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Catching Free Radicals: New Tricks with Old Traps.

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This paper describes some new and novel applications of spin trapping to biological problems. As a timely subject the use of NMR/MRI methods are updated. The enzyme, NAD(P)H:quinone oxidoreductase 1 or (NQO1) catalyzes the re-duction of quinone substrates, generating stable hydroquinones. The studies outlined here were designed to determine if NQO1 can scavenge superoxide, taking on an additional function of a superoxide reductase. The second part of this review describes the technique of NMR spin trapping with nitron spin traps that contain a stable isotope enabling the detection of diamagnetic products as a result of bioreduction or disproportionation reactions. Examples are shown for carbon- and oxygen based radicals with ^{31}P or ^{19}F containing nitrones. The real power of this method was demonstrated with $\text{SO}_3^{\cdot -}$ detection using nitron spin traps that showed that the radical adduct occurred as a result of non-radical addition reactions followed by oxidation, rather than the scavenging of the reactive radical species.