ImmunoTools IT-Box-139 Award 2012

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Effect of nanotopography on mesenchymal stem cell differentiation and stem cell maintenance

Stem cells have been identified as having great potential in the growing field of regenerative medicine, as they possess the ability to differentiate into a variety of cell types. Differentiated cells could be used to replace or repair damaged or diseased tissues, which is becoming increasingly important in a society with a trend towards an aging adult population.

A source of adult stem cells can be derived from human bone marrow, which are often referred to as mesenchymal stem cells (MSCs). These cells are normally subject to control from a range of biochemical and topographical cues in the body and it is of importance to mimic these methods of control using a particular strategy. Previous studies have utilised surface chemistry and adjusted substrate stiffness. However, recent advances have identified surface patterning of materials at the nanoscale as a method of MSC control, specifically to induce differentiation into a bone lineage or in the maintenance of stem cell phenotype.

This offers a non-chemical strategy to culture a sufficient supply of non-differentiated or differentiated MSCs for reintroduction to the body.

It is also crucial to investigate and further understanding of these nanotopographical effects at a biological and molecular level, and it is to this end that techniques such as flow cytometry will be useful. Using ImmunoTools antibodies, determination of the state of MSCs and the composition of MSC populations cultured on several nanopatterned materials will be assessed through analysis of expression levels of proteins including CD14, CD105, and CD45.

ImmunoTools IT-Box-139 for Louisa Lee includes 100 antibodies

FITC - conjugated anti-human CD1a, CD3, CD4, CD5, CD6, CD7, CD8, CD14, CD15, CD16, CD19, CD21, CD25, CD29, CD35, CD36, CD41a, CD42b, CD45, CD45RA, CD45RB, CD45RO, CD49d, CD53, CD57, CD61, CD63, CD80, CD86, HLA-DR, IL-6, Control-IgG1, Control-IgG2a, Control-IgG2b, Annexin V

PE - conjugated anti-human CD3, CD4, CD8, CD11b, CD15, CD14, CD18, CD19, CD20, CD21, CD22, CD31, CD33, CD38, CD40, CD45, CD45RB, CD50, CD52, CD56, CD58, CD62p, CD72, CD95, CD105, CD147, CD177, CD235a, HLA-ABC, IL-6, Control-IgG1, Control-IgG2a, Control-IgG2b, Annexin V

PE/Dy647 -tandem conjugated anti-human CD3, CD4, CD8, CD14, CD19, CD20, CD25, CD54

APC -conjugated anti-human CD2, CD3, CD4, CD8, CD10, CD11a, CD11c, CD14, CD16, CD27, CD37, CD42b, CD44, CD45, CD59, CD62L, CD69, CD71, IL-6, Control-IgG1, Control-IgG2a, Control-IgG2b, Annexin V

DETAILS