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NMR and MRI spin trapping: using NMR to learn about free radical reactions
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The paper supports the idea that NMR spectroscopy and imaging can enhance the classical EPR spin trapping techniques. NMR was used to follow and identify the diamagnetic products of DEPMPO/R• spin adduct breakdown. Oxyradical adducts of DEPMPO led to recycling of the spin trap, however, without sufficient long-term accumulation that would enhance EPR detection in vivo. Fluorinated derivative of the same spin trap, FDMPO, although not specific for •OH or •O2-, was giving much more stable EPR signal. High sensitivity of H-MRI, allowing to distinguish tissue boundaries very clearly, could be coupled with proton relaxation enhancing capabilities of paramagnetic spin traps to better visualize free radicals in vivo. This approach can be exemplified by the image of NO generation in the liver of a living rat. In general, NMR-, MRI-, and EPR spin trapping appear excellent complementary methods to follow localization of short-living radicals in vivo, under variable physiological conditions causing biodestruction of trapped radicals.