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The NO-Age and NO-AD Seminar Series 025

'Molecular insights into cardiometabolic health from a long-lived mammal the naked mole-rat'

by

Dr. Jane Reznick
CECAD Excellent in Aging Research, University of Cologne, Germany

at

14:00-15:00 (CET), Monday, 20 Sep., 2021

Register in advance for this webinar:
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Organizers:
Evandro F. Fang (UiO), Jon Storm-Mathisen (UiO), Menno P. Witter (NTNU)
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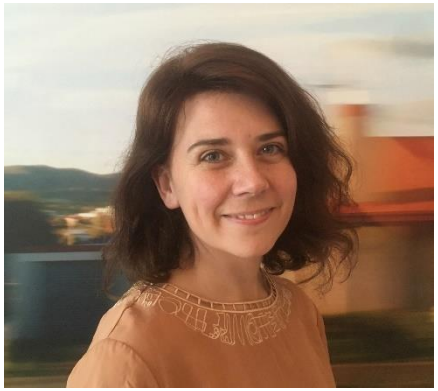

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Image: ERC/CECAD

Naked mole-rat from the Reznick lab
Image: Jane Reznick

Speaker: Dr. Jane Reznick

Title: Molecular insights into cardiometabolic health from a long-lived mammal the naked mole-rat

Abstract:
The naked mole–rat has recently emerged as a rodent model of interest to biomedicine due to its extraordinarily long and healthy lifespan (>36 years). Naked mole-rats tolerate hours of extreme hypoxia and survive 18 minutes of total oxygen deprivation (anoxia) without apparent injury. During anoxia, the naked mole-rat switches to anaerobic metabolism fueled by fructose and sucrose. Global expression of fructose specific transporter GLUT5 and ketohexokinase (KHK) were identified in the naked mole-rat suggesting a rewired transcriptome to enable fructose metabolism across the entire organism. We have combined transcriptomics and in vivo stable isotope resolved metabolomics analyses and showed that under hypoxia the naked mole-rat activates the polyol pathway to synthesise fructose in the heart whilst enhancing fructolysis in heart and brain. Unexpectedly, when supplied with fructose mouse brain also showed a preference for fructose under hypoxic conditions. Our findings reveal a new role for fructose metabolism under hypoxic contexts and suggest that fructose dependent metabolism could be protective under hypoxic conditions. Our analysis identified further unique features in the naked mole-rat heart at the transcriptomic and metabolomic level which serve as adaptive mechanisms to combat hypoxia and promote longevity thus providing novel insights into the biology of low oxygen tolerance and a long healthspan.

Biography:
Jane Reznick completed her PhD in 2011 at the Garvan Institute in Sydney Australia studying the impact of circadian rhythms in energy metabolism. She then moved to Berlin to do a post-doc at the Max Delbrück Centre for Molecular Medicine in the group of Prof. Gary Lewin where she first came across the naked mole-rat. Jane researched various molecular adaptations in this extraordinary animal model with a particular focus on metabolic adaptations under extreme hypoxic conditions. She also travels to Africa to conduct research on other African mole-rat species closely related to the naked mole-rat. With a background in metabolic diseases, during her post-doc Jane also discovered a novel protein involved in whole-body glucose homeostasis and is now developing a drug against this novel target for the treatment of Metabolic Syndrome and diabetes. In July 2020 Jane started her own group at CECAD in Cologne where she continues to research metabolic adaptations in the naked mole-rats with a particular focus on cardiometabolic disease.