

## DETECTION OF ENZYMATIC ACTIVITIES IN VITRO, EX VIVO, AND IN VIVO USING EPR AND OVERHAUSER-ENHANCED MRI

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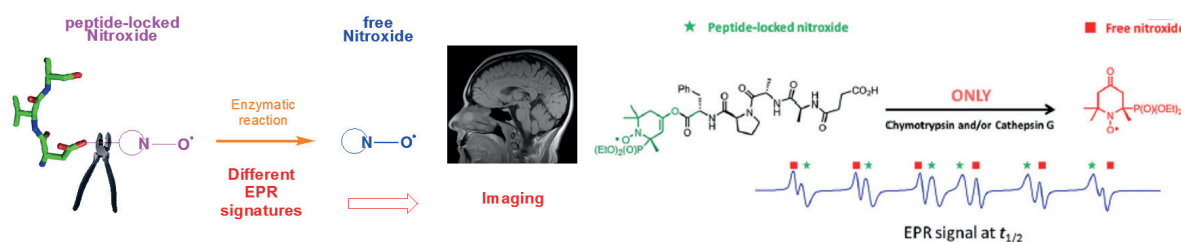
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There are a few techniques for *in vitro* investigation of enzymatic activity at the molecular level and none, *in vivo*, able to provide informations on molecular enzymatic activity with accurate localization or imaging. To tackle this challenge, Overhauser-enhanced Magnetic Resonance Imaging (OMRI) relying on shift-doubling nitroxides as polarizing agents is developed. To achieve our goal, a nitroxide exhibiting phosphorus hyperfine coupling constants sensitive  $a_p$  and specific of enzymatic activity was designed. The selectivity and activity of enzymes is controlled using a specific peptide attached to the nitroxide via an enolester function. The sensitivity of achieved by the keto-enol equilibrium observed after hydrolysis of the enolester function carrying the specific peptide.<sup>1-3</sup>



Using a 0.2 T MRI machine, *in vitro* and *in vivo* OMRI experiments were successfully performed **affording *in vitro* a 1200% enhanced MRI signal and a 600% enhanced signal *in vivo*.**<sup>3</sup>

### References:

- 1: Dutttagupta, N. Jugniot, G. Audran, J.-M. Franconi, S.R. A. Marque, P. Massot, P. Mellet, E. Parzy, E. Thiaudière, N. Vanthuyne Chem. Eur. J. 2018 ASAP I. Dutttagupta, N. Jugniot, 2: G. Audran, J.-M. Franconi, S.R. A. Marque, P. Massot, P. Mellet, E. Parzy, E. Thiaudière, N. Vanthuyne In preparation Audran G., Bosco L., Brémond P., Franconi J.-M., Koonjoo N., 3: Marque S.R.A., Massot P., Mellet P., Parzy E., Thiaudière E. Angew. Chem. Int. Ed., 2015, 54, 45, 13379-13384

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