Parkinson's disease: causes & cures

European Parliament, 8 November 2018

Animal models and Parkinson's disease - Angela Cenci Nilsson, Lund University

Abstract

Animal models of Parkinson's disease (PD) can be broadly divided into two categories: genetic and neurotoxic models. One strength of the genetic models is that they mimic gene defects found to occur in the human disease. Yet, most genetic models do not display a sufficient degree of dopaminergic neurodegeneration, nor disease-relevant phenotypes. By contrast, animal models obtained using catecholamine-selective neurotoxins (6-OHDA or MPTP) mimic clinical PD with regard to both pattern and extent of dopaminergic degeneration. Accordingly, these models display PD-relevant motor features, although they do not reproduce some important aspects of PD pathology, such as, the formation of intracellular protein aggregates rich in misfolded alpha-synuclein ('Lewy bodies'). Lewy body-like aggregates can nevertheless be induced in relevant brain regions through inoculation of synthetic preformed fibrils of alpha-synuclein. In conclusion, although none of the current animal models displays all features of PD, investigators today have the possibility to choose among many excellent models that are suitable to investigate specific pathogenic pathways. Animal models have an essential role in PD research because they allow for testing scientific hypotheses and evaluating potential new treatments in ways that cannot be achieved using cell-based models.

Angela Cenci Nilsson (author name M. A. Cenci) carried out her medical education and clinical specialisation in Neurology at the University of Verona (Italy), followed by doctoral studies in neurobiology at Lund University (Sweden). Since 2008, Cenci Nilsson is a Professor of Experimental Medical Research at Lund University and leads a research group of 12 people ('Basal Ganglia Pathophysiology Unit'). She has pioneered the development of symptomatic rodent models of parkinsonism and L-DOPA-induced dyskinesia and has used these models for pathophysiological investigations and therapeutic discovery. Her work has identified mechanistic targets for both symptomatic and disease-modifying treatments that are currently being pursued for clinical translation in PD. Cenci Nilsson has scientific advisory roles in several national and international organisations engaged in Parkinson's research, such as the International Basal Ganglia Society (IBAGS), the International Parkinson and Movement Disorders Society, the Swedish Parkinson's Research Network, the Swedish Brain Foundation, and The Michael J. Fox Foundation.