High resolution/sensitivity solid-state NMR: a new approach towards in-situ structural biology

https://neurodegenerationresearch.eu/survey/title-of-pihigh-resolutionsensitivity-solid-state-nmr-a-new-approach-towards-in-situ-structural-biology/

Title of project or programme

Title of PI	High resolution/sensitivity solid-state NMR: a new approach towards in-situ structural biology

Principal Investigators of project/programme grant

Title	Forname	Surname	Institution	Country
Prof.	Marc	Baldus	Utrecht University Medical Center	Netherlands

Address of institution of lead PI

Institution	Utrecht University Medical Center
Street Address	Padualaan 8
City	Utrecht
Postcode	3584 CH

Country

- Netherlands

Source of funding information

Netherlands Organisation for Health Research and Development (ZonMw)

Total sum awarded (Euro)

4832000

Start date of award

15-11-2010

Total duration of award in months

60

The project/programme is most relevant to

- Alzheimer’s disease and other dementias

Keywords

Alzheimers and Parkinsons disease, Nuclear Magnetic Resonance (ssNMR) technology, complex functional networks and elementary biomolecular processes

Research abstract in English

All basic processes in life involve interactions of molecules within functional modules on different spatial and temporal scales. Their failure directly affects human health ranging from Alzheimers and Parkinsons disease to cancer and cardiovascular disorders. The essential functional building blocks of systems, i.e., atoms, molecules and their complexes thus far remained invisible because of insufficient sensitivity and resolution.
Now technological breakthroughs in solid-state Nuclear Magnetic Resonance (ssNMR) have taken place that establish high resolution conditions and can increase sensitivity by more than two orders of magnitude. We have performed test experiments that confirm that this hires-ssNMR technology for the first time offers the possibility to characterize complex functional networks and elementary biomolecular processes in situ and at atomic scale. This installation would allow for an entirely new range of ssNMR-based studies that can bridge the gap between 3D nanoscopy on cells or other complex biomolecules and traditional structural biology.
Our group has a strong background in NMR method development and gained significant expertise to apply such techniques at the forefront of structural biology and biophysics. This project aims to reinforce the leading status of the Netherlands in the field of biomolecular NMR and will create a new research area that merges structural and cell biology.
At present, Utrecht is home to strong research lines in structural biology, developmental and molecular cell biology as well as to excellent pharmacological and clinical science. We will establish Utrecht as an internationally unique place to study cellular processes and combat diseases related to them from the atomic scale to the clinical environment. Such research will also provide new clues to address other principal challenges of our society including the natural production of energy or the generation and removal of biomaterial.

Lay Summary
In which category does this research fall?

- Basic research