

CLAIMS

1. A method of culturing cells, comprising: (a) providing a microfluidic device comprising a membrane, the membrane comprising a top surface and a bottom surface; (b) coating the top surface of the membrane with laminin and the bottom surface with a mixture of collagen and fibronectin, the mixture free of laminin; (c) seeding induced motor neuron progenitor cells on the top surface and brain microvascular endothelial cells on the bottom surface so as to create seeded cells; (d) exposing the seeded cells to a flow of culture media for a period of time; and (e) culturing the seeded cells under conditions such that the brain microvascular endothelial cells on the bottom surface form tight junctions.
2. A method according to Claim 1, in which the induced motor neuron progenitor cells are derived from induced pluripotent stem cells from a human patient diagnosed with a CNS disorder.
3. A method according to Claim 1, in which the flow promotes the differentiation of the induced motor neuron progenitor cells.
4. A method according to Claim 3, in which the induced motor neuron progenitor cells differentiate into neurons.
5. A method according to Claim 4, in which the neurons exhibit a more mature electrophysiology as compared to the same neurons cultured in a static culture
6. A method according to Claim 1, in which the induced motor neuron progenitor cells are derived from induced pluripotent stem cells from a patient diagnosed with Amyotrophic lateral sclerosis (ALS).
7. A method according to Claim 1, in which the brain microvascular endothelial cells are derived from induced pluripotent stem cells from a patient diagnosed with MCT8-specific thyroid hormone cell-membrane transporter deficiency.
8. A method according to Claim 1, in which the induced motor neuron progenitor cells were stored frozen and then thawed prior to step (c).