massa, MD
nadelre@upmc.edu

Department: Neurology
Affiliation: Movement Disorders

Undergraduate: Emory University
Graduate:
Medical School: University of Maryland School of Medicine
PhD:

Research Interest Areas: Movement Disorders

Research Title: Neuroimaging Signature of a Postural Tracking Task Performance in Older Ambulatory Adults

Project Authors: Robyn Massa MD,Andrea Rosso PhD MPH,Andrea Metti, PhD MPH,Patrick Sparto PhD PT,Howard Aizenstein MD PhD,Luigi Ferrucci MD PhD,Caterina Rosano MD MPH

Abstract:
Background: In older adults, postural instability contributes to falls, a major source of morbidity. Understanding central mechanisms may help identify individuals at risk for impaired postural control and inform strategies for fall prevention. Method: In a cohort of 193 community-dwelling older adults (mean age 82, 55% female, 44% black), total and regional gray matter volume (GMV), white matter hyperintensities, mean diffusivity, and fractional anisotropy (FA) were obtained along with a visual feedback test of controlling lateral stability. Root mean square error (RMSE) was calculated based on the difference between participant center of pressure and a visual tracking target moving at 0.25 Hz. Associations were assessed by linear regression with adjustment for atrophy, sex, quadriceps strength, digit symbol substitution test (DSST) score, abnormal sense of ankle position, and mild parkinsonian signs. Results: RMSE was higher for women (p<0.0001) and was inversely correlated with gait speed (r=-0.20, p=0.01), modified mini-mental state (r=-0.27, p=0.0001), DSST (r=-0.20, p=0.01) and quadriceps strength (r=-0.18, p=0.01). Whole brain GMV (p=0.0002) and FA (p=0.01) were inversely associated with RMSE. Associations for GMV were stronger for cortical regions with only bilateral precuneus independent of covariates. Associations with FA appeared localized to the right hemisphere (anterior thalamic radiation, cingulum, inferior longitudinal and fronto-occipital fasciculi) and corpus callosum. Conclusion: Atrophy of gray matter and impaired microstructural integrity in selected networks are associated with worse lateral balance control in older ambulatory adults. Unexplained poor postural control in older adults may be explained by these neuroimaging characteristics.

Submission Category: Post-Doctoral Researchers and Fellows

Akiko Mizuno, PhD
akm82@pitt.edu

Department: Psychiatry
Affiliation: Geriatric Psychiatry Neuroimaging Lab

Undergraduate: San Diego State University
Graduate:
Medical School:
PhD: Carnegie Mellon University

Research Interest Areas: Geriatric Psychiatry

Research Title: An Investigation for Neural Basis of Subjective Cognitive Decline

Project Authors: Mizuno A, Karim HT, Rangarajan A, Klunk WE, Snitz BE, Aizenstein HJ

Abstract:
Study: Subjective Cognitive Decline (SCD) is a pre-clinical state that refers to individuals with high subjective concerns for cognitive decline (primarily in memory) without objective cognitive impairment. SCD could represent the earliest stage of dementia; however, the course of progression and underlying neural basis is not understood. We compared brain activation during a memory-encoding task between healthy older individuals with no cognitive impairment and individuals with subjective concerns. /Methods: We recruited 44 normally aging subjects and 16 self-referred memory clinic subjects (mean age = 74.02, SD=7.04, range 61-93 years). All subjects were clinical unimpaired on neuropsychological assessment. We used the "face-name" memory encoding fMRI task. We built a general linear model for the dependence of voxel-wise activation on 1) a subjective concern score, 2) an objective memory score, and 3) their interaction. We also conducted one-way ANOVA to compare the mean activations among 4 groups: high-concern/high-performance, high-concern/low-performance, low-concern/high-performance, and low-concern/low-performance. /Results: We found that the bilateral thalamus and right anterior insula showed significantly modulated activations depending on subjective concerns and objective memory performance. Among individuals with high subjective concerns, reduced brain activation was associated with lower memory performance. /Conclusion: The reduced activation among individuals with elevated concern and relatively lower memory performance may indicate unsuccessful recruitment of the extended memory encoding system, and this group may have the highest risk to develop dementia. /Significance: SCD could be a more heterogeneous clinical group than previous studies indicated.

Submission Category: Master's-level students and candidates for doctoral degrees

Nayana Nagaraj, MBBS, MPH, CPH
nayana.nagaraj@pitt.edu

Department: Epidemiology
Affiliation: Graduate School of Public Health

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Women's health, Ageing, Life Course approach

Research Support Sources: Study of Women's health Across the Nation

Research Title: Association between reproductive factors and physical function in later life: A life-course hypothesis

Project Authors: Nayana Nagaraj, Anne Newman, Robert Boudreau, Samar El Khoudary, Rebecca Thurston,Jane Cauley

Abstract:
The risk of functional decline in women increases greatly after menopause, suggesting a possible hormonal influence. However, our current understanding of reproductive health & physical function in later life is very limited. We studied women from Study of Osteoporotic fractures (N=9704) with information on reproductive factors- menarche, parity, breastfeeding, menopause, hormone therapy use, hysterectomy & oophorectomy. Physical function measures included chair stand, maximum grip strength & 6m gait speed. Women >80 years were excluded to limit survivor bias. Generalized linear regression models were used, adjusting for confounders (age, BMI, smoking, alcohol intake, physical activity, diabetes & stroke). We studied 6154 women at baseline [Age, mean(SD)= 70.56(4.05), BMI= 26.46(4.43)]. Menopause at =40 years was associated with longer chair stand time, independent of confounders [ß (95% CI) =0.55(0.002, 1.11)]. Later age at menarche [0.16(0.06, 0.25) & greater parity [0.14(0.05, 0.23)] were associated with greater grip strength, while hysterectomy [-0.44(-0.72, -0.17)] & oophorectomy [-0.41(-0.69, -0.13)] were associated with lower grip strength, independent of confounders. Hormone therapy user [0.02(0.004, 0.03)] had faster walk speed while shorter length of reproductive life(LRL) [= 33 yrs] [-0.02(-0.04, -0.001)] was associated with slower walk speed, independent of confounders. In conclusion, later age at menarche, menopause & longer LRL are protective while hysterectomy & oophorectomy were harmful to physical function in later life. These results support the protective effect of estrogen on physical function in later life. Interventions targeting women with "at risk" reproductive factors could help manage & prevent functional decline in later life.

Submission Category: Master's-level students and candidates for doctoral degrees

Ameya Naniavdekar, MSE
amn69@pitt.edu

Department: School of Engineering
Affiliation: Bioengineering

Undergraduate: University of Pennsylvania
Graduate: University of Pennsylvania
Medical School:
PhD:

Research Interest Areas: Neuroprosthetics, somatosensory feedback

Research Title: Modulation of phantom limb pain using epidural stimulation of the cervical dorsal spinal cord

Project Authors: Ameya Nanivadekar, Santosh Chandrasekaran, Ahmed Kashkoush, Eric Helm, Jennifer Collinger, Robert Gaunt, Lee Fisher

Abstract:
Introduction: Recent evidence suggests that the incidence of chronic phantom limb pain can be regulated by delivering sensory feedback that is relevant to the amputated limb. This study aims to determine whether cervical spinal root stimulation to elicit sensations localized to the amputated arm can also result in concomitant changes in PLP
Methods: All procedures were approved by the University of Pittsburgh Institutional Review Board and the US Army Human Research Protection Office. Two study participants were implanted with three 8 or 16 contact spinal cord stimulation leads (Boston Scientific) in the lateral epidural space of the cervical spinal cord. Stimulation electrode, amplitude, frequency and pulse width were varied across trials and the intensity of PLP was recorded on a visual analog scale (VAS) after every stimulation trial. The McGill Pain Questionnaire (MPQ) was administered on a weekly basis, and again one month following explantation. The leads were explanted after 2-4 weeks.
Results: A total of 1,493 trials evoked localized sensations, of which 580 PLP episodes were reported (38.9%) at a mean intensity of 2.5 ± 1.9 on the VAS. For the 115 electrodes that evoked a sensation, stimulation amplitude and pulse width were related to the intensity and incidence of PLP respectively. Furthermore, a clinically significant (>5 points) reduction in PLP was observed on the MPQ in subject 1 (9 points) and subject 2 (8 points) at 1-month follow-up.
Conclusion: This study suggests that stimulation amplitude and pulse width may modulate the intensity and frequency of a PLP episode. We further observed time-dependent PLP modulation such that the immediate post-stimulation phase was associated with increased PLP that may be coupled to a long-term reduction in PLP.

