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Investigation of the effects of Zinc, Copper, Vitamin C and Vitamin E on myeloperoxidase activity from human leucocyte

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Background and Aims: Myeloperoxidase (MPO, 1.11.1.7) is a heam-containing enzyme with peroxidase activity abundantly expressed in neutrophils and to a lesser extent in monocytes. During polymorphonuclear neutrophils activation, MPO is released into phagocytic vacuoles and then into the extracellular spaces. MPO catalyses the conversion of H2O2 and Cl- to hypochlorous acid (HOCl), which is a potent oxidizing agent, and can modify a wide variety of biomolecules. Recent studies have shown that MPO is profoundly involved in initiation and propagation of acute and chronic vascular inflammatory disease. So, regulation of enzyme activity by various kinds of compounds may help to prevent some conditions involved in the producing of such disease. In the present study the effects of Zinc, copper, vitamin C and vitamin E on the catalytic activity of MPO were investigated.
Methods: MPO was isolated from human white blood cells by ion exchange and gel-filtration chromatography. MPO activity was measured spectrophotometrically using tetramethyl benzidine (TMB) as a chromogen substrate at 655nm. The purity of the enzyme was expressed as the ratio of absorbance at 430nm to absorbance at 280nm. Kinetic studies were done by measuring the MPO activity in either the absence or the presence of the investigated compounds.
Results: The Purity index of MPO was 0.61 and its specific activity was 21.74 U/mg protein. Oxidation of TMB in the presence of MPO system was linear for 3minutes. Enzyme activity was inhibited in the presence of Zinc, copper and vitamin C, whereas, vitamin E was unable to inhibit the enzyme activity in the physiological concentrations of the vitamin E.
Conclusions: Our results showed that the mode of inhibition of the enzyme activity in the presence of Zinc, copper or vitamin C was noncompetitive, whereas vitamin E was unable to inhibit the enzyme activity.

Keywords: Zinc; Copper; Vitamin C; Vitamin E; Myeloperoxidase