Current Topics in Biophysics, 2007, 30 (suppl. B) 49

NEW PARAMAGNETIC PROBES AND SINGLET OXYGEN FORMATION IN CELLS

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Singlet oxygen molecules O_2 cause free radicals reaction and toxic effects in living organisms. Singlet oxygen is responsible for lipid peroxidation and destroys cell membranes. Singlet oxygen molecules are diamagnetic and it is impossible to detect them directly by the use of EPR spectroscopy. However diamagnetic O_2 concentration may be measured indirectly by EPR method. In this work we described new type of paramagnetic probes for oximetry and their behavior in selected types of cells. We compared EPR spectra of carbonized coals and TEMPO probe in biological systems differing in level of singlet oxygen. Carbonized coals reveal stable paramagnetism. Nitroxyl radicals are responsible for paramagnetism of TEMPO. We tested paramagnetic probes during laser irradiation of different cells. We tested irradiation during different times. Paramagnetic probes are characterized by EPR spectra sensitive to the concentration of paramagnetic oxygen molecules concentrations in the environment. Laser irradiation of cells excites oxygen O_2 molecules to the diamagnetic singlet state. Formation of singlet oxygen is accompanied by a decrease of triplet oxygen concentration in the culture studied. The oximetric probes proposed by us are very sensitive to oxygen in the sample environment. Amplitudes of their EPR lines increase after triplet-singlet oxygen excitation. We proved the usefulness of these probes to determine concentrations of singlet oxygen in tumor and the others pathological cells. In the present work we compile physical and chemical properties of coal and TEMPO probes. We compare lineshape and parameters of their EPR spectra in biological samples at different conditions.