Submission Category: Post-Doctoral Researchers and Fellows

DAIBANG NIE
dan52@pitt.edu

Department: Department of Orthopaedic Surgery, School of Medicine
Affiliation: University of Pittsburgh

Undergraduate:
Graduate:
Medical School:
PhD: China

Research Interest Areas: Tendon Biology

Research Title: RAPAMYCIN DECREASES TENDON STEM CELL SENESCENCE - A POTENTIAL APPROACH TO TREAT AGING INDUCED TENDINOPATHY

Project Authors: Daibang Nie, Jianying Zhang, James H-C. Wang

Abstract:

RAPAMYCIN DECREASES TENDON STEM CELL SENESCENCE - A POTENTIAL APPROACH TO TREAT AGING INDUCED TENDINOPATHY
Daibang Nie, Jianying Zhang, James H-C. Wang#
MechanoBiology Laboratory, Department of Orthopaedic Surgery, University of Pittsburgh School of Medicine Pittsburgh, PA, USA #wanghc@pitt.edu
INTRODUCTION: Aging is generally associated with cell senescence, which may lead to degenerative changes in tendons of aging patients. Although it is known that proliferation and differentiation potentials of tendon stem/progenitor cells (TSCs), which are essential for tendon homeostasis, decline with senescence, the role of mTOR in TSC senescence is poorly understood. Therefore, in this study, we aimed to determine whether mTOR regulates TSC senescence induced by bleomycin.
METHODS: Patellar tendon stem cells (PTSCs) were isolated from Sprague-Dawley rats (female, 5 months) using a previously published protocol [2]. PTSCs were treated with 0, 10, 50 µg/ml bleomycin for 5 days. Rapamycin was used at final concentration of 25 nM. Senescent cells were detected by histochemical staining of ß-gal and measuring the expression of p53, p-S6, total S6, and ß-Actin using Western blotting.
RESULTS: We found that bleomycin treatment induces senescence in rat PTSCs, as judged by a change of cell shape into a distinct, flat, and enlarged morphology and by increasing senescence-associated ß-gal activity. On the other hand, as shown by semi-quantification analysis, rapamycin at 25 nM blocked TSC senescence induced by 50 ?g/ml bleomycin. Finally, rapamycin at the same dosage completely inhibited S6 phosphorylation.
CONCLUSIONS: Use of rapamycin may represent a novel approach to slow the aging-associated tendinopathy by decreasing or blocking TSC senescence in vivo.

Submission Category: Master's-level students and candidates for doctoral degrees

Joshua Niznik, PharmD
jdn18@pitt.edu

Department: School of Pharmacy
Affiliation: University of Pittsburgh School of Pharmacy; VAPHS Center for Health Equity Research and Promotion

Undergraduate: BSPS, University of Pittsburgh
Graduate: PharmD, University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Pharmaceutical Outcomes and Policy

Research Support Sources: N/a

Research Title: Factors Predicting the Use of Anticholinergic Medications in Nursing Home Patients

Project Authors: Joshua Niznik,PharmD; Xinhua Zhao,PhD; Tao Jiang,MS; Joseph Hanlon,PharmD; Sherrie L. Aspinall,PharmD; Joshua Thorpe,PhD,MPH; Carolyn Thorpe,PhD,MPH

Abstract:
Study: Identify predisposing, enabling, and medical need factors associated with low and high levels of anticholinergic burden in nursing home residents.
Methods: National analysis of 2009--2010 Medicare Part A & B claims, Part D prescription drug events, and Minimum Data Set (MDS) assessments for nursing home admissions. Our cohort included 4730 Medicare beneficiaries age =65, admitted for non--skilled nursing stays =15 days between 01/01/2010--09/30/2010. Anticholinergic burden was defined using the Anticholinergic Cognitive Burden Scale (ACB) applied to Part D records. Scores assigned to individual medications were summed at the patient- level and categorized: high--level (score = 3), low--level (score 1-2), or none. Baseline predisposing factors, enabling factors, and medical need factors were evaluated for association with anticholinergic burden using multinomial logistic regression.
Results: Overall, 29.6% had high anticholinergic burden, and 35.2% had low burden. In adjusted analyses, the following factors were associated with increased risk of any anticholinergic burden: overall comorbidity, use of antidementia medications, depression, hypertension, and hospitalizations in the last year. Older age was uniquely associated with decreased odds of high burden and urinary incontinence and at least one specialist visit in the last year were uniquely associated with increased odds of high anticholinergic burden. Both severe and non--severe dementia were associated with decreased odds of low burden, but increased odds of high burden.
Significance: Use of anticholinergic medications is relatively common in nursing home patients. Interventions should be developed to optimize anticholinergic burden for those at increased risk for receiving anticholinergic medications.

Submission Category: Medical Student

Ihuoma Njoku, BS
ihn1@pitt.edu

Department: University of Pittsburgh Department of Physical Medicine and Rehabilitation and Safar Center for Resuscitation Research
Affiliation: University of Pittsburgh Department of Physical Medicine and Rehabilitation, and the Safar Center for Resuscitation Research

Undergraduate: University of Maryland, Baltimore County
Graduate:
Medical School: University of Pittsburgh School of Medicine
PhD:

Research Interest Areas: Physical Medicine and Rehabilitation, Geriatrics, and Psychiatry

Research Title: Effect of Galantamine on Attentional Set-Shifting Performance after Experimental Brain Trauma

Project Authors: Ihuoma Njoku, B.S., Lindsay Kutash, Ian Marshall, Hannah Radabaugh, B.S., Jeffrey P. Cheng, B.S., Anthony E. Kline, Ph.D. and Corina O. Bondi

Abstract:
Traumatic brain injuries (TBI) impact millions of Americans, with older patients being more likely to have a co-occurring condition, particularly dementia. Galantamine (GAL) acts as both an acetylcholinesterase inhibitor, a first-line drug used to treat dementia, and positive allosteric modulator of alpha-7-nicotinic acetylcholine receptors, having been reported to positively impact cognitive function in older adults. Previously, we demonstrated that a controlled cortical impact (CCI) injury produced significant impairments in executive function in the attentional set-shifting test (AST), a paradigm involving increasingly difficult tasks to obtain reward, analogous to the Wisconsin Card Sorting Test. In the current study, we predicted that daily GAL injections would normalize AST performance after a parietal lobe TBI in rats.
Methods: Rats were randomly assigned to either a TBI or sham group. Surgery was administered following a previously established CCI protocol. Following surgery, rats were randomly distributed into one of three treatment groups: saline or GAL (1 or 2 mg/kg/day), until the test day 4 weeks later.
Results: AST results indicated that TBI impairs performance on the first reversal stage, deficits attenuated by both GAL chronic doses ($p<0.05$). GAL (2 mg/kg/day) also significantly reduced TBI-induced cortical lesion volumes ($p<0.05$).
Conclusions: Chronic GAL administration provides an efficacious treatment for higher-order cognitive recovery following TBI.
Significance: Further studies will investigate whether these results are maintained when using older Sprague-Dawley rats in order to mirror the older age of adults typically treated with GAL, as well as specific brain pathways and mechanisms involved in restoring higher function after TBI.

