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## Nitroxide-modified chitosans with enhanced antioxidant potential

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Chitosan is a biocompatible glucosamine polymer with properties suitable for a great variety of biomedical applications. Water-soluble at neutral pH chitosan-(poly)nitroxides (CPNs), differing in molecular weight of the saccharide backbone (Mw ~1 and ~10 kDa) and the nature of nitroxide radical (pyrroline and piperidine), were obtained and characterized. Fractions of modified glucosamines were in the range 0.15–0.28. The dependence of delay time of 2,2-azobis-2-methylpropanimidamide dihydrochloride (AAPH)-induced erythrocyte hemolysis on the concentration of CPNs and data of electron paramagnetic resonance (EPR) spectra indicate their binding to the cell membrane. Because of this binding, CPNs demonstrate identical delay times of hemolysis at concentrations ~100 times lower than structurally similar low molecular nitroxides. The proposed mechanism includes multiple breaking of oxidation chain through nitroxide oxidation to oxoammonium cations and reduction of the latter by common biological reductants. Due to easier oxidation of piperidine nitroxide by radicals RO<sub>2</sub> to oxoammonium cations, CPNs with attached 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO) more effectively inhibit hemolysis than their counterparts with 2,2,5,5-tetramethylpyrroline-1-oxyl. Work is in progress in designing of amphiphilic CPNs and CPNs with negatively charged groups (heparinomimetics), as well as nanostructures based on them. The effect of new materials on the viability of normal and tumor cells under oxidative stress will be investigated, as well as their use for drug delivery and cardiovascular applications.

### Biography

Vasily Sen has completed his PhD from Institute of Organic Chemistry of Russian Academy of Sciences (RAS). He is a Head of the Laboratory of Stable Radicals in Institute of Problems of Chemical Physics of RAS. He has published more than 60 papers in reputed journals and is an author in several patents.

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