



# ANNUAL MEETING **SFRR-E 2021** Belgrade, Serbia, 15-18 June

Redox Biology in the 21<sup>st</sup> Century:  
A New Scientific Discipline

## MEETING ABSTRACTS

PRESENTED VIRTUALLY

ORGANIZED BY

Society for Free Radical Research Europe (SFRR-E)

SPONSORED BY



Republic of Serbia  
Ministry of Education, Science  
and Technological Development

## LOCAL ORGANIZER

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Serbian Society for Mitochondrial and Free Radical Physiology  
Bato Korac, Aleksandra Jankovic, Andjelika Kalezic

Dear Colleagues,

"Those who were fortunate to wake up this morning in Belgrade may believe that they have accomplished enough in their lives. To insist on more than this would be merely immodest" (*Serbian poet and writer Dusko Radovic*).

**With these words, we would like to warmly welcome you to the virtual SFRR-E 2021 annual meeting "Redox Biology in the 21st Century: A New Scientific Discipline" from June 15-18, 2021, presented from Belgrade, Serbia.**

Belgrade (Serbian: Beograd, meaning "white city") is the capital of Serbia and one of the oldest cities in Europe. It lies at the confluence of the Sava and Danube rivers, the position that defined Belgrade as the Door to Europe, the meeting point between East and West, North and South. In its 7000-year-old history, our city was demolished more than forty times, each time reborn and resurrected, like the Phoenix. Today, Belgrade unites diversity, creating a unique spirit of time. In the words of another Serbian writer, Momo Kapor: "Belgrade is not even in Belgrade, because Belgrade, in fact, is not a city; it is a metaphor, a way of life, a perspective on things".

There are a number of reasons one can say that the 21st century has given birth to a new scientific discipline – Redox Biology. And Redox Biology is also, like any other aspect of science and life, a perspective on things, with the cooperation of opposites in its basis. With a goal. Harmonized in health, out-of-balance in illness. Studying Redox biology: oxidants, antioxidants, redox active molecules and redox regulation is a multilayered endeavor to comprehend the complexity and uniqueness of this regulation. Understanding this complexity will allow for a greater understanding of biology and, life.

This Conference is an attempt to get to know more deeply the core of Redox Biology, the core of life.

**With these warm thoughts, we are waiting to virtually meet you in June 2021.**

On behalf of the Organizing Committee,



Bato Korac



Belgrade Fortress



Church of Saint Sava



Nikola Tesla Museum

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**Mechanisms of detoxification of high manganese concentrations by the microalga *Chlorella sorokiniana***

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Many neutrophilic and acidophilic microalgal species tolerate high metal concentrations and can survive or colonize metal-polluted waters. They show significant biotechnological potential for the remediation and wastewaters processing. On the other hand, negative effects of metal pollution on microalgae may affect the function of aquatic ecosystems because these photosynthetic microorganisms represent the primary producers of O<sub>2</sub> and biomass. However, adaptive mechanisms that microalgae employ to detoxify metal excess are largely unknown. Herein we analyzed the response of the freshwater microalga *Chlorella sorokiniana* to high but non-toxic levels of Mn<sup>2+</sup>. Manganese is a key metal pollutant, with five possible oxidation forms that can bind to a variety of different ligands. At pH below 7, it is predominantly present in Mn<sup>2+</sup> form. Scanning electron microscopy showed that in response to 1 mM Mn<sup>2+</sup>, *C. sorokiniana* released mucilage polymers within 1 h. Electron paramagnetic resonance spectroscopy (EPR) showed that the early response involved loose Mn<sup>2+</sup> binding to mucilage and/or the cell wall. The amount of loosely bound Mn<sup>2+</sup> was significantly decreased after 24 h, whereas biomass showed significant accumulation of Mn, O and P, as determined by energy dispersive X-ray spectrometry, indicating the production of polyphosphates, which may sequester Mn. Further, it was found that the exposure to Mn<sup>2+</sup> resulted in rapid and transient decrease of total free glutathione concentration; the drop was observed after 1 h, and the concentration returned to initial values after 24 h. EPR measurements showed a similar trend in the level of reduced thiols. The observed changes can be explained either by the synthesis of phytochelatins – sulfur-rich short-chain peptides that sequester metals, or by glutathionylation of proteins. Reduced thiols could not be detected in the extracellular space, indicating that *C. sorokiniana* did not release thiols in response to high Mn. These results demonstrate that the adaptive response of *C. sorokiniana* to high Mn levels involves multiple components and time phases. The early phase involves mucilage release, phytochelatins and/or protection of protein thiols, whereas the successive phase involves Mn coordination by polyphosphates and other mechanisms that remain to be resolved.

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