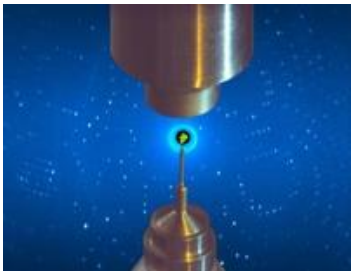

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Mechanical plasticity of the ECM directs branch elongation in human mammary gland organoids

Tuesday, 8 June 2021 13:00 (30 minutes)

Epithelial branch elongation is a central developmental process during branching morphogenesis in diverse organs. This fundamental growth process of large arborized epithelial networks is accompanied with huge structural reorganizations of the surrounding Extracellular Matrix (ECM), which is well beyond its mechanical linear response regime. Here, we report that epithelial ductal elongation within human mammary organoid branches relies on an intricate tension-driven feedback mechanism, which is based on the non-linear and plastic mechanical response of collagen. Specifically, we demonstrate that collective motion of cells within the branches generates tension that is strong enough to induce a plastic reorganization of the surrounding collagen network which results in the formation of mechanically stable collagen cages. Such matrix encasing in turn directs further tension generation, branch outgrowth and plastic deformation of the matrix. The identified mechanical feedback loop model sets a framework to understand how mechanical cues can direct organogenesis.

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