

Multiple Sclerosis: new MRI contrast medium enables early diagnosis in animal model

Promising therapies can be initiated at an early stage; team of scientists from Heidelberg and Würzburg publishes in the journal Brain

In an animal model of multiple sclerosis (MS), neuroradiologists and neurologists of the University hospitals of Heidelberg and Würzburg have been able to visualize inflammatory tissue damage, most of which had remained unrecognized up to now, with the aid of a new contrast medium, Gadofluorine M, in magnetic resonance imaging. The scientists have published their results in the online edition of the renowned medical journal *Brain*.

In particular at the early stage of the disease, drug treatment is effective. Up to now, however, an early diagnosis is frequently not established with certainty, especially if no (or very few) inflammatory lesions are present on MRI. "With this new contrast medium, we were able to visualize five to ten times more foci of inflammation in comparison to conventional MRI images and contrast media", reports Professor Dr. Martin Bendszus, Medical Director of the Department of Neuroradiology at the University hospital of Heidelberg.

Previously unrecognized patches of demyelination visible in MRI

MS is a chronic inflammatory disease of the central nervous system of unknown cause. It usually begins in young adults, and women are affected more frequently. In Germany, approximately 120,000 patients are afflicted. MS is characterized by multiple inflammatory lesions in which nerve fibers lose their myelin sheath. These patches of demyelination cause neurological malfunctions that may regress upon remyelination. At later stages, MS may result in a loss of nerve fibers, leading to irreversible damage and persistent neurological symptoms. MRI plays a crucial role in the early diagnosis of MS and monitoring of the disease.

The scientists from Heidelberg and Würzburg examined brains and spinal cords of animals at different stages of the disease with the new contrast medium and found significantly more inflammatory lesions than with conventional contrast media. Examinations of tissue sections

from these lesions showed that these were actually foci of inflammation. The application of this new contrast medium was clearly superior to conventional contrast media, especially for the spinal cord or optical nerve, nerve regions that are particularly difficult to examine on MRI.

New contrast medium accumulates better in MS lesions

The results of the study could help dramatically improve the diagnostic work-up in MS with a potential impact on early treatment. "MS is the most frequent cause of occupational disability and handicap in young adults", explains Professor Bendszus. "New therapies have a positive influence on the course of the disease, but are often not initiated at early stages since the diagnosis of MS is not yet established. "

The new contrast medium gadofluorine M supposedly visualizes MS lesions better because it binds especially well to certain components of the extracellular matrix of inflammatory foci. Because of this, it accumulates in these lesions in higher concentrations.

Now, the next objective of the interdisciplinary working group is to further develop the new MRI contrast medium for application in clinical practice. As of now, the contrast medium is not yet approved. Additional preclinical tests are necessary for the planned clinical application.