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CHEMILUMINESCENCE IN ACTIVATED PERITONEAL PHAGOCYTES: ROLE OF ANTIOXIDANTS

W.M. Tom, Department of Pharmacology, Faculty of Medicine, The University of Hong Kong, Hong Kong.

Phagocytes generate reactive oxyradicals which can be both beneficial and destructive to the host. These highly reactive molecules contribute considerably to various immune and non-immune inflammatory conditions. The chemiluminescence of luminol and lucigenin is used to detect the production of reactive oxygen derivatives by phagocytic cells. Scavengers e.g. superoxide dismutase and catalase, and inhibitors, e.g. azide, are usually used to determine the relative importance of the reactive molecules. Rat peritoneal exudate cells consisting mainly of macrophages were isolated at 18 hr following i.p. administration of thioglycollate medium. Phagocytes (1×10^6 per ml) activated by the chemotatic peptide N-formyl-L-methionyl-L-leucyl-L-phenylalanine (fMLP; 10 μM) produced a weak spontaneous chemiluminescence that could be amplified by addition of luminol (10 μM). Light emission reached maximum within 1 min and subsided to $<20\%$ of peak values in 2 min. When opsonised zymosan (0.5 mg/ml) was used to stimulate the phagocytic activity, the rate of production of luminol chemiluminescence was much slower. Peak chemiluminescence was reached in about 25 to 30 min. Similar pattern of cellular response was observed when lucigenin (0.1 mM) was used as the amplifier, but the maximum chemiluminescence was comparatively weaker. Hydroxyl radical scavengers, thiourea and dimethylthiourea suppressed cellular chemiluminescence (IC_{50} 80 mM) induced by both soluble (fMLP) and particulate (zymosan) stimuli. Dithiocarbamates, diethyldithiocarbamate and pyrrolidine dithiocarbamate, displayed strong inhibitory actions at lower concentrations (IC_{50} 50 μM). This suggests the importance of trace elements in the catalysis of free radical generation in phagocytic respiratory burst.