Restricting desmosomal assembly in interfollicular stem cells (IFSCs) via desmosomal protein nanopatterns

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Adhesion between intra follicular stem cells (IFSCs) is established by the formation of specific cellular junctional complexes, desmosomes. Such junctions are specialized for strong adhesion and their failure can result in various diseases [1]. Regarding the dynamic structure of desmosomal junctions, this type of cell-cell adhesion may also play the role of signaling centers [2]. Desmosomes are composed of two types of cadherins, desmocollins (Dsc) and desmogleins (Dsg), but their combinatorial roles in desmosome assembly and cell behaviors are not understood well in IFSCs.

In this work, nanopatterns of desmoglein 2 are created as mimics of the cellular interface and used to study the formation of desmosomal assemblies for adherent IFSC cells. Nanoscale engineering was used to create a chemical pattern which was used to assemble oriented Dsg2Fc into created arrays of circular nanopatterns of the Dsg2Fc protein with size 100, 300, 500 nm. Between the protein nanopatterns, cell adhesion studies show that IFSCs adhere to the Dsg2Fc patterns and start expression of intra- and extra-cellular domains of the Dsg2 protein after 2 hr in high Ca^{2+} media while cells in low Ca^{2+} media just express a small number of intracellular domain of Dsg2 proteins even after 6 hr post incubation. The preliminary results show that the size of nanopatterned and Ca^{2+} concentration alter desmosomal formation.

References:

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