
10th Indo-Italian Workshop on Chemistry and Biology of Antioxidants

Organized by

Department of Physiology and
Pharmacology
“Vittorio Erspamer”

and

Department of Biochemical Sciences
“Alessandro Rossi Fanelli”



SAPIENZA
UNIVERSITÀ DI ROMA

Institute for
Biomolecular
Chemistry of
CNR



9-13 November 2011

Venue

*Department of Biochemical Sciences
Sapienza University
P.le Aldo Moro 5, Rome*

	<p><u>C. Musicco, V. Pesce, L. Nicassio, F. Fracasso and M.N. Gadaleta.</u> IS ACETYL-L-CARNITINE ABLE TO REDUCE OXIDATIVE STRESS IN THE LIVER OF AGING RAT BY FAVOURING MITOCHONDRIAL BIOGENESIS?</p>	<p><u>Ilaria Tirota, Maurizio Barontini, Giuliana Righi, Paolo Bovicelli.</u> REGIOSELECTIVE AZIDOLYSIS OF VINYL THREE MEMBERED HETEROCYCLIC RINGS: STUDY OF THE REACTION AND UPGRADE TO GREENER CONDITION</p>
	<p>12 November, 2011</p> <p><i>Room A, Department of Biochemical Sciences, Sapienza University of Rome</i></p>	<p>12 November, 2011</p> <p><i>Room B, Department of Biochemical Sciences, Sapienza University of Rome</i></p>
9:00-11:00	<p>SESSION 7A Chairpersons: Anna Giovanetti and Stefano Rufini</p>	<p>SESSION 7B Chairpersons: Paolo Bovicelli and Jens Pedersen</p>
	<p><u>Darinka Gjorgieva, Tatjana Kadifkova Panovska, Tatjana Ruskovska</u> TOTAL ANTIOXIDANTS LEVEL AND DNA DAMAGE IN PLANT MODEL SYSTEM SUBJECTED TO HEAVY METALS PHYTOTOXICITY</p> <p><u>Danka Obreshkova, Dobrina Tsvetkova, Nikolai Danchev</u> ANTIOXIDANT ACTIVITY OF GALANTHAMINE DERIVATIVES</p> <p><u>Tapas Kumar Mandal.</u> STUDIES ON CHLORPYRIFOS, AN ESTROGENIC ORGANOPHOSPHATE PESTICIDE, ON TESTICULAR OXIDATIVE STRESS AND THE ROLE ANTIOXIDANT DEFENSE SYSTEMS ON ADULT MALE ALBINO RATS</p>	<p><u>Sibel Suzen.</u> NOVEL INDOLE-BASED MELATONIN ANALOGUES AS FREE RADICAL SCAVENGERS</p> <p><u>Anna Marchiani, Stefano Mammi, Giuliano Siligardi, Isabella Tessari, Luigi Bubacco, Giovanna Delogu, Davide Fabbri, Maria A. Dettori, Daniele Sanna, Sonia Dedola, Pier A. Serra, Paolo Ruzza</u> NATURAL-LIKE HYDROXYLATED BIPHENYLS AND THEIR POTENTIAL ROLE AS ANTIOXIDANTS AND LIGANDS IN PARKINSON'S DISEASE</p> <p><u>D. Tofani, V. Balducci, T. Gasperi, A. Gambacorta, R. Bernini, F. Crisante, M. Barontini</u> HYDROXYTYROSOL ANALOGUES AND THEIR FATTY ACID ESTERS. SYNTHESIS AND STRUCTURE/ANTIOXIDANT ACTIVITY RELATIONSHIPS</p>

TOTAL ANTIOXIDANTS LEVEL AND DNA DAMAGE IN PLANT MODEL SYSTEM SUBJECTED TO HEAVY METALS PHYTOTOXICITY

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Metals comprise one of the major groups of genotoxic environmental pollutants possessing serious threat to human as well as environmental wellbeing. One possible mechanism, in which elevated concentrations of heavy metals may damage plant tissues, is the stimulation of free radical production and interactions with enzymes by imposing oxidative stress. Tolerance to heavy-metal stress has been correlated with efficient antioxidative defense system. Heavy metals also induce several cellular stress responses and damage to different cellular components such as membranes, proteins and DNA.

Common bean (*Phaseolus vulgaris* L., *Fabaceae*) was chosen as the object of this study because it is a widespread crop plant and is frequently used as a model plant in ecotoxicological studies. The objective was to investigate if short-term exposure of bean seedlings to different metals can induce significant changes in metal content in the plant, endogenous total antioxidants level and direct DNA damage.

To evaluate the capacity of the tolerance mechanisms of plants to metal contamination in the environment, bean seedlings were exposed to two different concentrations (150 and 350 mg L⁻¹) of selected heavy metals (Cu, Mn, Pb, Ni, Cd and Zn). Element analysis (by ICP-AES), and FRAP (Ferric-Reducing Antioxidant Power) assay were performed. Also, RAPD (Random Amplified Polymorphic DNA) analysis was used in order to evaluate the variation at the DNA level.

The obtained results showed that the treatment of bean seedlings with selected metals resulted with an increase of the contents of Cu, Mn, Pb, Ni, Cd and Zn and changes in the total antioxidant capacity, evident from the decreasing of total antioxidants (in $\mu\text{mol FeSO}_4 \text{ L}^{-1}$) in samples exposed to metals. RAPD profiles generated by treated samples were different from those obtained using control DNA. Events observed following the metal exposure were variations in the disappearance of bands and/or appearance of new bands in "DNA fingerprints".

We hope that the results of our research may provide a new insight into understanding metal phytotoxicity and use of plant bio-assays as sensitive tool for detecting genotoxicity.