Submission Category: Master's-level students and candidates for doctoral degrees

Darik O'Neil, BS-BA
dao25@pitt.edu

Department: University of Pittsburgh PM&R
Affiliation: Safar Center for Resuscitation Research

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Traumatic Brain Injury

Research Title: Age-dependent difference in cognitive performance after cardiac arrest in rats

Project Authors: O'Neil, D.A., Manole, M.D., Dezfulian, C., Kline, A.E., & Bondi, C.O.

Abstract:
Study: Cognitive impairments are frequently reported after cardiac arrest (CA), often seen as deficits in executive functioning. The pathological changes that underlie executive dysfunction are relatively unknown and remain unstudied in the laboratory. This study utilizes the attentional set-shifting test (AST) as a sensitive and well-validated cognitive paradigm to investigate higher-order cognitive functioning following clinically-relevant CA in immature and adult rats.
Methods: CA and resuscitation procedures were performed in accordance with previously established methodology. Rat pups (PND 16-18) underwent 9 or 12 minutes of asphyxial CA. Due to resiliency concerns, adult rats underwent only 9 minutes of asphyxial CA. Rats were tested on the AST at four weeks post-CA. The AST involves a series of increasingly difficult discriminative tasks to obtain food reward.
Results: AST findings suggest CA does not impair measured aspects of executive functioning in either age group. Intriguingly, there seems to be a paradoxical improvement of performance on specific AST stages. Specifically, CA adult rats performed faster than SHAM group on the second stimulus reversal, while CA adolescents subjected to 9-min pediatric CA also performed better on the intradimensional shift stage compared to SHAM ($p<0.05$).
Conclusions: The surprising lack of detrimental cognitive outcome post-insult could be secondary to enhanced neuroplasticity, elevated scanning attention or reduced impulsivity.
Significance: Neurological deficits are considered the most important prognosticators of functional outcome post-CA and remain understudied. By characterizing the long-term higher order cognitive performance, the groundwork for future rehabilitative and preventative intervention can be established.

Submission Category: Undergraduate Student

Nima Patel
nhp7@pitt.edu

Department: Physical Medicine and Rehabilitation
Affiliation: Safar Center for Resuscitation Research

Undergraduate: University of Pittsburgh, 2015-2019
Graduate:
Medical School:
PhD:

Research Interest Areas: Traumatic brain injury

Research Title: Frontal lobe brain trauma impairs attentional set-shifting performance in male rats

Project Authors: Nima Patel, Ian Marshall, Melissa Nicholas, Lindsay Kutash, Darik O'Neil, Hannah Radabaugh, Anthony Kline, Corina Bondi

Abstract:
Study: More than 10 million people sustain a traumatic brain injury (TBI) yearly, with survivors displaying cognitive impairments as well as psychological consequences. We showed that a controlled cortical impact (CCI) injury over the parietal cortex produced executive dysfunction in the attentional set-shifting test (AST) in rats, a paradigm analogous to the Wisconsin Card Sorting Test. This study aims to investigate cognitive deficits after experimental frontal lobe TBI by testing the hypothesis that injury will impair executive function in a cortical deformation depth-dependent manner. Methods: Adult male rats were subjected to CCI (2.0, 2.2, and 2.4 mm cortical depth) or sham injury over the prefrontal cortex region. Rats were tested on the AST 4 weeks later, via a series of increasingly difficult discriminative tasks for food reward. Dependent measures include number of trials to reach criterion, number or total errors and number of set loss errors. Results: Frontal CCI increased total trials to reach criterion and total errors on the ED stage and stimulus reversals compared to SHAM ($p<0.05$, n=7-8/group). These effects were particularly robust in the more severe injury groups, namely 2.2 and 2.4 mm cortical depth ($p<0.05$). Conclusions: These results suggest that frontal lobe injury negatively impacts complex cognitive functioning. Ongoing studies focus on disentangling neurotransmitter alterations responsible for attentional deficits following brain trauma. Significance: Considering that many TBIs occur via direct impact to the frontal part of the skull, this approach is clinically-relevant and may prove valuable for successful translation from bench to bedside, identifying necessary pharmacotherapies for cognitive performance and advance rehabilitation research.

Submission Category: Master's-level students and candidates for doctoral degrees

Prashanti Patil, PhD
prashanti1991@gmail.com

Department: School of Medicine
Affiliation: University of Pittsburgh

Undergraduate: Rochester Institute of Technology
Graduate:
Medical School:
PhD:

Research Interest Areas: Age associated changes in spine

Research Title: Human senescent disc cells exhibit metabolic shift and imbalanced matrix homeostasis.

Project Authors: Prashanti Patil; Joon Lee; Gwendolyn Sowa; Nam Vo

Abstract:
STUDY: The progressive impairment in intervertebral disc tissue health has been attributed to the increased levels of inflammatory proteins and matrix proteases with ageing in the disc. Previous reports from our lab had shown that cellular senescent phenotype increases with ageing in disc and that it could contribute to the age-associated disc degenerative changes. The goal of the study was to characterize senescent disc cells in vitro and examine the metabolic changes that senescent disc cells undergo in order to support their chronic secretion of numerous SASP factors at elevated levels.
METHODS: Human disc cells isolated from surgical specimens were treated with H_2O_2 to induce senescence. Cellular senescence was assessed by examining SA-ßgal, ?H2A.X and SASP (IL-6, 8 and ADMATS4). NF-?B (p-p65), aggrecan, and collagen II levels were measured by immunofluorescence. Mitochondrial respiration and ATP production and glycolysis were measured using XF Extracellular Flux Analyzer. Mitochondrial content and morphology was assessed by examining mitochondrial proteins TOM20 and ATP synthase ß by confocal imaging.
RESULTS: Oxidative-stress induced senescent disc cells exhibited an increase in SA-ß gal activity and number of ?H2A.X foci, and reduced aggrecan and collagen II content. Elevated level of activated NF-?B and pro-inflammatory cytokines, IL-6 and 8, was present in senescent disc cells. Compared to control cells, senescent disc cells had higher mitochondrial content, respiration, ATP production, and unchanged glycolytic capacity.
CONCLUSION/SIGNIFICANCE: The age-related degenerative disc hallmarks are all characteristic features of senescent disc cells. Hence, the senescent disc cells could contribute to the age-associated degradative changes in the disc.

Submission Category: Resident Physicians and Clinical Fellows

Marissa Pfoff
pfoffmk2@upmc.edu

Department: UPMC PM&R Residency
Affiliation: UPMC

Undergraduate: BS
Graduate:
Medical School: MD
PhD:

Research Interest Areas: Physical Medicine and Rehabilitation

Research Support Sources: Dr. Julie Lanphere

Research Title: A rare presentation of brachio-cervical inflammatory myopathy late in the disease course in a rehabilitation setting: a case report.

