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SYSTEMS BIOLOGY OF OXIDATIVE STRESS IN VASCULAR TISSUE

ABSTRACT: Oxidative stress causes cell damage and is associated with the initiation and progression of many cardiovascular and neurovascular diseases. The cellular oxidative stress system is composed of interconnected components including enzymes, metabolites, free radicals, redox couples, and transcription factors. The interactions between and among these components are regulated in time and space. These components are observed to disturb in oxidative stress leading to the cellular dysfunctions. Although many aspects of these components have exhibited

therapeutic potential in various diseases, clinical trial results have been disappointing. I will review our research on the molecular mechanisms and relationships between these interconnected components in the endothelial cell dysfunction, which is observed in vascular diseases. The mechanisms and effectiveness of antioxidant defense systems in oxidative stress are discussed. Systems biology approaches may provide an effective tool to the characterization of the cellular oxidative stress and to provide insights into mechanisms of diseases and therapeutic opportunities.



Through the generous support of the Wallace H. Coulter Foundation, the Department of Biomedical Engineering facilitates weekly lectures each year during academic terms. Experts in all areas of Biomedical Engineering are invited to provide a research seminar and to meet with faculty and students to discuss the latest developments and research in Biomedical Engineering.

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