

Title: The NAD⁺-mitophagy axis in ageing, delirium, and Alzheimer's disease

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Key papers: two if possible

<https://pubmed.ncbi.nlm.nih.gov/30742114/>

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Biography

Evandro F. Fang is an Associate Professor of Molecular Gerontology at the University of Oslo (UiO) and the Akershus University Hospital, Norway, and his group are working on the molecular mechanisms of human ageing and age-predisposed neurodegeneration (<https://evandrofanglab.com/>). More specifically, the Fang laboratory is focusing on the molecular mechanisms behind how cells clear their damaged and aged mitochondria, a process termed “mitophagy”, as well as the roles of the NAD⁺-mitophagy/autophagy axis in healthy ageing and AD inhibition. NAD⁺ is a fundamental molecule in life and health and decreases in ageing and AD. Dr Fang is fascinated with and actively engaged in moving his laboratory findings to translational applications and is involved in 5 NAD⁺-based clinical trials, with the overarching goal of establishing novel and safe biological approaches to promote longer and healthier human lives.

He has published over 100 papers in international peer-reviewed journals including papers in *Cell*, *Cell Metabolism*, *Nature Reviews MCB*, *Nature Neuroscience*, *Nature Ageing*, and *Nature Biomedical Engineering*. He routinely reviews grants for more than 30 leading foundations, including European Research Council (ERC, EU), Medical Research Council (MRC, UK), and AFAR (USA). He has been associate Editor-in-Chief (Deputy Editor) of 4 leading ageing journals, including *Ageing Research Reviews*, *Mechanisms of Ageing and Development*, *npj Ageing*, and *Journal of Gerontology: Biological Section*. He has received several awards including the Butler-Williams Scholar on Aging 2016 by NIA (USA), the 'Scientific Award to Young Scientist in the Natural Sciences for 2020 by The Royal Norwegian Society of Sciences and Letters (Norway), and the 2023 Norwegian National Dementia research award of the National Association for Public Health presented by H.M. Kong Harald V.

After finishing his PhD at the Chinese University of Hong Kong, he had a 6-year postdoc training with Prof. Vilhelm Bohr on molecular gerontology and Prof. Mark Mattson on neuronal resilience in Alzheimer's disease at the National Institute on Ageing, Baltimore. He opened his lab in Oslo in the fall of 2017. He is the founding (co)coordinator of the Norwegian Centre on Healthy Ageing network (**NO-Age**, www.noage100.com), the Norwegian National anti-Alzheimer's disease Network (**NO-AD**, www.noad100.com), and the Hong Kong-Nordic Research Network.

Abstract

Increased lifespan enables people to live longer, but not necessarily healthier lives^{1, 2}. Ageing is arguably the highest risk factor for numerous human diseases, including Alzheimer's disease (AD); thus understanding the molecular mechanisms of human aging holds the promise of developing interventional and therapeutic strategies for many diseases simultaneously, promoting healthy longevity. Accumulation of damaged mitochondria is a hallmark of aging and age-related AD. However, the molecular mechanisms of impaired mitochondrial homeostasis and their relationship to AD are still elusive. Mitochondrial autophagy (mitophagy) is the cellular self-clearing process that removes damaged and superfluous mitochondria, and therefore plays a fundamental role in maintaining neuronal homeostasis and survival^{1, 3-8}. NAD⁺ is a fundamental molecule in life and health, and is reduced during ageing and in AD; we first reported that NAD⁺ is a mitophagy inducer⁴, and evidenced that impaired NAD⁺-mitophagy axis contributes to AD⁵. In close collaboration with Prof. Leiv Otto Watne, we also investigate roles of the NAD⁺-mitophagy axis in delirium and its linkages to AD. The Evandro Fang lab is now involved in several clinical trials looking into the use of NAD⁺ precursors to treat AD and premature ageing diseases, among others⁹.

Key References

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