Project Authors: Dr. Marissa Pfoff, Dr. Jeff Kandt, Dr. Julie Lanphere

Abstract:
Case Description:
Patient was a 45 year-old previously active male climber and cyclist with no past medical history, who presented with a 16 month history of progressive functional decline, neck and proximal muscle weakness with marked weight loss, muscle wasting, dyspnea, dysphonia and dysphagia. He underwent extensive work-up and was diagnosed with brachio-cervical inflammatory myopathy + CREST syndrome/early limited systemic sclerosis based on laboratory, imaging and biopsy results. He received treatment with steroids, Cellcept and IVIG and transferred to acute inpatient rehabilitation. The patient received physical, occupational and speech therapies that utilized repeated low-resistance and sub-maximal effort strategies to improve strength and endurance without precipitating further muscle injury in the setting of active myositis process. His strength and endurance improved over the course of rehabilitation, but he was unable to achieve a level of function that would allow for independent living at home and discharged to a skilled nursing facility.
Discussion:
Brachio-cervical inflammatory myopathy is an extremely rare diagnosis. Documented case was accompanied by other autoimmune disorders which further complicate the clinical picture. BCIM is infrequently seen in the rehabilitation setting and poses unique challenges both in medical management and therapeutic approach. This case demonstrates that patients with BCIM who present with extensive, severe myopathy at time of treatment initiation have limited ability to regain strength within a relatively short period of time. However, like patients with other inflammatory myopathies, they notably benefit from structured rehabilitation with focus on repetitive sub-maximal effort strategies.

Submission Category: Master's-level students and candidates for doctoral degrees

Sneha Potdar
potdars@duq.edu

Department: Graduate School of Pharmaceutical Sciences
Affiliation: Duquesne University

Undergraduate: Bachelors in Pharmacy
Graduate:
Medical School:
PhD:

Research Interest Areas: Neuropharmacology

Research Support Sources: Mylan School of Pharmacy

Research Title: Effects of the antioxidant, resveratrol, on age-related motor function deficits in obese mice

Project Authors: Sneha Potdar, Matthew Kostek and Jane E. Cavanaugh

Abstract:
Aging is associated with a loss of motor co-ordination and increased cognitive deficits. Higher oxidative stress with aging has been implicated in the decline of motor and cognitive function. We hypothesize that antioxidant therapy will be effective in combating these deficits. One such antioxidant is resveratrol, a phytoalexin known for its anti-inflammatory, anti-cancer and neuroprotective properties. Our goal is to elucidate the effects of chronic resveratrol administration on motor and cognitive deficits in an animal model of aging. Therefore, in an ongoing study, we are supplementing the diet of middle-aged (13-15 mo) C57BL/6 male mice with resveratrol (120mg/kg of food) for 6 months. Interestingly, the mice ate a greater amount of the specially formulated diet as compared to regular purina chow; possibly due to its softer texture and ease of chewing as opposed to the hard compacted purina chow. We observed a significant increase in bodyweight of mice in both the control and resveratrol-supplemented groups compared to the control group on regular animal chow. In contrast to studies that use a high-fat diet to induce obesity, weight gain in our model was caused due to greater food consumption; making our model a unique blend of aging and obesity by overeating. Mice on resveratrol-supplemented diet showed a significant improvement in their working memory as shown by the novel object recognition test. In order to elucidate the mechanism of action we are currently probing the effect of resveratrol on neuroprotective signaling pathways in the brain (MAPK's), muscle strength and function and levels of oxidative stress markers. The characterization of this model will provide significant insights in aging, obesity and potential therapeutic effects of natural antioxidants.

Submission Category: Resident Physicians and Clinical Fellows

Emily Robbins, DO
robbinsea@upmc.edu

Department: Department of Physical Medicine and Rehabilitation
Affiliation: University of Pittsburgh Medical Center

Undergraduate degree: University of Colorado at Denver
Medical School: Arizona College of Osteopathic Medicine, Midwestern University

Research Interest Areas: Inflammatory response and sympathetic dysregulation following spinal cord injury, stem cells therapies for spinal cord injury

Research Title: Differences in the Dynamic Immune Response Following Spinal Cord Injury at T6 and Above vs Below T6

Project Authors: Emily A. Robbins, DO[1], Wan Huang, MD, PhD[1], Ruben Zamora, PhD[2], Yoram Vodovotz, PhD[2], Gwendolyn Sowa, MD, PhD[1]
1. University of Pittsburgh Medical Center, Department of Physical Medicine and Rehabilitation; 2. University of Pittsburgh School of Medicine, Department of Surgery

Abstract:
Study: We aim to define dynamic immune networks following SCI and how these responses differ in subjects with injuries T6 and above (T6A) vs. below T6 (BT6).
Methods: Retrospective analysis of 23 serum inflammatory biomarkers, collected from SCI subjects (T6A [n=20] or BT6 [n=15]) 2-28 days post-injury (DPI). American Spinal Injury Association Impairment Scale of A or B and Injury Severity Score (ISS) of 9-59 were selected. Mann-Whitney Rank Sum Test was used to determine significant differences in biomarker concentrations. Dynamic network analysis (DyNA) was used to characterize the dynamic immune response.
Results: Mann-Whitney Rank Sum Test found 16/23 biomarkers to have concentrations that were statistically significant between the two groups. DyNA suggested a dynamic and oscillating immune response over 28 days for both groups. T6A showed a more robust response with high connectivity during two time points (early (d3-4) and late (d18-19)) over the course of 28 days. High connectivity represented increased biomarker interaction and an immune response influenced by IL-1β, TNF-α and IFN-γ. There was an intervening period with relatively no to low connectivity in T6A signifying a low immune response. The immune response in the BT6 group was much less complex, with less connectivity between biomarkers such as IL-1β, TNF-α and IFN-γ compared to T6A.
Conclusions: These data suggest key differences in immune responses of T6A and BT6, with the latter exhibiting a less connected, innate response and the former a robust pro-inflammatory response.
Significance: Knowledge of the influence of injury level on the dynamic immune response may help clinicians understand patient vulnerability to infection and researchers determine proper timing for placement of stem cell therapies.

Submission Category: Resident Physicians and Clinical Fellows

Melissa Roscher, MD
rigginsms@upmc.edu

Department: Dept of PM&R
Affiliation: UPMC

Undergraduate: University of North Carolina - Chapel Hill
Graduate:
Medical School: University of Arkansas for Medical Sciences
PhD:

Research Interest Areas: MSK, Sports Medicine

Research Support Sources: None

Research Title: Painful hip snapping in a 15-year-old Female Soccer Player: A Case Report

Project Authors: Melissa Roscher, Kentaro Onishi

Abstract:
A 15 y/o girl with history of bilateral iliotibial band (ITB) lengthening was referred for diagnostic ultrasound evaluation of the right anterior hip due to painful snapping in the groin region. Pain was exacerbated by kicking a soccer ball forcefully. Ultrasound demonstrated snapping iliacus and psoas major tendons with reproduction of groin pain. Physical therapy focusing on iliopsoas stretch was ineffective, and she subsequently underwent iliopsoas tendon lengthening and synovectomy with complete resolution of this pain. Five months following iliopsoas tendon lengthening, she returned with a new painful grinding sensation in the right buttock region. The pain was exacerbated by walking, specifically at the toe-off phase of gait. Pain was sharp, episodic, and quite debilitating. She no longer had groin pain, nor did she have pain with hip flexion. She denied neurologic deficits of the right lower extremity.
Physical examination was remarkable for an audible clunk with ambulation. Otherwise, there were no visible defects of the Right leg. Pain was not reproducible with palpation but was reproduced with passive external hip rotation. Strength and neurological exam was normal.
MRI showed minimal labral fraying. Diagnostic ultrasound showed significant hypertrophy of the Right quadratus femoris with dyskinesis of the muscle between the ischial tuberosity and lesser trochanter. An ultrasound-guided lidocaine and steroid injection to the Right quadratus femoris was performed with short-lived benefit. She was started into physical therapy for hip stretching and pelvic stabilization. She later underwent surgical release of the hypertrophied muscle.
Final diagnosis was ischiofemoral impingement 2/2 hypertrophied quadratus femoris

