COSMINNOV 3rd
COSMETIC INNOVATION DAYS

UN ÉVÉNEMENT COSMETIC VALLEY FRANCE

SKIN MODELS : DEVELOPMENT & APPLICATIONS

T. Steinberg, University Freidburg Medical Center, Germany

On the mutuality of biomechanics and gingival keratinocyte behavior with emphasis on translation into innovative biomaterials

In view of the fact how biomechnics of the extracellular environment governs the convenience of target cells, derived from oral mucosal and other periodontal tissues, our studies have focused on the analysis of two pivotal biomechanical parameters, i.e. micropatterning of cell adhesion points and stiffness/elasticity of the extracellular cultivation substrate. To explore the effects of these two parameters on cell behavior, we have generated model surfaces by photolithography of defined biomechanics, comprising elastic pillars/posts, while the pillars act like little springs. Hereby, pillars arranged in defined microarrays and stiffness allowed for (i) providing defined anchor point interspaces to target oral mucosal/periodontal cells, (ii) exert defined forces on the cells, while vice versa, the cells' forces onto the pillars could be measured and calculated simultaneously. Thereby, we succeeded in determining and defining optimal cell envirionmental biomechanics, required for proper tissue-innate characteristics. Interstingly, all biomechanically affected cell parameters are important key players in supporting wound healing or tissue regeneration. Moreover, we were able to calculate the biomechanical forces of oral epithelial keratinocytes on their pre-defined extracellular environment.
In summary, such kind of analyses, will open the road to create a platform for the development of novel customized candidate biomaterials for improved treatment of soft tissue oral cavity mucosal defects. In this context and on the basis of oral epithelial keratinocyte-innate biomechanical needs, we recently employed two rapid prototyping techniques, i.e. electrospinning (ESP) and electroblotting (EBL), to create the "prime father" of a biohybrid polymer, which we optimized to a customized cell-/tissue-convenient medical device or oral soft tissue regeneration.