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Editorial

Oxidative stress remains a central focus in biomedical and physiological research, with profound implications for both human and animal health. This Special Issue, Therapeutic Frontiers and Physiological Impacts of Oxidative Stress Across Biological Systems, presents a curated collection of articles that reflect the diversity and complexity of redox biology—ranging from molecular signalling mechanisms to translational therapeutic approaches.

The included studies highlight the multifaceted roles of oxidative stress in developmental, metabolic, infectious, and degenerative conditions. Several contributions explore emerging links between gut microbiota and redox homeostasis, shedding light on how microbial communities influence oxidative responses to environmental factors. Others focus on the interplay between oxidative stress, antioxidant defense systems, and male fertility, offering mechanistic insights and potential therapeutic avenues.

Additional topics addressed in this issue include redox regulation in chronic and age-related diseases; mitochondrial dysfunction and energy metabolism; the role of reactive oxygen species (ROS) in tissue damage and repair; comparative physiology of oxidative stress across species; veterinary perspectives on animal health; and methodological advances in assessing oxidative balance.

Collectively, these contributions provide a comprehensive and interdisciplinary perspective on oxidative stress, bridging molecular biology, physiology, toxicology, and clinical science. By connecting foundational insights with applied therapeutic strategies, this Special Issue aims to foster a deeper understanding of redox processes and their relevance across biological systems.

We extend our sincere thanks to the authors and reviewers for their invaluable contributions and are pleased to present this issue as a platform for continued scientific dialogue and discovery in the field of redox biology.

Prof. Dr. Natalia Kurhaluk,
Prof. Dr. Halina Tkaczenko
Guest Editors