

## **Introduction: Amine oxidases and polyamines in biological systems**

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In the present four reviews, the Authors attempt to give the essence of their lectures and posters, including subjects of discussion, that were presented at the International Meeting on Amino Acids and Proteins held in Italy, September 5–9, 2003. The reviews deal with research carried out up to mid-2003 and contain literature references, figures and reaction schemes.

The 8<sup>th</sup> International Congress on Amino Acids and Proteins, organized by Dr. S. Beninati and Prof. E. Agostinelli, was held in Italy at the University of Rome “La Sapienza”, in September 2003. The bull of the Pope Bonifacio VIII established “La Sapienza”, the largest University in Europe, on April 20, 1303. Thus, in 2003, “La Sapienza” celebrated its 700<sup>th</sup> anniversary.

The pioneer and honorary President of the 2003 meeting was Prof. Gert Lubec (Wien). Following the tradition of previous successful Congresses held every two years in several European Union countries since 1989, lectures and poster exhibitions focused on the most topical aspects in the area of amino acid and protein research. Particular attention was paid to recent developments in macromolecular structure, gene sequencing, enzyme physiology and metabolism, cell division and survival mechanisms.

More than 400 scientists, from all around the world, attended to the meeting that included 16 different sessions, which were all related to amino acids and proteins. In this edition of the Congress, new sessions were introduced about amine oxidases, transglutaminases, glutathione and glutathione-S-transferases in toxicology and proteomics.

Mammalian cells contain significant amounts of the polyamines spermine, spermidine and putrescine, which play different roles in various tissues. If they accumulate excessively within the cells, either due to uptake from very high extracellular amount or to deregulation of the systems, which control polyamine homeostasis, they can induce toxic effects.

The first paper by Agostinelli et al. (2004) reports that although the physiological function of these amines is still not well clarified at the molecular level, several studies have demonstrated that their intracellular concentration, which is particularly elevated in tumours, is highly regu-

lated and that normal cellular growth, multiplication and differentiation require polyamines. These polycations are substrates of the amine oxidases, enzymes that catalyse the oxidative deamination of these molecules, regulating their cellular levels. The enzymatic oxidation products of polyamines are implicated in programmed cell death and can cause apoptosis in several cell types, suggesting novel hints for developing new therapeutic agents.

In the article by Pignatti et al. (2004) the role of polyamines in signalling pathways related to apoptotic cell death and the molecular targets proposed for these polycations at the level of the apoptotic cascade is discussed. Secure evidence suggests that polyamines are also involved in the mitochondrial and post-mitochondrial phases of apoptosis by modulating cytochrome *c* release from mitochondria and activation of caspases.

The issue is further discussed by Ruggeri et al. (2004), describing the polyamine biosynthesis and oxidation processes in free-living amoebae. In all the amoeba strains a polyamine oxidase activity has been detected, which acts on N<sup>8</sup>-acetylspermidine. This enzyme is responsible of 1,3-diaminopropane synthesis whose function is not well known.

Polyamines also represent substrates for transglutaminases, enzymes which catalyze protein cross-linking by the formation of isopeptide bridges, between peptide-bound glutamines and lysines. Findings reported in one of the articles by Caccamo et al. (2004), agree with the postulated role for transglutaminases in molecular and cellular responses to neuronal damage in several neuropathological conditions.

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