**Real-time Study of the Intestinal α-Synuclein Aggregation using Laser-Printed Electrochemical Sensor Chips**

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The accumulation of aggregated α-synuclein protein and the depletion of dopamine levels in the brain are associated with the development of Parkinson's disease. The absence of effective therapeutics to slow this disease progression is because of a limited understanding of the mechanisms of α-synuclein aggregation. Recently, it has been shown that a gut bacterial metabolic pathway is responsible for initiating α-synuclein aggregation, based on dopamine oxidation.1 Herein, we developed fully printed laser-induced graphene sensor chips to electrochemically monitor α-synuclein aggregation and the corresponding dopamine levels in real time, which are in agreement with conventional end-point immunostaining assays. Importantly, using the sensor chips, we studied the inhibitory potential of two model diet-derived catechols against α-synuclein aggregation. Additionally, we showed that these dietary catechols demonstrate the capability to inhibit α-synuclein aggregation in model enteroendocrine cells. These results represent crucial strides towards uncovering novel avenues for better understanding the mechanisms involved in pathogenesis of Parkinson's disease and its management using electrochemical sensors.

1. Ortiz De Ora, L., Uyeda, K. S., Bess, E. & Bess, E. N. Discovery of a Gut Bacterial Metabolic Pathway that Drives α-Synuclein Aggregation and Neurodegeneration. *bioRxiv* 2022.06.08.495350 (2022) doi:10.1101/2022.06.08.495350.