maturation, and depression, suggesting that pubertal risk factors may relate more closely with emotion-regulation and self-referential processing deficits.

3221

Optimization of chondrogenesis on 3-dimensionally printed porous tissue bioscaffolds for auricular tissue engineering

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OBJECTIVES/SPECIFIC AIMS: This study's aims are to optimize the isolation and growth of chondrocytes from pig auricular cartilage; to identify the ideal seeding conditions onto 3D printed auricular bioscaffolds to maximize chondrocyte growth; and to investigate what quantity and types of host tissue can grow on the bioscaffold. Primary outcomes will include comparisons between different seeding conditions in various objective measures of bioscaffold growth and survival as listed in the methods section. Secondary outcomes will include continued optimization of bioscaffolds to minimize extrusion rates and maximize morphologic and histologic similarity to human auricular cartilage. METHODS/STUDY POPULATION: For chondrocyte-seeded scaffolds, cartilage will be collected from freshly harvested porcine auricular tissue and digested in type II collagenase. Chondrocytes derived from the harvest will be seeded into auricular PCL scaffolds using a type I collagen/hyaluronic acid composite gel, which has been previously shown to support chondrogenesis. For scaffolds containing cartilage, punch biopsies will be collected and embedded in specific areas of the scaffold previously shown to experience excessive stress/strain compared to the rest of the construct. From there, five of each chondrocyte-seeded bioscaffolds, chondrocyte-unseeded bioscaffolds, and cartilage-containing bioscaffolds will be implanted into athymic rats. Total follow up will be for six months, with outcomes as measured by clinical assessments, morphologic measurements, radiological imaging, histological analysis, biomechanical evaluation, and photodocumentation. Once these measures are obtained, we will work closely with Dr. Myra Kim, an adjunct professor with the Biostatistics Department, to appropriately analyze differences between the models. RESULTS/ANTICIPATED RESULTS: We believe that while all scaffolds (chondrocyte-seeded, chondrocyte-unseeded, and cartilage-containing) will be structurally sound, the chondrocyte-seeded scaffolds and cartilage-containing scaffolds will exhibit improved soft tissue coverage and have lower exposure and fracture rates. Additionally, between the two, we posit that there will not be appreciable differences histologically, radiologically, or morphologically. DISCUSSION/SIGNIFICANCE OF IMPACT: Auricular reconstruction is a geometrically complex and technically challenging problem. Reconstruction hinges on the physical characteristics of the deformity, patient preferences, and reconstructive materials available. The current gold standard for auricular reconstruction uses autologous rib cartilage as foundational support for overlying soft tissue and these techniques involve freehand carving of the cartilage, requiring high levels of technical skill. Harvesting the materials for this procedure is invasive, and the outcomes of the surgery are largely variable and sometimes undesirable. As alternatives, implantable scaffolds including those made from high density porous polyethylene (commercially referred to as MedPor) have been investigated. However, many of these have proven inadequate due to factors including infection, extrusion, and morphologic and biomechanical dissimilarity from native tissue. 3D printing represents an exciting new avenue through which to address many of these difficulties. Our group has previously demonstrated the successful design, production, and implantation of 3D-printed models: in auricular reconstruction, we have demonstrated the successful creation and implementation of a 3D printed ear scaffold into an athymic rodent model. We now turn our attention to optimization of seeding of our ear scaffold with chondrocytes derived from porcine auricular cartilage or with cartilage punch biopsies, all while maintaining emphasis on regulatory feasibility. With success in this arena, we will be able to provide a much less invasive and technically challenging alternative to the current gold standard, create patient-specific bioscaffolds which are more form fitting and individualized, and provide children with ear malformations better alternatives and treatments for their conditions.

3270

Patient Attitudes Survey to Guide Development of a Cell Replacement Device for the Management of Type 1 Diabetes

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OBJECTIVES/SPECIFIC AIMS: This study aims to estimate patient attitudes and receptiveness towards stem cell-based cell replacement devices to management Type 1 Diabetes. The primary outcomes of this study are mean response values to questions interrogating patient attitudes, knowledge, and receptiveness. METHODS/STUDY POPULATION: A RedCap survey was generated for this study. 100 participants will be drawn from Mayo Clinic Rochester, MN patients living with Type 1 Diabetes. RESULTS/ANTICIPATED RESULTS: Response values will be used to estimate broader patient attitudes. DISCUSSION/SIGNIFICANCE OF IMPACT: The response values of this survey will help inform future directions of cell replacement device development. Additionally, understanding patient attitudes may be useful in crafting more effective education strategies.

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Production of Engineered Cardiac Tissue for Disease Modeling

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OBJECTIVES/SPECIFIC AIMS: Cardiovascular diseases (CVD) is the leading cause of death worldwide in both men and women due to lack of cardiac regeneration after disease or damaged is caused. There are many challenges to studying CVD since native cardiomyocytes cannot be cultured in vitro. With the advancements in biomaterial and pluripotent stem cells research, scientists are now able to produce engineered cardiac tissue models in vitro that mimic the native myocardium. This study shows our methods for producing engineered cardiac tissue with potential applications in cardiac regeneration, disease modeling, and scalable production. METHODS/STUDY POPULATION: In this study, human induced pluripotent stem cells (hiPSCs) were combined with two different photocrosslinkable hybrid biomaterials, poly (ethylene)- glycol fibrinogen (PF) and gelatin methacrylate (GelMa), in various tissue geometries to form 3D human engineered cardiac tissues (3D-hECTs). To study

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