

methods for localizing STN during DBS surgery include the use of stereotactic coordinates and multi-electrode recording (MER) during implantation. MERs are incredibly useful in DBS surgeries, but require penetration of brain structures in order to infer location. Using multi-photon microscopy techniques to aid identification of STN during DBS surgeries offers a number of advantages over traditional methods. For example, blood vessels can be clearly identified with second harmonic generation, something that is not possible with MER. Multi-photon microscopy also allows visualization deep into tissue without actually penetrating it. This ability to look within a depth of field is useful for detection of STN borders based on autofluorescent cell density. When combined with traditional stereotactic information, our preliminary image classification methods are a fast, reliable way to provide surgeons with extra information concerning their location in the midbrain. We anticipate that future advancements and refinements to our image classifier will only increase accuracy and the potential applications and value. In summary, these preliminary data support the feasibility of multi-photon microscopy to aid in the identification of target brain regions during DBS surgeries. The techniques described here complement and enhance current stereotactic and electrophysiological methods for DBS surgeries.

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A robust spatial normalization pipeline for individuals with focal cortical lesions

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OBJECTIVES/SPECIFIC AIMS: To develop a robust spatial normalization pipeline for brains of individuals with focal cortical lesions. **METHODS/STUDY POPULATION:** Individuals with chronic focal cortical lesions from stroke. **RESULTS/ANTICIPATED RESULTS:** We have developed a robust spatial normalization pipeline for brains of individuals with focal cortical lesions, and demonstrate how the pipeline overcomes obfuscated neuroanatomy to yield both consistent and excellent results. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our robust normalization pipeline will enable group analyses of individuals with cortical lesions with greater spatial precision. This greater spatial precision will improve answers to questions about functional localization in the brain, and ultimately allow translation of findings from neuroimaging studies in individuals with cortical lesions to the clinic.

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A systematic overview of cost-utility analyses in dermatology

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OBJECTIVES/SPECIFIC AIMS: Costs associated with the treatment of skin diseases accounted for greater than 4% of total US healthcare spending in 2013, an increase of \$46 billion (170%) since 2004. Considering the increase in novel treatments and spending, cost-utility analyses (CUAs) may provide a better understanding of costs in dermatology. In this study, we conduct a systematic overview of study quality among CUAs related to dermatology. **METHODS/STUDY POPULATION:** We queried studies from the Tufts Medical Center Cost-Effectiveness Analysis Registry (www.cearegistry.org), a database supplying information on all peer-reviewed cost-effectiveness analysis through 2014. Database methodology was previously discussed here. We queried studies using keywords from the 24 major skin disease categories (e.g., diseases relating to actinic damage were searched by using "actinic," "actinic keratosis"). We collected data on study design, reporting methods, and analyzed relevant data stratified by 2 time-periods (1976–2008 and 2009–2014) chosen to encompass a comparable number of studies. **RESULTS/ANTICIPATED RESULTS:** In total, 42 and 50 studies corresponding to the 2 time-periods were retrieved (representing 14/24 disease categories). Based on the recommended data reporting guidelines for CUAs, study quality remained largely unchanged across the 2 phases. Across the 2 time-periods, a societal perspective was used in 19% and 12% of studies, costs and (quality adjusted life-years) QALYs were discounted in 67% and 72% of studies, a correct (incremental cost-effectiveness ratio) ICER was reported in 67% and 72% of studies, and a sensitivity analysis was included in 88% and 84% of studies, respectively. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our findings suggest the quality of dermatology-related CUAs, as evaluated by recommended data reporting guidelines, to be generally stable during the analyzed time-periods. However, the quality of our results may be limited by the small number of CUAs within dermatology (10/24 disease categories did not have CUAs across any time-period). Moving forward, we encourage researchers within dermatology to pursue additional investigation towards cost-effective practices while adhering closely to recommended quality reporting guidelines for CUAs.

