Efficient myogenic commitment of hESC-derived cells on the biomimetic substrate replicating myoblast topography

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Spontaneous and heterogeneous differentiation of hESCs and iPSCs may limit their applications in clinical settings. Here, we describe the efficient generation of mesenchymal cell population from both hESCs and iPSCs having non-turmoigenic potentianl and their commitment into myoblast. In skeletal development, increased cell-cell contact plays critical initial steps for myogenic commitment. We demonstrate that iPSCs and hESCs-derived cells can undergo efficient myogenic commitment by topographical cues present in their environment. We have created substrates from biomimetic materials that can replicate the mico- and nanoscale topography of fully differentiated skeletal myoblast. When hESCs and iPSCs-derived mesenchymal cells were cultured on biomimetic pattern, mesenchymal cells followed the underying myoblast pattern. Furthermore, gene expression and cell fusion index showed enhanced myogenic commitment on these substrates. These results demonstrate that myogenic potential of hESCs and iPSCs-derived cells are highly dependent on the micro- and nanoscale topographical cues provide by skeletal myoblast.