

Combination of imaging methods improves diagnostics

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Scientists from the Helmholtz Zentrum München and the Technische Universität München have succeeded in a breakthrough for the further development of contrast agents and consequently improved diagnostics with imaging using MRI procedures. The results have been published in the *Angewandte Chemie International Edition* journal.

Magnetic Resonance Imaging (MRI) offers a high-resolution procedure for the <u>diagnostic imaging</u> of patients. Often this procedure additionally uses contrast agents that clarify certain tissue structures and pathological processes. However the image signal that is generated in the MRI does not correlate with the actual quantitative concentration of contrast agent in the tissue.

Imaging mass spectrometry registers distribution of contrast agent in tissue

The team headed by Prof. Dr. Axel Walch and Dr. Michaela Aichler from the Helmholtz Zentrum München developed an approach in order to make it possible specifically to measure contrast agent concentrations. Using imaging mass spectrometry (MALDI-MS imaging), they succeeded in acquiring quantitative data on the gadolinium-based contrast agents in the tissue and also in establishing a corresponding correlation with the MRI image.

MALDI-MS imaging is a form of molecular imaging in tissues at a



microscopic level. Using the mass signals, it can detect and localize a wide range of molecules, such as proteins, lipids and components of cell metabolism, as well as substances and their metabolites in tissue sections. The procedure is already being used at the Helmholtz Zentrum München and in industry for research into active substances. The current work has now made MRI contrast agents available as a new class of molecules for this method.

Combination improves the diagnostic value

"By precisely and quantitatively registering the histological distribution of <u>contrast agents</u>, we can make a crucial contribution to the further development and improvement of these substances," Walch reports. Working with scientists headed by Dr. Moritz Wildgruber from the Technische Universität München's Klinikum rechts der Isar, the researchers could successfully test their approach: They were able to determine the tissue-related kinetics of the contrast agent used in a myocardial infarction model. The data show how the contrast agent acts in healthy and damaged heart tissue. The new method consequently contributes to improving the use of imaging in the diagnostic process.

More information: Aichler, M. et al. (2015), "Spatially Resolved Quantification of Gd (III)-based Magnetic Resonance Agents in Tissue by MALDI Imaging Mass Spectrometry after in vivo MRI," *Angewandte Chemie* - International Edition, published as 'Hot Paper', <u>DOI:</u> 10.1002/ange.201410555

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