

Stable Nitroxide Free Radicals, Oxidative Stress, and Functional Imaging

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Stable nitroxide free radicals have long been used as spin labels for biophysical/chemical studies. However, over the past few years nitroxides have emerged as important and versatile biological reagents with respect to oxidative stress. Oxidative stress is implicated in the pathogenesis of a variety of human diseases, as well as evoking fundamental genetic responses at the cellular level. Likewise, applied oxidative stress is the basis for several cancer treatment modalities. Nitroxides have been shown to be potent antioxidants possessing superoxide dismutase- and catalase-mimic activity and are capable of protecting cells and animals against a variety of oxidative stress insults. In addition to their protective properties, nitroxides coupled with electron paramagnetic resonance imaging instrumentation can serve as in vivo functional imaging probes that non-invasively report on the oxygen status and redox properties of tissue. The presentation will focus on the biological and potential clinical applications of nitroxides.