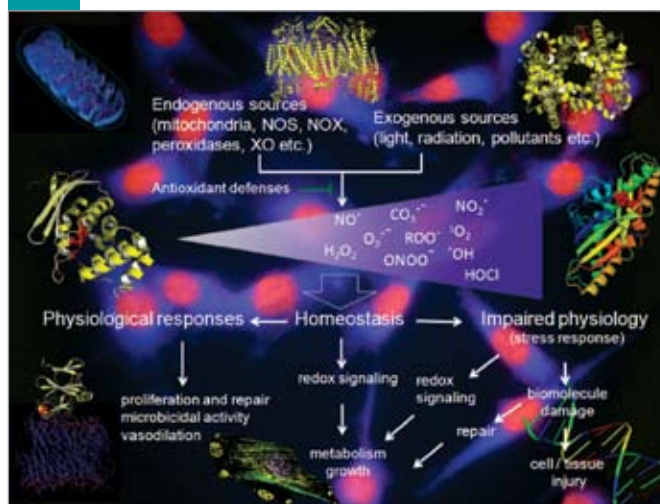


The Redox Processes in Biomedicine RIDC (Redoxome) is a multidisciplinary network of investigators focused on a concerted approach to investigating redox processes. These processes involve electron transfer reactions via free radicals or non-radical intermediates, and have a unique potential to elucidate biochemical pathways underlying cell and organ (patho) physiology, as well as to disclose disease mechanisms and therapeutic targets. This enormous potential has not yet been fulfilled, mainly because of insufficient basic mechanistic knowledge. The Redoxome Center will address issues relevant to overcoming such limitations to allow the design of effective antioxidant strategies and biomarkers of oxidative stress. Specifically, we will investigate: 1) reactive oxygen species (ROS) generation and control in biological systems; 2) chemical reactivity of ROS in biological environments and consequent changes in the structure and function of biomolecules; 3) mechanisms and networks involved in redox signaling processes relevant to human disease; 4) diagnostic and therapeutic applications of redox processes. Such investigations comprise a coherent set of interconnected studies expected to bridge meaningful conceptual gaps in the field and to allow technological and educational advances.

The pervasiveness of redox processes in the environment opens many possibilities for technological applications. Several public and private industrial sectors will benefit from new technologies developed by the Redoxome Center, varying from those in which Brazil has already acquired international leadership (personal care, fragrances, cosmetics, bioenergy) to those in which industries are emerging but are still not competitive in the national and international markets (pharmaceutical, medical devices, diagnostics, ecological services). The main goal is to innovate in these industrial sectors. In addition, the aim is to implement a core laboratory (Redoxoma Analysis Platform – RAP) at USP to provide state-of-the-art



Schematic and simplified overview of the multiple roles of radicals and oxidants as mediators of physiological and pathophysiological circuits

analytical tools for the evaluation of redox processes, which will be open for use by clinical and basic researchers. Redox state markers should favor early detection of risk factors for a number of diseases, allowing the design of adequate interventions and maximizing the chances of correcting these conditions.

In terms of education and knowledge diffusion, the Redoxome center will target students from all levels (primary education, high school, undergraduates, graduate), teachers and the general public. The actions are structured around four main axes: 1) courses: development of courses for graduate and undergraduate students, and for teachers continuing their professional development; 2) didactic resources: development of curriculum materials to complement science classes and experimental activities at a website; 3) scientific diffusion: a permanent exhibition at a science museum and the development of a website; and 4) educational projects: scientific research initiation at high school level supervised by teachers. In addition, the entire context of this plan and the actions derived from it will be used as research material for academic research in Science Education.

Host Institution

University of São Paulo (USP, campus São Paulo)

Associated Institutions

São Paulo State University (UNESP)
Federal University of São Paulo (UNIFESP)
Butantan Institute (IBu)
Centre National de la Recherche Scientifique (CNRS), France
University of the Republic, Uruguai
University of Milwaukee, United States
University of Madrid, Spain
Emory University
Liverpool John Moores University, United Kingdom
Koç University, Turkey
Boston University, United States
University of Rochester, United States
Harvard University, United States
Aarhus University, Denmark
National Institute on Aging (NIA), United States
Atomic Energy and Alternative Energies Commission (CEA), France
Heart Institute, University of São Paulo (INCOR-USP)
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