The Impact of Nanostructured Protein Patterns on Differentiation of Human Keratinocytes

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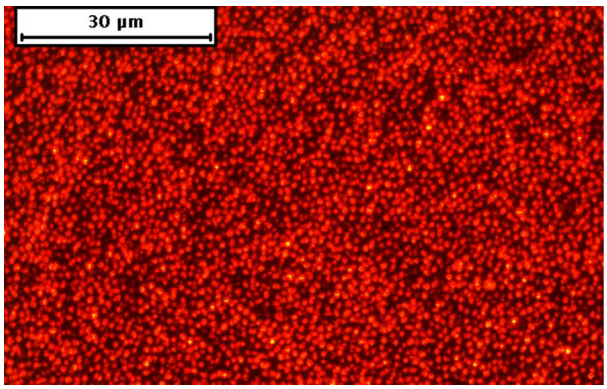

Fluorescence microscopy image at 63x magnification showing immunostained collagen IV located in patches created with 800 nm particles.

Adhesion have been shown to be an important factor in the differentiation of keratinocytes, with activation of integrins playing an important role[1]. To examine the effect of restricting the size of focal adhesions in human primary keratinocytes on cell adhesion and differentiation, they can be cultured on surfaces modified to present a nanopattern of integrin ligand islands of a certain size. Fluorescence microscopy can then be used to examine the adhesion and morphology of the cells.

Disperse colloidal lithography allows for the fabrication of large area nanopatterns with short range order, which can be functionalized to result in adhesive protein islands of tunable sizes ranging from 100 nm to 1000 nm on an otherwise protein repellant background[2]. In this case the method was used to create 100 nm, 300 nm and 800 nm islands of collagen IV, a ligand for the alfa2beta1 integrin involved in regulating differentiation in keratinocytes and a constituent of the basal membrane to which keratinocytes normally adhere prior to committing to terminal differentiation.

The method used for creating these patterns will be presented, as well as preliminary data regarding the adhesion of keratinocytes to such substrates.

[1]: Fiona M. Watt: Role of Integrins in Regulating Epidermal Adhesion, Growth and Differentiation, The EMBO Journal, 2002, Vol. 21, No. 15, page 3919-3926

[2]: J. Malmström, B. Christensen, H.P. Jakobsen, J. Lovmand, R. Foldbjerg, E.S. Sørensen and D.S. Sutherland: Large Area Protein Patterning Reveals Nanoscale Control of Focal Adhesion Development, Nano Letters, 2010, 10, page 686-694.