Development for *in Vitro* Fully Designed Capillary Formation of Endothelial Cells

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Angioplasty for below 1mm diameter blood vessels is carried out by injection of proangiogenic genes or proteins and by direct transplantation of endothelial progenitor cells or mononuclear cells from bone marrow or peripheral blood. With these therapies, however, it has been difficult to make freely form vascular networks and it takes long time to recover the blood flow after transplantation. We developed an angioplasty which makes a fully designed capillary in vitro and transplants to the ischemic region. The culture plates were developed using photolithographic techniques like off-set printing. Using photomask and UV irradiation, one of the surfaces of the plates was changed to hydrophobic to hydrophilic. Endothelial cells were inoculated to a fully designed substrate and as a result, the cells were able to be cultured on the hydrophilic region alone. When the substrate cultured endothelial cells were attached to the extracellular matrix or amnion membrane, endothelial cells were transferred to the matrix or membrane and formed tube during this process within 24hs. To demonstrate the process in details, it was observed the time course of capillary formation by electromicroscopy. They have luminal space in center and each cell makes polarity, and by microinjection of fluorescence dye the tubes are proved to successively adhered capillaries. They have elasticity and no leakage. Amnion membrane equipped capillaries was transplanted into a subcutaneous pocket of Balb/c nude mice. Five days after transplantation, blood flow was observed in the transplanted capillary on histological examination. This method is able to be developed to a novel clinical application for the therapy of ischemic diseases.