Letter of intent

File number: 175.2021.007

Grant: 2021/2022

Applicant

Title: Semi-naturalistic housing facilities and wireless neurotechnologies for translational rodent research (NeuNatRod)

Abstract

NWO-domain: ENW

Discipline code: 21.90.00

Laboratory animals provide us an incredibly important source of knowledge about human and animal health. Across the globe, animal research is generally conducted in traditional animal facilities that offer animals a very artificial and deprived, but standardized and well controlled, living environment for brain and behavioural studies. A primary limitation of these facilities is that these conditions are far distant from those in the wild and lack ecological validity. Evidence exists that this can lead to abnormal behaviour, and consequently the development and recruitment of irrelevant brain circuitries. This jeopardizes the translatability and applicability of results. As animal-free innovations are not foreseen for brain and behavioural research, we urgently need improvements in the way this research is being conducted. With the maturation of technologies to track the behaviour of individual animals, and measure physiology and brain function in a wireless mode, it now becomes possible to conduct controlled and integrated brain-behaviour research under more ecologically valid conditions. This provides us the necessary knowledge to address the increasing psychopathologies in society as well as a better understanding of the relationship between ecology, brain and behaviour in response to rapidly changing ecosystems. Accordingly, we aim to set-up cutting-edge infrastructure, allowing semi-naturalistic indoor (Nijmegen) and outdoor (Groningen) housing and testing of rodents, accommodating multiple disciplines, including behavioural (neuro)science, physiology, pharmacology, ecology and animal welfare. This infrastructure involves modular multi-room sensor-controlled habitats, mimicking wild-life conditions, amongst others by providing colony housing conditions to facilitate their complex social life. Through identification chip-driven behaviour and sound tracking, AI and machine learning, telemetry, wireless neurotechnologies, and new software synchronizing signals, it becomes possible to conduct detailed undisturbed measurements and manipulation of brain, behaviour, and physiology of individual animals in a semi-naturalistic social setting. To foster open science, we create a data storage and curation system according to the FAIR principle. This new infrastructure will be made accessible for a wide array of researchers, thereby facilitating collaborations leading to major breakthroughs across the aforementioned research fields. Additionally, this approach will significantly improve animal welfare and contribute to the societal acceptance of animal research. The semi-natural infrastructure would place the Netherlands in a leading position towards a change in the way animal research is being conducted. Matching by the universities of Nijmegen en Groningen for their respective facilities has been affirmed. Total funding required amounts to 4-4.5 million, of which 25% will be provided by both universities.

The consortium members are:
Radboudumc: Judith Homberg (main applicant), Benno Roozendaal, Werner Koopman, Leo Joosten
Radboud University: Lucas Noldus, Richard van Wezel, Francesco Battaglia, Bernhard Englitz, Lisa Genzel, Marcel van Gerven

Groningen University: Ton Groothuis, Martien Kas, Jocelien Olivier, Gertjan van Dijk, Peter Meerlo, Roelof Hut
Utrecht University: Rebecca Nordquist, Jan Langermans, Esther Langen, Heidi Lesscher
Maastricht University: Jos Prickaerts
Wageningen University: Jaap Keijer
Eindhoven University of Technology: Huib Visser
Dutch Mammal Society: Maurice La Haye
FAIR GO: Barend Mons

This application links to the GWI Roadmap XL-EFES

Organisation responsible for the application
Confirm letter of intent
With submitting this form via ISAAC I declare to have filled in this form completely and truthfully.

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