Description of Funded Research Projects
1st Call for H.F.R.I. Research Projects
to support Post-Doctoral Researchers

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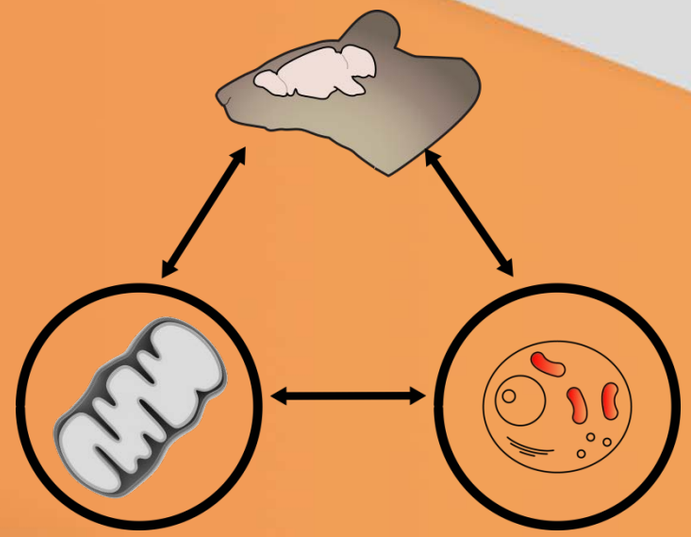
Research Project Title:

The bioenergetic dimension of stress: focus on mitochondria (ENERGEIA)

Principal Investigator:

Michaela Filiou



Popular Title:

Understanding how mitochondria affect stress

Scientific Field:

Life Sciences

Host Institution:

Max Planck Institute of Psychiatry, Germany,
University of Ioannina, Greece

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Chronic stress and stress-related pathologies pose a great challenge for modern societies, affecting our life quality, the health system, the pharmaceutical industry and how mental illness is perceived by the public. The molecular mechanisms underlying stress responses remain to date poorly understood. Consequently, currently used treatments for stress-related pathologies target mainly the symptoms rather than the molecular causes, have severe side-effects and show low remission rates.

The ENERGEIA project investigates how mitochondrial functions regulate stress responses and whether mitochondria can be used as pharmacological targets to treat stress-related pathologies. Besides ATP production and oxidative stress regulation, mitochondria mediate a plethora of energy-dependent functions in the brain, including synaptic neurotransmission, neuronal plasticity and apoptosis. Dysfunctions of these processes under stress conditions may causally disrupt brain circuits and lead to pathological states.

We have previously shown that mitochondrial pathways are implicated in high anxiety and that pharmacological manipulation of mitochondria in vivo exerts anxiolytic effects. This has been the first time that a mitochondria-driven pharmacological approach attenuated a psychiatric phenotype. Here, we extend this innovative concept to chronic stress and stress-related pathologies. We hypothesize that mitochondria regulate stress responses and can be pharmacologically targeted to exert therapeutic effects. We investigate how mitochondria mediate stress by analyzing mitochondrial changes in two different stress mouse models. We pharmacologically manipulate the identified mitochondrial changes in vivo to assess whether selective mitochondrial targeting alleviates stress effects. To pave the way for translational applications, we assess selected mitochondrial changes in human cohorts with pertinent pathologies. Through a series of dissemination actions, we also raise awareness for brain research and psychiatric disorders.

#BrainGain #strongergreece

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Project Impact on Society

The ENERGEIA project will illuminate the understudied role of mitochondria as mediators of the stress response and facilitate novel therapeutic avenues for psychiatric disorders. Understanding the molecular mechanisms of stress and stress responses will allow the discovery of molecular candidate biomarkers, lead to the identification of novel pharmacological targets and eventually change the way we diagnose and treat stress-driven psychiatric disorders.

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To me, H.F.R.I. funding would mean...

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H.F.R.I funding allowed me to establish my research team upon returning to Greece after 13 years abroad and to drastically increase our chances to receive additional competitive funding to pursue our scientific goals. Through H.F.R.I funding, our team has the opportunity to work on a timely research question, to collaborate with researchers in Europe and study in depth a topic with major societal and scientific impact: the molecular mechanisms of stress and neuropsychiatric disorders.

The Principal Investigator,
Michaela Filiou

Funding

Amount: **180,000 €**

Duration: **36 months**

Foundation: **H.F.R.I.**

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