"Exploration of the therapeutic potential of astrocytic connectivity in a functional *in vitro* model of Parkinson's disease"

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Parkinson's disease (PD) is an incurable disorder of older age affecting up to 10 million people worldwide. Motor symptoms of PD are more widely known and are used in diagnosing this condition, these include tremor, rigidity, and postural instability. Current therapies that help supply a chemical in the brain called dopamine alleviate the motor symptoms temporarily, but they do not slow the disease progression down, and often cause serious side effects. Moreover, non-motor symptoms that include cognitive, gastrointestinal, and sleep problems, are not addressed by these treatments. For these reasons, the clinical need for new transformative approaches is high.

Our project investigated the effects of PD-associated pathology on cells that are not yet well understood in the context of PD that are called astrocytes. We found that these cells suffer a number of alterations in their biology that include the disruption of communication within the cell networks. This can affect the neighbouring astrocytes and other cell types such as neurones.

To counteract these changes, we tested a drug, which has not been previously used in PD, on cells grown in Petri dishes. This novel approach improved the ability of the cells to send healthy signals, reduced the release of inflammatory molecules, and slowed down the aggregation rate of alpha-synuclein – the type of aggregated protein found in the brains of people with PD. We also found that astrocytes have different properties based on their brain region of origin, which can help us gain a deeper insight into why PD develops unevenly throughout the brain.

The results we have obtained are novel and encouraging. As the next step, we are planning to learn more about the behaviour of this drug in the brain, after which we can plan further pre-clinical trials so that the treatment approach can benefit the patients if the outcomes continue to be positive, or alternatively we would consider re-formulating the drug.