

## **PCL/20/05 - Single-cell transcriptomic analysis of anaesthetic effects on neuronal and non-neuronal cell populations modulating CNS vulnerability.**

Brain dysfunction following surgery and anaesthesia is common and can lead to significant disability. There is no treatment and the reason why it happens is poorly understood. In prior work, we found that anaesthesia alters the levels of a large number of different genes in the brain. Some of these genes are important for protecting the brain during injury. There was also an indication that these changes were not confined to nerve cells and affected other important cell-types in the brain. In this project, we want to understand how anaesthesia affects different types of cells in the brain. We will do this using a new technology that allows us to measure the levels of genes in individual cells on a cell-by-cell basis. We predict that anaesthesia will alter levels of genes across all the different types of cells found in the brain and will alter these cells into a way that drives enhanced brain vulnerability. As anaesthetic agents work by reducing the firing of nerve-cells in the brain, we also want to see whether increasing the firing of nerve-cells in vulnerable brain areas can reverse these changes. This will be done using a new method of stimulating the brain from outside the skull by applying overlapping electrical fields. This will help us understand to what extent the changes caused by anaesthesia are reversible and potentially indicate a new treatment method that could protect vulnerable patients.