Acellular hyaluronic acid scaffold with growth factor delivery for cartilage repair in a large animal model

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OBJECTIVES/SPECIFIC AIMS: Focal cartilage injuries of the knee joint are common and present a treatment challenge due to minimal intrinsic repair. Cartilage tissue engineering techniques currently used in clinical practice are expensive, cumbersome, and often ineffective in patients with mechanical or medical comorbidities. To address these issues, we developed an acellular nanofibrous scaffold with encapsulated growth factors designed to enhance articular cartilage repair. Our goal is to evaluate this technology in vitro and pilot a large animal model for eventual translation into human subjects. **METHODS/STUDY POPULATION:** Hyaluronic acid (HA, 65 kDa) will be methacrylated (~40% modification, MeHA) and conjugated with cell-adhesive (RGD) groups. A solution of 4% wt/vol MeHA, 2% wt/vol polyethylene oxide (900 kDa), 0.05% wt/vol Irgacure 2959, and 0.005% wt/vol stromal cell-derived factor-1 α (SDF-1 α) and/or transforming growth factor- β 3 (TGF- β 3) will be prepared in ddH₂O. The solution will be electrospun onto a rotating mandrel to achieve a dry scaffold thickness of 0.5 mm. The scaffold mat will be UV cross-linked and 5 mm-diameter samples will be cut out. Four groups of scaffolds will be prepared: MeHA, MeHA + SDF, MeHA + TGF, MeHA + SDF + TGF. All groups will be evaluated for fiber diameter, swell thickness, equilibrium compressive modulus, degradation rate, and growth factor release rate over 4 weeks (n = 10). Scaffolds will also be seeded with juvenile porcine MSCs (5 \times 10⁴) in 200 μ L of medium incubated for 24 hours. Seeded scaffolds will be evaluated for equilibrium compressive modulus, cell infiltration, and chondrogenesis at 4 and 8 weeks (n = 10). Scaffolds will then be evaluated in a juvenile Yucatan minipig cartilage defect model. In total, 6 animals will undergo bilateral knee surgery to create four 4 mm-diameter full-thickness cartilage defects in each trochlear groove. All defects will receive microfracture to release marrow elements. Each knee will receive 2 scaffolds of the same group (replicates) with paired microfracture controls, resulting in a sample size of 3. Animals will be sacrificed at 12 weeks and defects will be evaluated via non-destructive indentation testing for mechanical properties, microCT for defect fill and subchondral bone morphology, and histology for ICRS II Visual Histological Assessment Scoring. **RESULTS/ANTICIPATED RESULTS:** Our preliminary studies have shown reliable replication of electrospun MeHA scaffolds. We anticipate cross-linking density to correlate positively with compressive modulus, and negatively with swell thickness, degradation rate, and growth factor release rate. We anticipate the addition of SDF-1 α and TGF- β 3 to increase cell infiltration and chondrogenesis, respectively, within seeded scaffolds. Similarly, we expect minipig defects treated with growth factor-releasing scaffolds to show greater mechanical properties, defect fill, and ICRS II score compared with MeHA scaffolds without growth factor. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This study has the potential to show how an HA-based cell-free scaffold can be augmented with 2 growth factors that act synergistically to improve cartilage repair in a large animal model. This technology would improve upon the cell-free scaffolds already used clinically for autologous matrix-induced chondrogenesis and is directly translatable.

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Age-related change in 5-HT6 receptor availability in healthy male volunteers measured with IIC-GSK215083 PET

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OBJECTIVES/SPECIFIC AIMS: The serotonin receptor 6 (5-HT6) is a potential therapeutic target given its distribution in brain regions that are important in depression, anxiety, and cognition. This study sought to investigate the effects of age on 5-HT6 receptor availability using IIC-GSK215083, a PET ligand with affinity for 5-HT6 in the striatum and 5-HT2A in the cortex. **METHODS/STUDY POPULATION:** In total, 28 healthy male subjects (age range: 23–52 years) were scanned with IIC-GSK215083 on the HR + PET