Biomedical Discussion Group

"A tissue mechanist found in translation"

Thursday November 19, 2015
2:30 – 3:30 pm
E5 6127

Dr. Thomas Willett
Assistant Professor, Systems Design Engineering
University of Waterloo

Abstract:
As a tissue mechanist, it is common to conduct research related to fundamental structure-function-property relationships and pathology of tissues like tendon, ligament, cartilage or bone. Less common is the opportunity to engage in problem solving and truly 'translational' innovation. Fortunately, such an opportunity was found by engaging with a hospital tissue bank to address a severe product quality issue.

Large defects in cortical bone caused by trauma and tumor removal are significant challenges due to the inability of the biology to heal gaps greater than a certain critical size. Currently, metal implants and large bone allografts (non-living human donor tissues) are used to bridge such gaps but often with significant complications. In the case of bone allografts, high-dose γ-irradiation sterilization (25-35 kGy) is a commonly used and highly effective method for reducing biological risk (infection) to a graft recipient. However, severe weakening and embrittlement of the graft due to collagen fragmentation caused by the γ-irradiation is a concern for tissue banks, in terms of product quality, and for orthopaedic surgeons because an unacceptable 40% of implanted irradiation sterilized grafts reportedly fracture under normal physiological loading. A clear unmet need exists for novel solutions to the large cortical bone defect problem.

Prof. Willett will present his research group's previous work concerning the development of a simple yet novel patent pending technology that provides high-dose γ-irradiation sterilized bone allograft with greatly improved mechanical properties. Mechanical testing and collagen characterization demonstrate notable protection of ultimate strength (100%), ductility (~75%), work-to-fracture (~75%) and fracture toughness (~75%). This protection is partially a function of maintaining the connectivity of the collagen. This technology promises to improve product quality and surgical outcomes and reduce patient suffering and health care costs, if it is successfully commercialized.

New research directions for better addressing the large cortical bone defects problem will be briefly discussed.

See cbb.uwaterloo.ca/events for more information.

If you are interested in meeting with Dr. Willett, please email CBB.

Event is FREE – please RSVP via EventBrite

Pay parking available in lots B or N (map)

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