

Protein measurements in the cell

January 28 2014

A network of chemists at the University of Konstanz has developed an innovative method to study protein structures by means of magnetic labels. The ingenious thing about it is that the magnetic labels are directly incorporated inside the cell when the protein is naturally biosynthesized. The research results, that might have an impact on many areas of structural biology, have been published in the current issue of the renowned *Journal of the American Chemical Society*.

"Unnatural amino acids with special chemical or biophysical functions that are directly incorporated into proteins in the cell have been known for years. However, despite all efforts it has been impossible so far to develop a magnetic unnatural amino acid. Now we have achieved a real breakthrough," says the Konstanz-based chemist Dr. Daniel Summerer about the research project, which has been conducted in collaboration with the working group of the physical chemist Dr. Malte Drescher from Konstanz. "This has brought us a significant step closer to the final objective of measuring the structure and dynamics of proteins directly in the cell with high precision," Summerer explains.

Proteins that have been modified with the unnatural amino acids from Konstanz can be measured by means of electron paramagnetic resonance spectroscopy (EPR-spectroscopy). Interacting magnetic labels are introduced into strategically selected protein sites. "Measuring the strength of the magnetic interaction enables us to deduce the distance," explains Malte Drescher. "The structure of the protein can be determined by measuring several distances on the nanometer-scale."

In further steps, the scientists intend to implement their method, for which they have filed a patent, for the study of [protein](#) structures in cells: "Our vision is that we will use our method to investigate biologically relevant systems that play a role in e.g. the Parkinson's disease or in regulating the expression of disease-relevant genes", Malte Drescher provides an outlook for the continuation of the research works.

The research was carried out in close collaboration with the Konstanz Research School Chemical Biology. "I am particularly pleased that with this success the valuable work of our two doctoral students, Moritz Schmidt and Julia Borbas, is recognized," says Summerer. For Moritz Schmidt, who has begun his doctoral programme as a Hoechst scholarship holder of the Aventis Foundation less than two years ago, this study is already the second publication as lead author in a particularly prestigious chemical journal.

More information: M. J. Schmidt, J. Borbas, M. Drescher and D. Summerer. "A genetically encoded spin label for EPR distance measurements." *J. Am. Chem. Soc.*, 2014, [DOI: 10.1021/ja411535q](https://doi.org/10.1021/ja411535q).

Provided by University of Konstanz

Citation: Protein measurements in the cell (2014, January 28) retrieved 2 May 2024 from <https://phys.org/news/2014-01-protein-cell.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
