

Analysis of the impact of ROS in networks describing neurodegenerative diseases

<https://www.neurodegenerationresearch.eu/survey/analysis-of-the-impact-of-ros-in-networks-describing-neurodegenerative-diseases/>

Principal Investigators

Andrew Ignatenko

Institution

Université du Luxembourg

Contact information of lead PI

Country

Luxembourg

Title of project or programme

Analysis of the impact of ROS in networks describing neurodegenerative diseases

Source of funding information

FNR

Total sum awarded (Euro)

€ 171,757

Start date of award

15/01/2013

Total duration of award in years

4

Keywords

Research Abstract

Neurodegenerative diseases such as Parkinson's or Alzheimer are highly complex in nature and involve various physiological processes. There is clinical evidence that generation of reactive oxygen species (ROS) in dopaminergic neurons induces the apoptosis of mitochondria. Therefore, a kinetic model that describes apoptotic and non-apoptotic states of mitochondria and the regulation of the transition between those two states in neurodegenerative diseases is developed and its dynamic behaviour, in particular the role of ROS, is investigated in detail within the proposed project. The network developed is validated by experimental data so that it reflects accurately the behaviour of neurodegenerative diseases. The dynamic behaviour of the

network is analysed by rigorous mathematical tools among which are a sensitivity analysis, stability analysis in conjunction with identification of attractors and building a reduced model based on Intrinsic Low Dimensional Manifolds (ILDM). A sensitivity analysis identifies the most sensitive e.g. relevant reactions that determine the integral behaviour of the kinetic network, and therefore, requires accurate kinetic data. It results in an assessment of the quality of the data employed and highlights deficiencies in acquired data so far. In addition, attractors e.g. apoptosis and necrosis are determined. Of major importance are conditions that make the system embark on particular trajectories starting from a 'healthy' behaviour and leading to death. Understanding this behaviour allows identifying conditions that avoid undesired states and opens new paths to therapy or suggests novel promising experiments to deepen understanding. Finally, a reduced model based on ILDM is generated and its predictive accuracy is assessed. The reduced model will be included into the larger framework of networks to represent cell behaviour on a more complex level in on-going research.

Further information available at:

<https://www.fnr.lu/projects/analysis-of-the-impact-of-ros-in-networks-describing-neurodegenerative-diseases-2/>

Types:

Investments < €500k

Member States:

Luxembourg

Diseases:

N/A

Years:

2016

Database Categories:

N/A

Database Tags:

N/A