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Engineered *in vitro* model for mammary acini morphogenesis

W Bonani[1,2], **S Eccheli**[1], **F Alessandrini**[1], **A Inga**[1], **C Migliaresi**[1,2], **A Motta**[1] and **Y Ciribilli**[1]
[1]University of Trento, Italy
[2]INSTM, Italy

Mammary acini organization plays a fundamental role in tissue development and physiology, but also could offer valuable insights in cancer onset and progression. 3D *in vitro* models represent a new paradigm in biological sciences. Reconstituted Matrigel® Matrix was successfully used to model 3D tissues; however, Matrigel® encompasses a wide range of different factors, presents large batch-to-batch variation, is expensive and difficult to isolate. Here we designed tunable alginate-based substrates and assessed the assembly of MCF10A human breast-epithelial cells with a focus on the role of laminin-1 in acini maturation and cavitation. Collagen and laminin-1 were used to increase cell adhesive properties of the alginate matrix and to modulate cell activity. We exploited an overlay model consisting of an alginate-based hydrogel substrate and the addition of laminin-1 in the cell culture medium and followed mammary acini morphogenesis. The evolution of cell spheroids was followed for 21 days; immunofluorescence was performed to investigate acini maturation, cavitation and cell polarization were also analyzed in terms of area and roundness. Image analysis was performed to analyze spheroids/acini for area and roundness. We developed an efficient method for the development of 3D cell spheroids/acini *in vitro* and studied the effect of laminin-1 on spheroids formation (added to medium). This work established tunable, instructive and medium-throughput *in vitro* culture systems consisting of alginate-based hydrogel substrates and enriched culture media for the development of mammary acini. The modulation of culture substrates and signaling molecules could represent a platform to study the effects of cellular microenvironment on acinar morphogenesis.

Biography

W Bonani has received his PhD in Materials Science from the University of Trento in 2011 and in Mechanical Engineering from the University of Colorado in 2012. He is currently holding a Post-doctoral position at the University of Trento (INSTM research unit). During his career, he has developed and studied scaffolds for tissue engineering applications (vascular, bone, cartilage, neural), systems for drug encapsulation and delivery, extraction, manipulation and processing of biopolymers (silk, collagen, alginate) and cellularized 3D building blocks for tissue modeling. He has published more than 15 papers in peer-reviewed journals.

walter.bonani@unitn.it

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