

Design and Fabrication of a Microfluidic Device for Tissue Engineering

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(co-supervised by Hani Naguib) The goal of this research project is to design and fabricate a microfluidic device to study the effect of fluid flow on the osteogenic differentiation of human mesenchymal stromal cell (hMSCs). Microfluidics devices allow fluids to be handled and analyzed at the micrometer scale. It has found many applications in biology in the fields of macromolecular analysis and cellular analysis. Multipotent mesenchymal stromal cells (MSCs) are a population of multipotent stem cells primarily isolated from the bone marrow. They are also found in other organs such as adipose tissue, muscle, liver, and umbilical cord blood. MSCs is a popular candidate for bone tissue engineering due to their multilineage differentiation potential and immunomodulatory properties. The design entails to design and fabricate a microfluidic device that is suitable for investigating the effect of fluid flow on hMSCs.