

## ***Special Issue: Amino Acid and Protein Modifications by Oxygen and Nitrogen Species***

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### ***Editorial***

*To my daughter Chiara*

The reaction of reactive oxygen and nitrogen species with target proteins, either resulting in stress or physiological responses, remains one of the most intriguing aspects in protein science and is a concept of interest for all of the scientific community as it has an exquisite interdisciplinary nature and broad influence in virtually all fields of biology and medicine. In fact, searching on PUBMED with the key word “protein oxidation” sorts out more than 1700 results only in the stretch of time January–September, 2003.

This special issue entitled “Amino acid and protein modifications by oxygen and nitrogen species” is the upshot of an Editorial initiative planned on the occasion of the 7<sup>th</sup> International Congress on Amino Acids and Proteins held in Vienna, on 2001, and reaching completion right before the last Congress of Rome (September, 2003).

In approaching this initiative, I did not hesitate to invite Prof. Earl Stadtman to participate as a Guest Editor. He is surely a reference scientist in protein oxidation studies and his pioneering work has contributed to and is still providing key contributions to this research.

In this issue, we have collected comprehensive review papers that provide a state-of-the-art view of this subject. This set of papers is aimed at satisfying not only the purpose of making an extensive examination of the most recent literature, but it has been designed to critically evaluate our understanding on methodologies, most importantly biomarkers, and the overall biological and pathophysiological meanings of one of the most intricate aspects in biology.

The completion of the human genome project and the full understanding of the importance of proteomics investigations do not overcome, but rather magnify, the relevance to investigations on post-translational modifications

of proteins. In this context, the roles played by the reactive species of two of the most important gases in nature, O<sub>2</sub> and NO, have been demonstrated to be extremely important and possibly to represent a converging mechanism for several biochemical processes regulating cell function and viability, intra- and inter-cellular signalling, and tissue differentiation and development. In some instances, these changes in protein structures may represent the underlying mechanisms for degenerative processes and disease states that develop during aging, such as vascular damage and neurodegenerative events.

The three sections in this issue cover all of these aspects. The first section describes mechanisms of reaction and techniques used to investigate oxygen-dependent modification of amino acids and proteins, the second section focuses on NO-dependent modifications, and the third section describes different implications on both oxidative and nitrosative challenges to proteins in biological aspects relevant to medicine.

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