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strength following verum therapy (combined local and distal group) were correlated with improvements in median nerve velocity (r=0.38, p=0.035). During tonic local EA, compared to healthy controls, CTS patients demonstrated increased functional connectivity between S1 and left anterior hippocampus. Following local EA therapy, S1/hippocampus connectivity significantly decreased and this decrease was associated with improvements in patients’ function (r=0.64, p=0.01) and median nerve velocity (r=0.62, p=0.013). Stimu-
lus-evoked connectivity adds mechanistic insight to more common resting fMRI connectivity approaches. Decreased resting S1/pulvinar connectivity might reflect changes in sensory information control and sensation awareness, while S1/hippocampus connectivity during delivery of local EA can track improvements in patient function and median nerve health. Functional connectivity between S1 and sub-
cortical limbic and association regions may specifically support improved CTS response to local EA therapy. NIH, NCCH (R61-
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Pain in infants, children and adolescents

Validating skin conductance for measuring acute pain in mechanically ventilated infants
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Measuring pain in mechanically ventilated infants is challenging. The measurement of skin conductance (SC) is based on the sympa-
hetic nervous system’s response to stressors. This study purpose is to evaluate the validity of SC for measuring pain in mechanically ven-
tilated infants. A prospective cross-sectional observational design was used to study SC and its relation to: the category of procedure (i.e., painful or non-painful); the phase of procedure (i.e., before, during and after), and referent pain measures (i.e., Premature Infant Pain Profile-Revised (PIPP-R) and Neonatal Facial Coding Sys-
tem (NFCS)). Eligible infants were those up to 12 months of age, in intensive care units, who were mechanically ventilated, and required painful and non-painful procedures. From October 2017 to November 2018, 130 eligible infants were identified, and 87 infants were studied. SC (number of waves per second) during pain-
ful procedures (median 0.27, interquartile range 0.2-0.4) was statisti-
cally significantly higher than those during non-painful procedures (0, 0-0.09). SC during painful procedures was statistically significantly higher than those before (0, 0-0.07) and after painful procedures (0, 0-0.07). SC showed moderate statistically significant positive correlations with PIPP-R (Spearman’s rho=0.4-0.62) and the four-item NFCS (Spearman’s rho=0.3-0.67) before, during and after painful or non-painful procedures respectively. SC had excel-
ent performance (area under the receiver operator curve=0.979) with excellent sensitivity (92.31%), specificity (95.42%) and nega-
tive predictive value (99.21%) but only sufficient positive predictive value (66.67%) when used to discriminate moderate-to-severe pain. This present study is the first to evaluate different sources of validity evidence of SC for pain measurement in the same popula-
tion of infants during the same time period. Specifically, SC showed good validity for pain measurement in mechanically ventilated infants in relation to the category of procedure, the phase of pain-
ful and non-painful procedures and referent pain measures. This study was funded by the Canadian Pain Society (CPS) Trainee Research Award (Clinical Science, 2018-2019) and Sigma Tau International/Rosemary Berkel Crisp Research Award (2018-2019). The first author (J. Hu) was supported by the Ontario Trillium Schol-
arship (2015-2019) and International Doctoral Scholarship.

Memory bias for learned threat and safety cues in youth with chronic pain
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Negatively-biased memories for painful events (recalled pain greater than initial reported pain) are consistently associated with worse pain outcomes in adults and youth; thus, the tendency to develop negative memory biases is suggested to be a risk factor for chronic pain. From a transdiagnostic perspective, this may reflect a more general bias in recalling threatening vs. safe stimuli; this has not yet been tested. Sixty-seven youth (N=43 chronic pain patients, mixed diagnoses; N=24 controls) completed a developmentally-
appropriate fear conditioning task (the Screaming Lady) in which they rated their fear towards learned threat and safety cues. Patients completed self-report measures of pain catastrophizing (PCS-C), pain-related fear-avoidance (FOPO-C, fear and avoidance subscales), and physical functioning (FDI). Two months later (M=59 days), youth rated their recalled fear towards the threat and safety stimuli. For a subsample (N=32, 23 patients), their open-ended recall of the stimuli were coded. T-tests examined patient-control differences in memory biases. Partial correlations controlled for initial fear ratings to examine how memory biases covary with pain catastrophizing, fear-avoidance, and functioning. Patients and con-
trols did not significantly differ in their memory biases (p’s >.05). Patients with higher pain catastrophizing (r=.415, p=.007) and greater pain-related fear (r=.363, p=.02) had greater negatively-
biased recall of fear towards safety stimuli at follow-up; there was no association with functional disability. Youth with greater nega-
tively-biased recall of fear towards threat stimuli described the stimulus’ appearance (r=.430, p=.018) and emotional expression (r=.506, p=.006) in greater detail. Negatively-biased recall of safety cues is related to higher pain catastrophizing and pain-
related fear in youth with chronic pain. Mixed quantitative-qualita-
tive probing of threat-related memories will be helpful to reveal how memory biases are a risk factor for pediatric chronic pain. NIH R01HD083270 to LE Simons.

