The Respiratory Burst and Its Physiological Significance

The Respiratory Burst and Its Physiological Significance

Edited by

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Preface

When phagocytes are exposed to a number of different stimuli, they undergo dramatic changes in the way they process oxygen. Oxygen uptake increases markedly, frequently more than 50-fold; the phagocytes begin to produce large quantities of superoxide and hydrogen peroxide; and they immediately begin to metabolize large amounts of glucose by way of the hexose monophosphate shunt. This series of changes has become known as the respiratory burst. It was first believed that the major function of this respiratory burst was to generate powerful antibacterial agents by the partial reduction of oxygen. It is becoming apparent that the respiratory burst has much wider application, and its physiological function in many different biological areas is clear. In this volume, we have attempted to bring together the work of experts who have published extensively on the involvement of the respiratory burst in different physiological functions.

In the first three chapters, Dr. Borregaard and Dr. Berton and co-workers and Dr. Roos and co-workers bring together what is known about the respiratory burst. They present up-to-date versions of the biochemical and metabolic activities associated with the burst. In Chapter 4, Dr. Styrud and Dr. Klempner discuss the respiratory burst as it affects cellular ion homeostasis. Dr. Cohen and Dr. Britigan (Chapter 5) present some interesting data on the competition between the respiratory burst and bacteria for oxygen. Dr. Dobrina and Dr. Patriarca (Chapter 6) describe the involvement of the respiratory burst in the damaging of endothelial cells. Dr. Zabucchi, Dr. Menegazzi, and Dr. Patriarca (Chapter 7) discuss the respiratory burst and the eosinophils, evaluating comparisons between the eosinophils and the neutrophil.

Dr. Sagone (Chapter 8) discusses the possible effects of the reactive oxygen species resulting from the respiratory burst on the functional capacity of lymphocytes. Dr. Somerfield and Dr. Skamene (Chapter 9) present data concerning the modulation of the respiratory burst by naturally occurring substances. In Chapter 10, Dr. O'Brien discusses the oxidants formed by the respiratory burst and their physiological involvement in the oxidative metabolism and activation of drugs,

carcinogens, and xenobiotics. Drug-induced agranulocytosis and other effects mediated by peroxidases during the respiratory burst are discussed by Dr. Uetrecht in Chapter 11. Dr. Sagone (Chapter 12) discusses the capacity of granulocytes to metabolize xenobiotics and further discusses the possible clinical implication of this. Dr. Gordon and Dr. Weitzman (Chapter 13) review evidence implicating oxygen-derived free radicals in carcinogenesis.

Dr. Warren, Dr. Ward, and Dr. Johnson discuss in Chapter 14 how phagocytes generate oxygen-derived radicals and how they are important mediators of tissue damage. Dr. Zgliczyński and Dr. Stelmaszyńska (Chapter 15) discuss the influence of the respiratory burst on infected tissue.

In Chapter 16, Dr. Schopf presents data involving the respiratory burst of phagocytes in the inflammatory reaction in psoriasis. The special role of reactive oxygen species in diabetes mellitus is discussed by Dr. Nagy, Dr. Fülöp, Dr. Paragh, and Dr. Fóris in Chapter 17. Dr. Turner and Dr. Shapiro (Chapter 18) discuss the involvement of the respiratory burst in fertilization. The respiratory burst and the development of generalized atherosclerosis, a subject that is beginning to receive serious consideration, is presented by Dr. Paragh, Dr. Kovács, Dr. Nagy, Dr. Fóris, and Dr. Fülöp in Chapter 19. Aging and reactive oxygen species associated with the respiratory burst are discussed by Dr. Fülöp, Dr. Fóris, Dr. Nagy, and Dr. Leövey in Chapter 20. Dr. Cetrulo and colleagues (Chapter 21) present evidence that implicates the respiratory burst in the onset of human labor, preterm labor, and premature rupture of the membranes. In Chapter 22, Dr. Najjar discusses the biochemical and biological aspects of tuftsin, a powerful chemoattractant that can enhance the respiratory burst of neutrophils in the presence of other soluble or particulate stimuli. We are most grateful to all of the contributors for their contributions.

Anthony J. Sbarra
Robert R. Strauss

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