

Novel extracellular matrix mimics based on mussel adhesive protein fused with biofunctional peptides

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Previously, we demonstrated that mussel adhesive protein (MAP) fp-151 has the potential to be used as a cell or tissue bioadhesive for various cell lines in biocompatible aspect. To improve the cell-adhesion and proliferation properties of fp-151, we designed several extracellular matrix (ECM) mimics based on MAP fused with biofunctional peptide such as RGD, laminin, type 4 collagen, or growth factor, which is fused at C-terminus of fp-151, respectively. The adhesion and proliferation properties were tested in several cell lines (MC3T3-E1, ATDC5 and 3T3-L1) by MTT assay. In addition, we also investigated the differentiation ability of ECM mimics by alizarin red S staining. Our ECM mimics showed superior adhesion and proliferation properties compared to other commercially available cell-adhesion materials. The differentiations of MC3T3-E1 cells were also increased on ECM mimics-coated surfaces. Therefore, these data demonstrate that our proposed MAP-based ECM mimics can be successfully used in cell culture and tissue engineering and extended to other tissue-specific cell recognition motifs to allow attachment of target cells to artificial ECM surfaces.