Pain in Sickle Cell Disease

History of Pain is Associated with Hospitalization and Severe Course of COVID-19 in Children with Sickle Cell Disease
Lana Mucalo, Amanda Brandow, Mahua Dasgupta, Sadie Madison, Pippa Simpson, Ashima Singh, Bradley Taylor, Katherine Woods, Fouza Yusuf, and Julie Paneppinto; Medical College of Wisconsin

Recurrent pain causes significant morbidity for individuals with sickle cell disease (SCD) and is a marker of mortality. Considering the current pandemic, it’s important to understand how COVID-19 impacts individuals with SCD, a medically vulnerable population. We sought to identify factors associated with more severe COVID-

Pippa Simpson, Ashima Singh, Bradley Taylor, Katherine Woods, Fouza Yusuf, and Julie Paneppinto; Medical College of Wisconsin

Recurrent pain causes significant morbidity for individuals with sickle cell disease (SCD) and is a marker of mortality. Considering the current pandemic, it’s important to understand how COVID-19 impacts individuals with SCD, a medically vulnerable population. We sought to identify factors associated with more severe COVID-
We have shown people with fibromyalgia experience exacerbated pain in the exercising limb up to three days following submaximal isometric and concentric exercise however, the pain response following eccentric exercise has not been investigated. This study investigated the change in experimental pain up to two days following submaximal eccentric exercise while clinical pain was assessed through the 7-day recovery period in healthy women with and without FM. Eighteen women with fibromyalgia (49.1±11.8yr, BMI: 31.4±7.6) and 18 controls (49.5±10.1yr, BMI: 27.1±4.8) completed session 1 (exercise) and session 2 (recovery assessment) separated by 2 days; session 1 included a 10-minute bout of submaximal (20% of maximal voluntary contraction) eccentric exercise with the right elbow flexors. Pressure pain thresholds (PPTs), mechanical pain summation, and punctate pain summation were assessed before, immediately after exercise, and in session 2. Clinical pain (0-10 NRS) in the exercising arm and whole-body was assessed before, during, immediately after, and up to seven days following the exercise bout. PPTs and mechanical pain summation did not change immediately following exercise or session 2 (Time, p>0.05). Punctate pain summation changed following exercise (Time x Summation, p=0.003) however, post hoc analysis did not reveal a significant difference immediately after exercise (p=0.296) or at session two (p=0.03). The fibromyalgia group reported greater increases in exercising arm pain during (Time x Group, p<0.001) and immediately following exercise (Time x Group, p<0.001); and greater increases in whole-body pain immediately following exercise and on day seven (Time x Group, p<0.002) compared to controls. Only the change in arm pain achieved clinical significance (≥2-points). Women with fibromyalgia tolerate submaximal eccentric exercise with transient and clinically relevant increases in pain localized to the exercising limb which does not negatively impact systemic experimental pain sensitivity or self-reported whole-body pain following exercise. NCATS Tissue Injury and Regeneration Studies-I Scholarship from the Foundation for Physical Therapy Research [GB] NICHD R15HD090265 [MHB].

Reduction in movement-evoked pain and fatigue during initial Transcutaneous Electrical Nerve Stimulation treatment predicts responders in women with fibromyalgia

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Transcutaneous Electrical Nerve Stimulation (TENS) is a safe, economical non-pharmacological adjunctive intervention. Using data from the Fibromyalgia Activity Study with TENS (FAST) we performed a responder analysis to identify predictors of reduced pain and fatigue after 1-month of daily TENS use in women with FM. Women with FM were randomly assigned to active-TENS (2-125Hz; 5%NAP for tolerable intensity), placebo-TENS, or no-TENS for 1-month. After the randomized phase, placebo-TENS and no-TENS groups received active-TENS for 1-month. Responders to TENS were defined as those achieving a 30% reduction in movement-evoked pain and/or 20% reduction in movement-evoked fatigue, The predictor model was developed using data from the randomized phase of the active-TENS group (n=103) and validated using data from the placebo-TENS and no-TENS groups after active-TENS for 1 month (n=155). Participant characteristics, and changes in pain, fatigue, and function were assessed as potential predictors using a logistic regression model. Number needed to treat (NNT), and number needed to harm (NNH) calculations were made comparing the active-TENS group to the placebo-TENS and no-TENS groups using an intention-to-treat analysis. Predictors of clinical improvement in pain at 1-month follow-up were marital status, sleep impairment and initial decrease in fatigue during the first TENS use and widespread pain index (AUC=0.80; 95%CI: 0.73,0.87). Predictors of clinical improvement in fatigue at 1-month follow-up were marital status, sleep impairment and initial decrease in pain during the first TENS use and widespread pain index (AUC=0.80; 95%CI: 0.73,0.87). Predictors of clinical improvement in fatigue at 1-month follow-up were marital status, sleep impairment and initial decrease in pain during the first TENS use and widespread pain index (AUC=0.80; 95%CI: 0.73,0.87). 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