H.F.R.I.
Hellenic Foundation for Research & Innovation

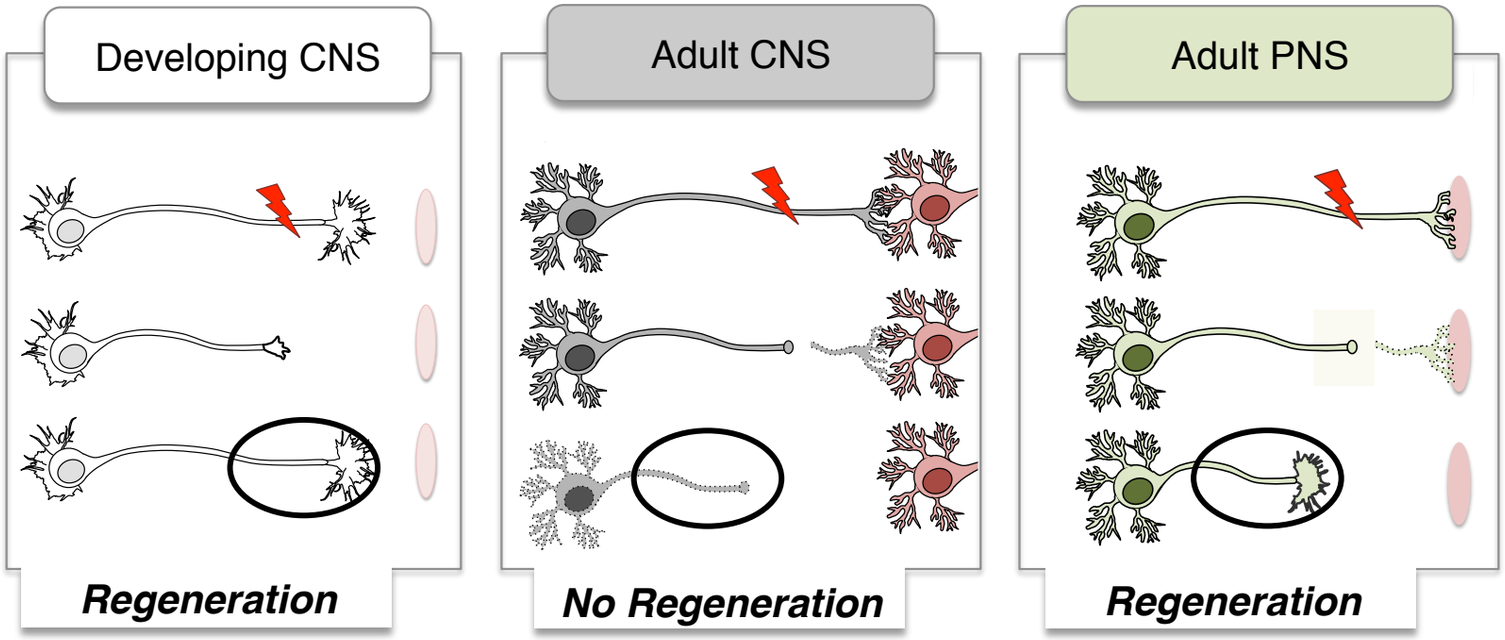
ΙΣΝ/SNF ΙΔΡΥΜΑ ΣΤΑΥΡΟΣ ΝΙΑΡΧΟΣ
STAVROS NIARCHOS FOUNDATION

Description of the funded project

2nd Call “Science & Society”

“Always strive for excellence – Theodoros Papazoglou”

Elucidating the intrinsic regenerative capacity of axons through a comparative study



Principal Investigator:

Marina Vidaki, PhD

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Reader-friendly title: Why can the peripheral nervous system recover after injury, while the central nervous system cannot?

Scientific Area: Life Sciences, Neurosciences

Institution and Country: IMBB, Greece

Host Institute: Institute of Molecular Biology & Biotechnology, Foundation for Research & Technology Hellas (IMBB-FORTH)

Budget: 250000 euro

Duration: 24 months

Research Project Synopsis

Trauma to the adult central nervous system (CNS) can cause substantial damage to axons, resulting in disrupted neuronal connectivity and permanent neurological and functional deficits, with a devastating socioeconomic impact. One key step towards re-establishing connectivity after injury is axon regeneration. Mounting evidence supports that axonal protein synthesis is a crucial, intrinsic process towards regeneration, and although adult peripheral nervous system (PNS) axons have a high capacity for local protein synthesis, associated to their regenerative potential, the respective capacity of CNS axons diminishes after development, contributing to their low ability to regenerate. However, the regulatory mechanisms of protein synthesis in adult axons and their role in regeneration after injury remain elusive. More importantly, what remains highly unexplored are the differences between the poorly regenerating CNS and highly regenerating PNS axons, in terms of their local translation abilities in the adult NS. The proposed research, aims to tackle those questions, through the study and comparison of the local molecular repertoire of developing and adult CNS and PNS axons, in order to identify similarities and more importantly differences that could explain the low intrinsic ability of adult CNS axons to synthesize proteins and regenerate. Overall, this project will provide new, critical insight into axon biology, and will uncover novel candidates of therapeutic potential for nerve injury and adult axon regeneration, therefore setting the ground for intriguing future studies and funding opportunities.

Expected results & Project Impact

The proposed study is highly innovative and will generate a high-resolution map of the local molecular repertoire of adult axons of the central (CNS) and peripheral (PNS) nervous system, and a detailed comparison of the two and of the respective developmental repertoires. This kind of information that is currently missing, can uncover key molecular players for regeneration and their potential differences and similarities between the CNS and PNS axons (expression levels, spatial distribution, etc). If we can identify molecules and molecular mechanisms that are absent from the adult CNS axons, or differentially expressed, compared to the respective PNS axons, we could better comprehend the basis of the diminished intrinsic ability of CNS axons to grow and regenerate. Therefore, we could uncover ways to promote and enhance adult CNS axon regeneration, affording novel therapeutic strategies for CNS repair after injury. We anticipate this work to be a milestone for many additional future studies with regards to regeneration in adult CNS axons, and set the ground for new fruitful collaborations and funding opportunities.

The importance of this funding

The particular grant is crucial for young Greek scientists, and generates optimism with respect to the future of research in Greece. It is a much needed appreciation of excellence, but most importantly it allows young scientists to build a research team and complete a research project that could advance their career and the development of the scientific community. So far, this kind of support has been impossible or very rare in Greece, and Greek scientists struggle to compete unevenly with their international colleagues. Therefore, the action “Science & Society” : “Always strive for excellence – Theodoros Papazoglou” and the respective grants are extremely valuable for the Greek scientific community. It will significantly contribute to the development of research in Greece, as well as to the dissemination of science and research, and thus to the development of our society as a whole.

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