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The effect of systemic inflammation induced by a high sucrose diet on inflammation in the rat substantia nigra

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Animal studies robustly demonstrate that systemic inflammation evoked by bacterial endotoxin can potentiate inflammation in the brain through the activation microglial cells. However, it is unclear if systemic inflammation associated with Metabolic Syndrome (MetS) can affect neuroinflammation in the Substantia Nigra (SN). MetS is primarily caused by obesity due to a high sucrose diet. The objective of this research is to determine if systemic inflammation induced by a high sucrose diet can affect an ongoing inflammatory process in the rat SN. Sprague Dawley rats were given a stereotaxic intranigral injection of either a normal dose (2.0 µg, n=40) or a low dose (0.2 µg, n=40) of Lipopolysaccharide (LPS) to trigger a high level or benign inflammatory process, respectively. The groups were then sub-divided and provided with either normal drinking water or drinking water with 30% sucrose (w/v) for 30 days. All rats were fed standard rat chow. Immunocytochemistry was used to assess morphological changes of microglial cells, astrocytes and dopamine neurons in the SN. Real-time RT-PCR was used to assess an array of pro and anti-inflammatory markers in the SN, adipose tissue and liver. The results show that the sucrose-fed rats exhibited a higher level of neuroinflammation in the SN. Interestingly, the group injected with the low dose of LPS and provided with sucrose displayed the highest level of inflammation. These findings support the hypothesis that a high sucrose diet and the resulting systemic inflammation can exacerbate a benign inflammatory process in the SN, thus increasing the risk of developing PD.

Biography

Ashton Rogers, the first person in the English speaking Caribbean to be awarded a PhD in Neuroscience by The University of the West Indies, is very enthusiastic about better understanding the relationship between diet, metabolic syndrome and neuroinflammation in the substantia nigra. After graduating in 2014, he founded the first Neuroscience Centre of Trinidad and Tobago, a non-profit organization aimed at promoting brain health awareness and improving the welfare of patients affected with neurological diseases. He is presently establishing the first Neuroscience Foundation of Trinidad and Tobago, a charity organization to sponsor patients in need of foreign treatment.

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