Current Topics in Biophysics (Zagadnienia Biofizyki Współczesnej) vol. 20 (1), 1996, 41-45

In vivo **ESR measurement of free radical reactions in living animals**

Hideo Utsumi, Keizo Takeshita, Kazuhiro Ichikawa, Ken-Ichiro Matsumoto

The *in vivo* free radical reactions were estimated in living mice with an *in vivo* ESR spectrometer using nitroxyl radicals as probes. One of the following nitroxyl radicals, 2,2,3,3-tetramethylpiperidine-1-oxyl (TEMPO), 2,2,5,5- tetramethylpyrrolidine-1-oxyl (PYROXYL), 4,4-dimethyloxazolidine-1-oxyl (OXANO), and their derivatives, was dissolved in isotonic buffer and was intravenously, intramuscularly, transtracheally or intraperitoneally injected to female ddY mice. The ESR signal of nitroxyl radical in living mice was gradually decreased by reducing to the corresponding hydroxylamine, and the reduction rate depended on physiological and pathological conditions. Pre-treatment of antioxidants reduced the enhancement of signal decay by oxidative stress. The present paper demonstrates that *in vivo* ESR technique using nitroxyl radical as a probe is very useful to estimate *in vivo* free radical reactions and to evaluate their relation to physiological and pathological phenomena.