The role of gut endocrine cells in Parkinsons Disease

https://www.neurodegenerationresearch.eu/survey/the-role-of-gut-endocrine-cells-in-parkinsons-disease/

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Country

USA

Title of project or programme

The role of gut endocrine cells in Parkinsons Disease

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4

The project/programme is most relevant to:

Parkinson's disease & PD-related disorders

Keywords

gut endocrine cell, Enteroendocrine Cell, alpha synuclein, Herbicides, Pesticides

Research Abstract
DESCRIPTION (provided by applicant): Enteroendocrine cells (EECs) are sensory cells of the gastrointestinal tract. Their apical surface is open to the lumen of the intestine and their basolateral surface contains abundant secretory vesicles that are released upon stimulation of

the cell. Through specific cell surface receptors, EECs sense food as it passes through the intestine. We recently discovered that EECs of the gut possess many neuron-like features including axon-like processes known as neuropods. It is through neuropods that EECs connect to neurons. This neural connection provides a direct communication from the gut to the brain and is how the brain senses luminal contents. The gastrointestinal tract is constantly exposed to the environment through food that sometimes harbors herbicides and pesticides and EECs in the gut mucosa are ready targets for herbicide exposure. Epidemiological and experimental data indicate that environmental exposure to herbicides and pesticides is a major cause of Parkinson’s disease. Parkinson’s disease is characterized by intraneuronal Lewy bodies that consist of aggregates of ?-synuclein, a neuronal protein that may protect against toxic injury. Aggregates of ?-synuclein can be passed from cell to cell, inducing aggregates in a “”prion-like cascade”” that spreads through the nervous system. Abnormal ?-synuclein appears in enteric neurons before it spreads to the brain. Therefore, Parkinson’s disease arises in regions where neural tissues are in close proximity to the environment, such as the gut, although how this occurs is unknown. Among their neuron-like features we discovered that EECs also express ?-synuclein. This finding raises the possibility that EECs are the source of Parkinson’s disease. We propose that pesticides and herbicides cause abnormal ?-synuclein in EECs that is transmitted to neurons in the gut and spreads to the nervous system. We will test this hypothesis by determining if herbicides and pesticides known to cause Parkinson’s disease produce abnormal ?-synuclein in EECs and if EECs transmit is folded ?-synuclein to neurons. These studies will determine if EECs are the source of abnormal ?-synuclein that could be the origin of Parkinson’s disease. Identifying the source of Parkinson’s disease may offer new targets for future therapy.

Lay Summary
PUBLIC HEALTH RELEVANCE: Gut endocrine cells are sensory cells of the gastrointestinal tract and are constantly exposed to the environment through ingested food that sometimes harbors herbicides and pesticides. Environmental exposure to herbicides and pesticides is a major cause of Parkinson’s disease. We discovered that gutendocrine cells express the neuronal protein ?-synuclein that is abnormal in Parkinson’s disease and is believed to cause the disease by spreading from cell-to-cell. We believe that herbicides and pesticides attack gut endocrine cells changing their ?-synuclein to a disease causing form that then spreads to the nervous system to cause Parkinson’s disease. This proposal will validate this process and provide novel insights into the origin of Parkinson’s disease.

Further information available at:

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United States of America

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