Submission Category: Resident Physicians and Clinical Fellows

Melissa Roscher, MD
rigginsms@upmc.edu

Department: Dept of PM&R
Affiliation: UPMC

Undergraduate: University of North Carolina - Chapel Hill
Graduate:
Medical School: University of Arkansas for Medical Sciences
PhD:

Research Interest Areas: MSK, Sports

Research Support Sources: None

Research Title: Improved Upper Extremity Spasticity During Continuous Intrathecal Baclofen Trial with High Cervical Catheter Placement: A Case Report

Project Authors: Melissa Roscher, Michael Munin

Abstract:
A 50-year-old man with history of right basal ganglia hemorrhage experienced left arm spastic dystonia following his stroke. Poor kidney function precluded adequate spasticity management with oral baclofen. About 1 year after his stroke, he expressed a desire to undergo a trial of continuous ITB therapy.
He underwent trial catheter placement with the catheter initially terminating in the low thoracic region. With titration of the dose to 225 mcg/24 hour, there was improved spasticity in his left leg both subjectively and based on the Modified Ashworth Scale (MAS). Spastic dystonia of the left arm improved on MAS, but the patient denied any subjective improvement. He subsequently underwent replacement of the catheter with termination at the level of C5-6. His final dose on trial completion was 225mcg/day (0.47cc/hr).
Subjective improvement was reported in finger flexion, finger extension, and elbow extension especially in his ability to hold his arm by his side while standing and ambulating. He was discharged home and underwent definitive pump placement two weeks later.
This individual with spastic dystonia following stroke obtained both subjective and objective improvement in upper and lower extremity spasticity with cervical placement of an ITB catheter compared with low thoracic placement. There was no adverse effect on lower extremity improvement with the more rostral catheter placement.

Submission Category: Junior Faculty

Andrea Rosso, PhD, MPH
alr143@pitt.edu

Department: GSPH, Epidemiology
Affiliation: CTSI

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Mobility, Brain Aging

Research Support Sources: K01

Research Title: Slowing Gait and Risk for Cognitive Impairment: The Hippocampus as a Shared Neural Substrate

Project Authors: Andrea L Rosso, PhD, MPH; Joe Verghese, MBBS, MS; Andrea L Metti, PhD, MPH; Robert M Boudreau, PhD; Howard J Aizenstein, MD, PhD; Stephen Kritchevsky,

Abstract:
Objective: To identify the shared neuroimaging signature of gait slowing and cognitive impairment.
Methods: We assessed a cohort of older adults (n=175, mean age=73 years, 57% female, 65% white) with repeated measures of gait speed over 14 years, magnetic resonance imaging for grey matter volume (GMV) at year 10 or 11 and adjudicated cognitive status at year 14. Gait slowing was calculated by Bayesian slopes corrected for intercepts with higher values indicating faster decline. GMV was normalized to intracranial volume with lower values indicating greater atrophy for 10 regions of interest (hippocampus, anterior and posterior cingulate, primary and supplementary motor cortices, posterior parietal lobe, middle frontal lobe, caudate, putamen, pallidum). Non-parametric correlations adjusted for demographics, comorbidities, muscle strength, and knee pain assessed associations of time to walk with GMV. Logistic regression models calculated odds ratios (OR) of gait slowing with dementia or mild cognitive impairment with and without adjustment for GMV.
Results: Gait slowing was associated with cognitive impairment at year 14 (OR per 0.1 sec/year slowing = 1.47; 95% CI: 1.04, 2.07). The right hippocampus was the only region that was related to both gait slowing (rho= -0.16; p=0.03) and cognitive impairment (OR= 0.17; p=0.003). Adjustment for right hippocampal volume attenuated the association of gait slowing with cognitive impairment by 23%.
Conclusions: The association between gait slowing and cognitive impairment is supported by a shared neural substrate that includes a smaller right hippocampus.
Significance: This finding underscores the value of long-term gait slowing as early indicator of dementia risk.

Submission Category: Master's-level students and candidates for doctoral degrees

Dylan Royston, B.S.
dar147@pitt.edu

Department: Department of Bioengineering
Affiliation: University of Pittsburgh, Center for the Neural Basis of Cognition

Undergraduate: University of Virginia
Graduate: University of Pittsburgh
Medical School:
PhD:

Research Interest Areas: Intracortical brain-computer interfaces, upper limb sensorimotor control

Research Support Sources: VA Pittsburgh Healthcare System

Research Title: Using enriched covert imagery to map hand representations in human sensorimotor cortex

Project Authors: D. A. Royston, S. T. Foldes, F. Liu, T. D. Verstynen, J. L. Collinger

Abstract:
Intracortical brain-computer interfaces (BCI) can allow people with spinal cord injury (SCI) to control robotic limbs by translating neural activity recorded from microelectrode arrays in motor cortex (M1) into intended movements. These arrays must be implanted in the cortical areas most active during hand movements; however, this activity is difficult to localize in the target population, where overt movements cannot be performed. One approach is to map the activity resulting from observed and imagined movements, which generate similar but less intense activity. We sought to determine whether observed and imagined movements, enriched with additional sensory information, may be used to effectively map cortical hand representations in BCI users.
We collected functional magnetic resonance imaging (fMRI) data while 13 able-bodied subjects viewed and imagined performing simple movements of the right hand (grasping), fingers (tapping), and wrist (flexing), tactile fingertip sensations, and passive wrist movement, as well as similar tasks enriched with additional visual goal, auditory, and referred vibrotactile stimulation on the clavicle. We found that the activity resulting from imagined movements was produced in the same areas of M1/S1 as overtly performed movements, and that additional sensory information increased this activity. On average across all 5 tasks, goal enrichment increased peak activity in M1/S1 compared to simple movement by 20/18%, auditory enrichment by 12/15%, and vibrotactile enrichment by 24/40%.
These results suggest that enriched covert motor imagery can improve the effectiveness of sensorimotor mapping protocols, allowing us to more accurately locate desired cortical activity and improving the long-term effectiveness of intracortical BCI systems.

Submission Category: Master's-level students and candidates for doctoral degrees

Amrita Sahu, MS
ams519@pitt.edu

Department: Environmental and Occupational Health/Graduate School of Public Health/University of Pittsburgh
Affiliation: Physical Medicine and Rehabilitation, Environmental and Occupational Health

Undergraduate: BE Biomedical Engineering, Manipal University, Manipal, India
Graduate: MS Biomedical Engineering, Carnegie Mellon University, USA
Medical School:
PhD: Ongoing at University of Pittsburgh

Research Interest Areas: Aging, Regenerative Medicine and Rehabilitation

Research Title: Age-related declines in Klotho drive dysfunctional muscle progenitor cell bioenergetics and impaired skeletal muscle regeneration

Project Authors: Sahu A,Cheikhi A,Shinde SN,Winter LL,Mamiya H,Vo NV,Stolz D,Roginskaya V,Tang WY,St. Croix C,Sanders LH,Van Houten B,Barchowsky A,Ambrosio F

Abstract:
While young muscle is capable of restoring the original architecture of the damaged myofibers, aged muscle displays a marked reduction in regenerative capacity. We show here that expression of the "anti-aging" protein, Klotho, is up-regulated within young injured muscle as a result of transient Klotho gene promoter demethylation. However, epigenetic control of the Klotho promoter is lost in aged muscle. Genetic silencing of Klotho in young muscle progenitor cells (MPCs) drives mitochondrial DNA (mtDNA) damage and decreased cellular bioenergetics. Conversely, Klotho supplementation to aged MPCs restores mtDNA integrity and oxygen consumption to youthful levels. Consistent with in vitro findings, silencing of the Klotho gene in young muscle impairs myogenesis after injury, whereas systemic supplementation with recombinant Klotho enhances regeneration of aged muscle. These studies identify a novel role for Klotho in the regulation of MPC mitochondrial integrity, and implicate Klotho declines as a driver of impaired muscle regeneration with age.

