

Stem cell expansion and differentiation using nano/micro-substrate

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For clinical application of human embryonic stem cells (hESCs) and adult stem cells, it is critical to develop the culture techniques that completely exclude the use of animal cells, mitotic inhibition, enzyme treatments and so on. For hESC expansion, the human adipose-derived stem cells (ASCs) were seeded on the bottom surfaces of inverted porous membrane (PM) and subsequently hESCs (or induced pluripotent stem (iPS) cells) were seeded on the top surfaces of the membranes. The microscale PM allows that the cell types are separate for ease of transfer, yet retain the ability to interact through the pores of the membrane. Transfer of hESCs (or iPS cells) was carried out mechanically without the need for any enzyme treatment. In this presentation, I will also introduce stem cell differentiation on the patterned substrates with surface structure of lotus, nanopillar, nanopore, respectively. Thus, Regulating nanomicroscale substrate would be a useful tool to regulate expansion and differentiation of both hESC and adult stem cells without additional and detrimental treatments.