

BIOMEDICAL ENGINEERING RESEARCH LUNCH SEMINAR

Tuesday March 17th 2020, 12:30 – 13:30, sitem-insel room O1.123

"3D Printed Resorbable Patient Matched Implants for Head and Neck Reconstruction"

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Abstract

Reconstructing head and neck tissue defects presents significant challenges. Firstly, tissue defects are anatomically complex, often requiring solutions customized for the individual. Second, the patient population is limited, especially in pediatrics, which combined with the need for custom devices presents economic barriers from both manufacturing and regulatory perspectives. 3D printing combined with image-based design may provide an economically feasible manufacturing approach to customize head and neck reconstruction devices. However, this approach brings new challenges in terms of developing suitable biomaterials for 3D printing, assessing quality in 3D printed head and neck implants, and generally understanding how engineering requirements for patient specific design and 3D printing translate into pre-clinical and eventually clinical outcomes. In this talk, I will discuss an example of engineering two head and neck reconstruction implants, one for auricle reconstruction and the other for airway reconstruction, from developing design requirements through design, manufacturing and testing to pre-clinical outcomes and, for airway reconstruction, clinical outcomes in 15 patients. I will couch the entire image-based design and 3D printing process within the FDA design control paradigm. Finally, I will discuss developments in a 3D printable shape memory elastomer that may expand the capabilities of 3D printed tissue reconstruction devices.