

A Soft Microfluidic Device as an In Vitro Model for Studying Mechanobiology of Tubular Organs

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We are currently in course of developing the soft microfluidic device that can be used as an in vitro model for studying mechanobiology of tubular organs. The device would recapitulate a number of geometrical and mechanical properties of tubular organs, e.g. a circular cross-section, a varying diameter along the channel, a microstructure on the luminal side (valves, plaques, wrinkles, etc.), a physiological or pathological level of stiffness, and a branched/bifurcated channel. The device is made of polydimethylsiloxane, which has long been used for the material of the conventional microfluidic device, with polymeric hydrogel forming an inner layer of the device. Controlling the formation of hydrogel, which acts as an extracellular matrix, allows the device to be furnished with desired biochemical, mechanical and geometrical properties to mimic various tubular organs and their pathological conditions.