

Long-term human pluripotent stem cell self-renewal on synthetic polymer surfaces.

Journal: Biomaterials

Publication Year: 2010

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PubMed link: 20817292

Funding Grants: Genetic modification of the human genome to resist HIV-1 infection and/or disease progression, A Novel Microenvironment-Mediated Functional Skeletal Muscle from Human Embryonic Stem Cells and their In Vivo Engraftment, Interdisciplinary Stem Cell Training Program at UCSD

Public Summary:

Scientific Abstract:

Realization of the full potential of human pluripotent stem cells (hPSCs) in regenerative medicine requires the development of well-defined culture conditions for their long-term growth and directed differentiation. Current practices for maintaining hPSCs generally utilize empirically determined combinations of feeder cells and other animal-based products, which are expensive, difficult to isolate, subject to batch-to-batch variations, and unsuitable for cell-based therapies. Using a high-throughput screening approach, we identified several polymers that can support self-renewal of hPSCs. While most of these polymers provide support for only a short period of time, we identified a synthetic polymer poly(methyl vinyl ether-alt-maleic anhydride) (PMVE-alt-MA) that supported the long-term attachment, proliferation and self-renewal of HUES1, HUES9, and iPSCs. The hPSCs cultured on PMVE-alt-MA maintained their characteristic morphology, expressed high levels of markers of pluripotency, and retained a normal karyotype. Such cost-effective, polymer-based matrices that support long-term self-renewal and proliferation of hPSCs will not only help to accelerate the translational perspectives of hPSCs, but also provide a platform to elucidate the underlying molecular mechanisms that regulate stem cell proliferation and differentiation.

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