Restorative plasticity at corticostriatal excitatory synapses (REPLACES)

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Title of project or programme

Restorative plasticity at corticostriatal excitatory synapses (REPLACES)

Principal Investigators of project/programme grant

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Source of funding information

European Commission

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4219766

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Total duration of award in months

48

The project/programme is most relevant to

- Parkinson’s disease

Keywords
Research abstract in English

Long-lasting, activity-dependent synaptic changes are thought to underlie the ability of the brain to translate experiences into memories and seem to represent the cellular model underlying learning and memory processes. Alteration of brain plasticity may lead to the motor and cognitive disturbances

observed in neurodegenerative diseases. Therapeutic approaches targeting synaptic plasticity could prevent neuronal degeneration and restore altered motor and cognitive functions. Long-term synaptic plasticity, long-term potentiation and long-term depression, are widely expressed at excitatory synapses throughout the brain and have both been described at corticostriatal connections, at which they might underlie motor-skill learning, cognitive performance and reward mechanisms. Unique feature of corticostriatal plasticity is the observation that the loss of these opposite forms of synaptic plasticity has been observed in experimental models of neurodegenerative disorders such as Parkinson's disease (PD). REPLACES will use cortical striatal plasticity and its alterations in experimental PD to explore basic mechanisms of brain plasticity and repair and to translate the new generated knowledge into novel restorative therapeutic approaches. The long-term efficacy of new treatments for PD will be conditioned by their ability to restore, structurally and functionally, the synaptic wiring of striatal neurons and physiological synaptic plasticity. REPLACES addresses the potential restorative effects of either novel pharmacological treatments or neuronal transplants on the corticostriatal microcircuitry. Since chronic treatment with DA precursor L-DOPA induces in the majority of PD patients a maladaptative plasticity causing dyskinesia, innovative strategies should prevent the development of this disabling condition. REPLACES will characterize corticostriatal synaptic plasticity from molecular aspects to clinical neurophysiology involving behavioural and morphological analysis.

Lay summary