Submission Category: Master's-level students and candidates for doctoral degrees

Alessandro Salatiello, MS, PhD student
als414@pitt.edu

Department: Bioengineering
Affiliation: University of Pittsburgh - CNBC

Undergraduate: Bioengineering
Graduate: Bioengineering
Medical School:
PhD:

Research Interest Areas: Locomotor adaptation

Research Title: Interference in Locomotor Adaptation

Project Authors: A Salatiello, G Torres-Oviedo

Abstract:
Split-belt treadmill walking, in which legs move at different speeds, can be used to improve patients' mobility by correcting their gait asymmetry. For this strategy to be effective it is necessary to maximize the retention of motor memories acquired during the training. In order to do so, it is important to know how motor memories learned within the same environment influence each other. In this study we specifically tested whether learning two locomotor patterns counteracting equal and opposite perturbations is possible or instead the memories interfere with one another. To this end we studied subjects' ability to counteract the same perturbation twice after either experiencing an opposite perturbation in-between (interference group, n=4) or walking without any perturbation (savings group, n=4). Critically, unlike prior work (Malone et al. 2011), we removed the opposing perturbation gradually to reduce the experienced errors known to reinforce the motor memory initially learned (Herzfeld et al. 2014). We compared across groups 1) the change in initial error that subjects experienced when the perturbation was introduced and 2) the percent change in adaptation rate. We found that while both groups had similar initial change in errors (and thus similar recall of the perturbation, p=0.37), the interference group re-adapted 3.52 times slower ([2.06%, 6.01%] 95% bootstrap CI), whereas the savings group re-adapted as fast as during the first exposure. In sum, our results suggest that the memory of adapted walking patterns is subject to interference and that this memory can be reinforced by the errors experienced during de-adaptation. These findings can inform the design of more effective rehabilitation techniques to counteract step length asymmetry in stroke survivors.

Submission Category: Junior Faculty

Jacobo Sellares, MD
sellaresj@upmc.edu

Department: Division of Pulmonary Medicine, Allergy and Critical Care Medicine
Affiliation: Simmons Center for Interstitial Lung Disease

Undergraduate:
Graduate:
Medical School:
PhD:

Research Interest Areas: Interstitial Lung Disease

Research Support Sources: R01

Research Title: The potential role of intracellular heat shock protein 70 deficiency in aging and pulmonary fibrosis.

Project Authors: J. Sellares Torres, K. J. Thiel, D. Alvarez, N. Cardenes, F. Schneider, J. Pilewski, M. Rojas, C. Feghali-Bostwick, K. Veraldi

Abstract:
Idiopathic Pulmonary Fibrosis (IPF) is a disease that may have pathophysiological similarities to some of the mechanisms involved in aging. Loss of proteostasis is one of the current hallmarks of aging and heat shock proteins (Hsp) are currently considered chaperones that regulate proteostasis. Preliminary data have demonstrated that Hsp-70 might be associated with IPF. We sought to investigate the potential association between the deficiency of Hsp70 with aging and IPF.
Hsp70 expression was assessed using immunofluorescence in human lungs, and found that Hsp70 was not expressed in older compared to younger IPF tissues. . We also observed decreased Hsp70 mRNA and protein in primary fibroblasts from IPF versus normal donors. Treatment of primary human lung fibroblasts in vitro with TGF-ß1 decreased Hsp70 in parallel with increased extracellular matrix proteins, collagen and fibronectin. Young Hsp70 knock-out mice (8-10 weeks) were subjected to an inhalational bleomycin model of pulmonary fibrosis and demonstrated accelerated fibrosis versus wild-type controls. No spontaneous fibrosis was observed in older knock-out mice (> 20 weeks).
We therefore conclude that reduced Hsp70 protein is associated with pulmonary fibrosis. Interventions aimed at restoring normal expression of Hsp70 represent a novel therapeutic strategy for pulmonary fibrosis.

Submission Category: Junior Faculty

Sarah Stahl, PhD
sts80@pitt.edu

Department: Psychiatry/School of Medicine
Affiliation: Psychiatry

Undergraduate: West Virginia University
Graduate: West Virginia University
Medical School:
PhD: West Virginia University

Research Interest Areas: depression prevention, lifestyle regularity, behavioral interventions

Research Title: Measuring Participant Effort in a Depression Prevention Trial: Who Engages in Problem-solving Therapy?

Project Authors: Stahl ST, Albert SM, Dew MA, Anderson S, Karp JF, Gildengers A, Butters MA, Reynolds CF

Abstract:
Objective: To determine the acceptability of clinical interventions for depression prevention, identifying clinical characteristics associated with its engagement is needed. The purpose of this study is to describe levels and correlates of participant engagement in Problem Solving Therapy (PST) in adults 60 and older with subthreshold depression. Methods: As part of a clinical trial to prevent depression among older adults with subthreshold depression, participants who were randomized to receive PST completed 6-8 sessions in which they learned skills to solve problems that were contributing to stress and reduced quality of life. To measure participants' engagement with PST, interventionists completed 3 scales that rated participants' level of participation in problem solving activities, understanding of the multistep process of PST, and between-session homework effort. Using logistic regression, we examined whether physical health, level of cognitive function, and disability served as correlates of engagement in the PST intervention of our depression prevention trial (n=50). Results: Gait speed was significantly associated with engagement in PST. Participants who walked faster were more likely to engage with PST compared to participants who walked slower. All other baseline variables did not reach significance. Conclusions: Our data suggest that older adults who walk slowly may need alternative delivery methods to fully engage in PST. Significance: Gait speed is reflective of physical and cognitive health and predictive of frailty, disability, and psychomotor speed slowing. For these reasons, gait speed and may be a marker for poor engagement in psychosocial interventions like PST. We strongly encourage geriatric specialists to assess older adults' gait speed and dev

Submission Category: Master's-level students and candidates for doctoral degrees

Kaitlyn Stepler
kes219@pitt.edu

Department: Department of Chemistry
Affiliation: RASR Laboratory

Undergraduate: McDaniel College
Graduate:
Medical School:
PhD:

Research Interest Areas: Proteomics in Alzheimer's disease

Research Title: Optimization of a brain proteomics workflow to study proteins in lipid metabolism in Alzheimer's disease

Project Authors: Kaitlyn E. Stepler, Renã A.S. Robinson

Abstract:
Study: African Americans (AAs) have two to three times greater risk for Alzheimer's disease (AD) than Caucasians (European ancestry, EA), due in part to higher incidence of dysregulated lipid metabolism, known to increase the risk of AD. The goal of this work is to optimize a proteomics workflow to maximize identification and quantification of lipid metabolism-related proteins in postmortem brains between EA and AA. Methods: Mouse brain homogenate is used for optimization. Human hippocampus (HC) and inferior parietal lobe (IPL) samples from EA and AA individuals, healthy and AD (total N=37), are used. Protein is extracted and digested with trypsin/Lys-C. The resulting peptides are tagged, quantified, and analyzed using offline high pH reverse-phase (HLB cartridge, 3-95% acetonitrile pH 10 with ammonium hydroxide, 6-16 fractions) and online reverse–phase liquid chromatography–mass spectrometry (LC-MS; 80-120 min gradient). Tandem mass tags (TMT) and combined precursor isotopic labeling and isobaric tagging (cPILOT) are compared. Proteome Discoverer 2.1 is used for identification and quantitation of total proteins. Results: TMT and cPILOT identified 1885 and 2032 proteins and 10756 and 7978 peptide spectral matches, respectively. Analysis of tagging quality, fraction number for high pH reverse-phase separation, and gradient for online LC will be presented, along with the optimized workflow analysis of human HC and IPL samples. Conclusions: The benefits and tradeoffs of the TMT and cPILOT approach for this project will be discussed. This workflow has been optimized to increase proteome depth. Significance: This study establishes a brain proteomics workflow optimized to identify differences in lipid metabolism between EA and AA related to AD.

