PWRFA are proud to announce Dr Partha Das of Monash University's Biomedicine Discovery Institute as the recipient of the 2020 PWS Grant Round. Dr Das' project will grow and study 3D brain organoids (mini-brains) using cells (iPSCs) from people with PWS. By studying how the mini-brains grow and develop we will learn more about brain development in people with PWS and how this compares to typical brain development. Read on to learn more about this exciting project.

Project Title: Disease modelling of neurodevelopment defects in Prader-Willi Syndrome using patient specific iPSCs derived human brain organoids.

Project Description

This proposal aims to develop a novel tool to access early neurological defects that occur in PWS patients. We will be using 3D brain organoids, which are "mini-brains" that are derived from healthy/patient-specific induced pluripotent stem cells (iPSCs – are usually generated from blood cells/skin cells of an individual) in a dish. These brain organoids or lab-grown mini-brains resemble many aspects of structural and organization and functionality of the developing human brain. Hence, a brain organoid system is an attractive and powerful research tool to model normal human brain development/function, as well as several neurodevelopmental disorders like PWS, in the laboratory setup. This is not possible using human brain samples, as availability of the human brain tissues is challenging, and they are difficult for genomic manipulation and expansion in the culture.

In this study, we will model PWS using brain organoids that will be derived from control and PWS patient-specific iPSCs. Further cellular and functional characterizations of these brain organoids will be performed to dissect the underlying defects in PWS. This will be critical for understanding the PWS pathobiology. Personalized brain organoid system will be extremely beneficial for genome manipulation, drug screening and identifying molecular targets for developing therapeutics in future.

Anticipated Outcomes:

- This proposal will set up a comprehensive framework for studying neurodevelopmental disorders like PWS, using cortical brain organoid as a model system.
- Detailed cellular and functional characterization of PWS brain organoids will potentially echo the actual pathobiology of PWS patients