Detection of the Production of Reactive Oxygen Species by Neutrophils in Whole Blood: Modulation by Adamantanes and Triggering by Fe^{3+}-ions

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Using indicators for the production of reactive oxygen species (ROS) such as the a) OH-radical type (α-keto-γ-methiolbutyric acid, KMB) or b) hypochlorous acid (1-amino-cyclopropyl-1-carboxylic acid, ACC) neutrophil activities can be both quantified and differentiated in whole blood *via* ethene production. Ethene is trapped in the head space of blood samples incubated in the presence of zymosan and the respective indicators, KMB or ACC. This procedure allows the detection of effects of aminoadamantanes (AAD) such as amantadine or memantine, compounds frequently used for the treatment of *Morbus Parkinson* and *Morbus Alzheimer*. In this report we describe the detection of $OH^{\cdot}$-type oxidants produced by isolated activated neutrophils and whole blood. Immunomodulatory activities of AAD are deduced from the following observations: AAD-stimulated ethene formation from (KMB) as an indicator for production of $OH^{\cdot}$-type reactive oxygen species by zymosan-stimulated neutrophils ("respiratory burst") is detectable with isolated neutrophils. In whole blood, however, this reaction is only measurable in the presence of Fe-EDTA-complex. Stimulating effects of AAD are observed within a concentration range between 10^{-8} and 10^{-4} M with a maximum at 1 μM. Ethene release from (ACC) as indicator for the myeloperoxidase reaction after degranulation is not stimulated by AAD but inhibited at concentrations higher than 100 μM. The presented results suggest that submicromolar concentrations of AAD only stimulate the respiratory burst and apparently not degranulation of zymosan-prestimulated polymorphonuclear neutrophils (PMN).