Submission Category: Post-Doctoral Researchers and Fellows

Chelsea Stillman
cmstillm@gmail.com

Department: Psychiatry
Affiliation: Psychiatry/ CNBC

Undergraduate: Colby College
Graduate:
Medical School:
PhD: Georgetown University

Research Interest Areas: health neuroscience; physical activity; brain health

Research Title: Changes in Brain Perfusion Following Weight Loss are Associated with Changes in Body Mass Index

Project Authors: Chelsea M. Stillman; Jennifer C. Watt; Renee J. Rogers; John M. Jakicic; Kirk I. Erickson

Abstract:
Growing evidence suggests that mid-life may be an important staging-ground for physical and cognitive health in late life. Being overweight in adulthood is associated with brain hypoperfusion. However, it is unknown to what extent obesity-related brain dysfunction can be reversed following weight loss. The aim of the present study was to examine changes in brain perfusion following a 12-month weight loss intervention, and to relate changes in perfusion to changes in BMI.

121 healthy adults (M±SD = 44±8 years old; 95 female) completed a 12-month randomized controlled trial involving diet-only, or diet combined with PA. Participants also completed MRI scans before and after the intervention, including psuedocontinuous arterial spin labeling (pcASL). Changes in brain perfusion were assessed with a voxelwise linear regression to examine regions where changes in brain perfusion covary with changes in BMI.

There was a significant reduction in BMI following the intervention, suggesting it was effective at facilitating weight loss regardless of group. Brain perfusion following the intervention increased across the brain, particularly in the medial temporal lobe and prefrontal cortex. Changes in BMI were correlated with baseline-to-post intervention increases in brain perfusion in two clusters in the right medial prefrontal cortex.

A 12 month weight loss intervention in midlife increased brain perfusion across the brain. Collapsing across intervention groups, the magnitude of weight loss was positively correlated with changes in prefrontal brain perfusion. The regional specificity of this later finding is important as it suggests that weight-loss may have the greatest effects on brain health in regions that are particularly vulnerable to obesity.

Submission Category: Resident Physicians and Clinical Fellows

Anne Tita, MD
titaa@upmc.edu

Department: UPMC Dept of Physical Medicine and Rehabilitation
Affiliation: UPMC Adult Spina Bifida Clinic, University of Pittsburgh School of Medicine

Undergraduate: Denison University
Graduate:
Medical School: University of Toledo College of Medicine
PhD:

Research Interest Areas: Functional Outcomes

Research Title: Correlation between neurologic impairment grade and ambulation status in the adult spina bifida population

Project Authors: Anne C. Tita, M.D., John R. Frampton, M.D., and Brad E. Dicianno, M.D.

Abstract:
OBJ: While International Standards for Neurological Classification of Spinal Cord Injury (ISNCSCI) have been widely accepted as a means of localizing and describing neurologic impairments in patients with acquired spinal cord injuries, there is no similar consensus for spina bifida. We hypothesized that neurologic impairment graded by four commonly used scales would be correlated with ambulation status in adults with spina bifida.
METH: A retrospective chart review was performed on patients seen at the UPMC Adult Spina Bifida Clinic from August 2005 – May 2016. Exam findings were graded using existing neurologic impairment scales: two versions of the National Spina Bifida Patient Registry (NSBPR) classification (with "reproducible movement" defined as strength 3 or greater vs 1 or greater), ISNCSCI motor level, and Broughton classification (a comprehensive 9-point scale designed by Broughton, et al. for use in spina bifida patients). Ambulation ability was ranked using a 4-point classification system published by Hoffer, et al. Spearman's rho testing was then performed to evaluate correlation between Hoffer ambulation status and each scale.
RES: Data were collected from 409 patient records. Significant correlations were found between Hoffer ambulation status and all neurologic impairment scales evaluated. Strongest correlation was noted with Broughton classification (rs=-0.771 and p<0.001). High correlations were noted with both versions of NSBPR: strength 3 or greater (rs=-0.763 and p<0.001), and strength 1 or greater (rs=-0.716 and p<0.001). For ISNCSCI motor level, a moderate correlation was observed (rs=-0.565 and p<0.001).
CON: The less comprehensive NSBPR scale shows high correlation with ambulation status and may be easier to administer in a busy clinic setting.

Submission Category: Master's-level students and candidates for doctoral degrees

Leah Vaughan, BA
vaughanle316@gmail.com

Department: Physical Medicine & Rehabilitation, Mathematics, University of Pittsburgh
Affiliation: University of Pittsburgh

Undergraduate: Washington & Jefferson College
Graduate: 2016
Medical School:
PhD:

Research Interest Areas: Traumatic brain injury mathematical modeling

Research Title: A Mathematical Model of Neuroinflammation in Severe Clinical Traumatic Brain Injury

Project Authors: Leah Vaughan, Raj Kumar, Jonathan Rubin, Amy Wagner

Abstract:
Understanding the interdependencies of inflammatory mediators in the acute phase of traumatic brain injury (TBI) is essential to providing effective care for TBI patients and minimizing tissue damage. The relative CNS concentrations of inflammatory mediators, such as cytokines and activated microglia, reflect many elements of the complex cascades associated with acute neuroinflammation post-TBI. Importantly, variability in these mediators between patients is predictive of outcome. However, TBI clinical studies to date have not focused on modeling the dynamic temporal patterns of multiple simultaneously evolving inflammatory mediators. Characterizing the timing of inflammatory processes, as well as relative concentration changes that promote good outcomes, offers significant potential to guide the design of future immunomodulation studies. We derived a reduced mathematical model consisting of ordinary differential equations (ODE) to represent the intricate timing of interactions between pro- and anti-inflammatory cytokines, M1- and M2-type microglia and CNS tissue damage. We incorporated cytokine variables known to have an active role in microglial activation and phenotype differentiation, including interleukin (IL)-1ß, IL-12, IL-10 and IL-4. The ODE model was then fit to cerebrospinal fluid (CSF) cytokine data, collected the first 5 days post-injury from individuals with severe TBI. We performed preliminary principal component analysis (PCA), using collected cytokine data, to characterize unique variance within the population (n=92). Cluster analysis was done using PC scores to identify individuals with similar CSF inflammatory profiles days 0-3 post-TBI; clusters were then subdivided based on Glasgow Outcome Score (GOS) at 6 months. These classifications identified thr

Submission Category: Master's-level students and candidates for doctoral degrees

Nicolas Velasquez
Nfv4@pitt.edu

Department: Department of bioengineering
Affiliation: University of pittsburgh

Undergraduate: University pierre and Marie cutie, paris, france
Graduate: University of pittsburgh
Medical School:
PhD:

