In Vitro platforms iPSCs-based for drug screening and drug discovery

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Technology

The blood brain barrier (BBB) is a multi-cellular neuro-vascular unit (NVU) that forms a highly selective barrier between the blood circulation and the central nervous system (CNS). As a result, CNS drug delivery is a major challenge in efficient drug development. Until now models failed to mimic the heterogeneity of the BBB within the different brain regions. *In vivo* animal models are poor predictors of human BBB penetrability. *In vitro* systems currently available fail to mimic the heterogeneity across different regions of the CNS.

Dr. Gad Vatine and his team developed a novel, one of a kind approach to establish brain region-specific NVU platforms for drug screening and discovery. The platforms developed at Ben-Gurion University (BGU) consist of a dual-compartment system, based on Transwell® and microelectrode array (MEA). The top, derived from human induced pluripotent stem cells (iPSCs), are seeded on a porous membrane and form a monolayer that displays physiologically relevant barrier properties. At the bottom, the electrophysiological properties of CNS region-specific primary rat neural cells are measured in real time. Barrier properties were shown to vary across the different region-specific platforms, indicating that these innovative platforms are highly valuable for drug discovery since region-specific BBB permeability and neuronal activity are taken into account.

Advantages

- Novel and easy to use.
- Cost-effective.
- *In vitro* platforms that simulate physiologically relevant BBB properties and heterogeneity of the different regions of the CNS.

Applications

- Drugs screening platforms that examine BBB penetration.
- Personalized drug screening platforms that consider the diversity in brain penetrability among individuals.

Patent

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