# Antioxidative Activity of New *N*-Oxides of Tertiary Amines: Membrane Model and Chromogen Studies

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Potential antioxidative activities of three series of newly synthesized *N*-oxides were studied. Individual components in each of the series differed in the lipophilicities and number of free radical scavenging groups. Various methods were used to determine their antioxidative efficiencies: Prevention of erythrocyte membrane lipid oxidation induced by UV irradiation and chromogen experiments in which antioxidative efficiencies of compounds were compared to that of the standard antioxidant Trolox (a water-soluble vitamin E analogue). Additionally, some hemolytic (pig erythrocytes) and differential scanning calorimetry (DSC) measurements were performed to determine a mechanism of the interaction between membranes and *N*-oxides.

It was found that *N*-oxides, especially those of long alkyl chains (> $C_{12}H_{25}$), readily interacted with both, erythrocyte and liposomal membranes. No marked differences were found in their protection of erythrocytes against oxidation. In most cases inhibition of oxidation changed between 15% and 25%. Still, it was far better than in chromogen experiments where suppression of free radicals reached 20% in the best case. It may be concluded that antioxidative capabilities of *N*-oxides are moderate.

Studies on the interaction mechanism showed that incorporation of particular compounds into model membranes varied. Hemolysing activities of compounds increased with the elongation of the alkyl chain but differed for corresponding compounds of particular series indicating that lipophilicity of compounds is not the only factor determing their interaction with erythrocyte membranes.

DSC experiments showed that *N*-oxides, upon incorporation into 1,2-dipalmitoyl-3-sn-phosphatidylcholine liposomes, shifted the subtransition (Tp) and the main transition (Tm). The shifts observed depended on the alkyl chain length. The effects differed for each series. It seems that in the case of long alkyl chain compounds the domain formation may take place. Generally, the decrease of Tm was greatest for the same compounds that exhibited the best hemolytic efficacy. The same conclusion concerns the decrease of cooperativity of the main transition and the observed changes suggest an increase in membrane fluidity. Both, erythrocyte and DSC experiments seem to indicate that compounds of particular series incorporate in a somewhat different way into membranes.

*Key words*: *N*-Oxides, Antioxidative Activity