Research Interest Areas: Biomechanics, gait analysis, rehabilitation

Research Support Sources: University of pittsburgh

Research Title: Explicit control of step timing during split belt walking

Project Authors: Gelsy Torres Oviedo

Abstract:
Humans can adapt their walking to different situations imposing distinct motor demands. It has been proposed that people can adapt spatial and temporal gait features independently when exposed to new environmental conditions such as walking on a split-belt treadmill that has two belts moving at different speeds. Interestingly, this independent adaptation of spatial and temporal features has only been observed when subjects voluntarily modify the adaptation of spatial walking features, raising the question of whether temporal gait features can be also altered voluntarily without affecting the adaptation of spatial ones. We contrasted the adaptation of spatial and temporal gait features when subjects walked on a split-belt treadmill under two conditions: 1) temporal feedback and 2) control conditions. The temporal feedback group received visual feedback indicating "when" to step to prevent the adaptation of step timing, while the control group walked without any instructions. All subjects walked with one belt moving at 0.5m/s and the other one at 1m/s. Kinematic and kinetic data were recorded during the entire experiment. We found that subjects in the temporal feedback group could voluntarily prevent the adaptation of step timing during split-belt walking, such that their stepping rhythm was the same as that for baseline walking when the belts move at the same speed. Surprisingly, changes in the adaptation of step timing had an impact on the adaptation of spatial gait features, which is at odds with prior findings indicating that these two could be modulated independently. Our results suggest that explicit strategies could be used to correct patients' asymmetries in step time. However, it would be imposible to target temporal asymmetries without altering spatial ones.

Submission Category: Master's-level students and candidates for doctoral degrees

Jeffrey Weiss, BS
jmw182@pitt.edu

Department: Physical Medicine & Rehabilitation
Affiliation: Bioengineering, Physical Medicine & Rehabilitation

Undergraduate: University of Pittsburgh
Graduate:
Medical School:
PhD:

Research Interest Areas: Neural Engineering

Research Title: Comparing reaction times of microstimulation in human somatosensory cortex to peripheral sensory input

Project Authors: Jeffrey Weiss, Michael Kryger, Sharlene Flesher, Douglas Weber, Jennifer Collinger, Robert Gaunt

Abstract:
STUDY: We recently showed that intracortical microstimulation (ICMS) of human primary somatosensory cortex (S1) can evoke tactile percepts with naturalistic qualities, suggesting that ICMS could be an effective way to provide somatosensory feedback. We expect that reaction times (RTs) to ICMS need to be similar to those of natural somatosensory input to be useful for motor control. Here we compare the simple RTs of a human participant in response to ICMS of S1 and electrical and mechanical stimulation of the hand.
METHODS: A person with a C5/C6 spinal cord injury was implanted with two microelectrode arrays in S1. RTs were measured for ICMS of S1 and compared to those of vibrotactile or electrical stimulation of the hand. Stimulation amplitudes and electrode/vibrotactor locations were matched to produce perceptually similar experiences from ICMS and peripheral stimulation. The subject responded to stimulation using a bite switch. All stimuli were presented at 100 Hz for 500 ms after a variable delay. Catch trials in which no stimulus was delivered were randomly interleaved.
RESULTS: RTs to ICMS and peripheral stimulation were similar but variable. RTs to vibrotactile stimulation were highly variable across days, and a two-way ANOVA comparing RTs across sessions and modality (vibrotactile vs. ICMS) found no significant effect of stimulus modality (p = .917), but a significant effect of session number (p < .001). Electrical stimulation was less variable across days. After excluding the first session, a two-way ANOVA found no significant effects of modality (electrical vs. ICMS, p = .222) or session number (p = .961).
CONCLUSION: RTs to ICMS of S1 are similar to those of peripheral stimulation, suggesting that ICMS may be a useful feedback source for motor control.

Submission Category: Master's-level students and candidates for doctoral degrees

Sharon Welburn, MPH
scw42@pitt.edu

Department: Graduate School of Public Health
Affiliation: Department of Epidemiology

Undergraduate: BS, University of Alabama at Birmingham
Graduate: MPH, University of Pittsburgh
Medical School:
PhD: In Progress, University of Pittsburgh

Research Interest Areas: fatigue, fatigability, and injury in older adults

Research Support Sources: Graduate Student Researcher, Long Life Family Study

Research Title: Association Between Fatigue and Incident Falls in Older Men: The Osteoporotic Fractures in Men Study

Project Authors: Adam Santanasto, Terri Blackwell, Robert M. Boudreau, Nancy Lane, Eric Orwoll, Jane A. Cauley, Nancy W. Glynn

Abstract:
Fatigue is a component of frailty; both fatigue and frailty are associated with lower physical function. Frailty is a known fall risk, but the independent contribution of fatigue to fall risk is unclear. This association was examined in 5,994 men aged 64-100. Fatigue was measured "during the past four weeks, how much time did you feel energetic?" then classified (fatigued=none, little, some; non-fatigued=good bit, most, all). Incident falls were captured using triannual questionnaires over three years. Men with fatigue (25%) were older (75.1±6.2 vs. 73.2±5.7 years), less active (Physical Activity Scale for Elderly=118.7±62.1 vs. 155.9±67.7), and lower functioning (narrow walking speed=1.05±0.27 vs. 1.18±0.26 m/s) than non-fatigued (all $p<0.0001$). Fatigued versus non-fatigued men had 26% higher fall risk (RR=1.26, 95%CI:1.15, 1.40) adjusted for demographics, fall history, medications, activity, and function. Perceived fatigue is an important risk factor of falling and, if reduced, may lessen the burden of falls in older men.

Submission Category: Resident Physicians and Clinical Fellows

Rollin Wright, MD, MS
rmw27@pitt.edu

Department: Medicine/Geriatrics
Affiliation: University of Pittsburgh

Undergraduate: University of Virginia
Graduate: University of Pittsburgh
Medical School: Albany Medical College
PhD:

Research Title: Are Residents Prepared to Work with People Living with Dementia?

Project Authors: Priyamvada Murali, Victoria Hornyak, Peg Chabala, Judy Mathews, Rollin Wright

Abstract:
Introduction: Health care providers frequently encounter patients living with dementia. Little internal medicine (IM) training is dedicated to interacting with older adults who have language loss and challenging behaviors. A communication skills curriculum was developed to teach IM residents how to use multiple techniques to work with patients and caregivers living with dementia.
Design: The curriculum started in July 2016 and occurs during a required outpatient geriatrics rotation. IM residents learn pathophysiology of communication loss and meet residents of a dementia support personal care home in Pittsburgh, PA and practice with 13 dementia communication skills.   IM residents report on knowledge, comfort, and confidence in ability to work with this patient population in a pretest/posttest. They document 5 dementia encounters identifying skills used and self-rated skill-performance. Faculty rated skills performed in at least 1 encounter. At a debriefing session, residents present a dementia encounter with active role-play of skills identified. Coaching and final performance evaluations by geriatrics faculty and a dementia education specialist are completed.
Results: 28 residents practiced an average of 8 skills each in 5 dementia encounters per rotation between July 2016-March 2017 for a total of 1104 skills demonstrated. The most-used skills were: establish connection, respect space, and go with the flow. Comfort level improved in working with (p=.02, 95%CI 0.14, 0.19) and looking forward to caring for someone with (p=0.03, 95%CI -.91-- -0.05) severe dementia. Confidence in ability to work with people with dementia significantly improved across 6 items. Discussion: Our curriculum improved residents' ability to communicate with people living with dementia.