

Publication

An Overhauser-enhanced-MRI platform for dynamic free radical imaging in vivo.

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Author(s) Waddington, David E J; Sarraçanie, Mathieu; Salameh, Najat; Herisson, Fanny; Ayata, Cenk; Rosen, Matthew S

Author(s) at UniBasel [Salameh, Najat](#) ;

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Overhauser-enhanced MRI (OMRI) is an electron-proton double-resonance imaging technique of interest for its ability to non-invasively measure the concentration and distribution of free radicals. In vivo OMRI experiments are typically undertaken at ultra-low magnetic field (ULF), as both RF power absorption and penetration issues-a consequence of the high resonance frequencies of electron spins-are mitigated. However, working at ULF causes a drastic reduction in MRI sensitivity. Here, we report on the design, construction and performance of an OMRI platform optimized for high NMR sensitivity and low RF power absorbance, exploring challenges unique to probe design in the ULF regime. We use this platform to demonstrate dynamic imaging of TEMPOL in a rat model. The work presented here demonstrates improved speed and sensitivity of in vivo OMRI, extending the scope of OMRI to the study of dynamic processes such as metabolism.

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