

## Project #13

**Title:** Generation of brain organoids as an in vitro model of human brain development

**Description:** The human brain develops in a complex manner that makes it difficult to study brain disorders in model organisms. Lancaster et al. (2013) published a paper in Nature that developed a ground-breaking technology, termed cerebral organoids that provides an in vitro model of human brain development in a three-dimensional culture system. These cerebral organoids can be derived from human induced-pluripotent stem cells (hiPSCs) and they undergo the full developmental processes from proliferation and migration into fully mature neurons and other brain cells such as astrocytes and oligodendrocytes. Importantly, various brain regions of dorso-ventral identities are developed together within one organoid tissue with spatial and temporal patterning specific to the human brain. Therefore, the cerebral organoid culture system recapitulates many of the unique features of human brain development and provides a promising approach for studying neurodevelopmental disorders such as autism spectrum disorder (ASD). The cerebral organoids are also excellent alternatives to the traditional two-dimensional hiPSC cultures and other animal models that exhibit distinct developmental characteristics in comparison to the human brain. Eventually we would like to use this technology to study the underlying mechanisms of the abnormal brain development in ASD that might be unique to the Qatari population. This technology might also lead to the development of novel ASD biomarkers and therapeutic strategies that together provide a platform for personalized medicine in ASD.

**Mentor:** Dr. Sara A. Abdulla, Research Fellow. Email: [saabdulla@hbku.edu.qa](mailto:saabdulla@hbku.edu.qa) Dr. Salam Salloum Asfar, Postdoctoral researcher. Email: [ssalloumasfar@hbku.edu.qa](mailto:ssalloumasfar@hbku.edu.qa)

