

SFRR-E Summer School 2016:

FEBS Advanced Lecture Course on Redox Regulation of Metabolic Processes

Spetses, Greece, Sep 19-Sep 25, 2016

The SFRR-Europe Summer School 2016 (Sep 19-Sep 25) was held in Spetses, Greece, as a “FEBS Advanced Lecture Course on Redox Regulation of Metabolic Processes”, organized by Niki Chondrogianni (Athens, Greece) and Lars-Oliver Klotz (Jena, Germany). The course provided young scientists with an overview on recent developments in the field of redox biology, including the recent changes in understanding of the role of reactive oxygen species in metabolism. Topics covered in lectures, poster sessions, tutorials, and discussions included: principles of redox regulation; interaction of reactive species with metabolic processes and signalling cascades; novel methods, approaches and model systems as well as caveats in redox signalling research. The course was aimed at young scientists from different areas of natural and health sciences, primarily post-doctoral level scientists within 5 years after completion of their Ph.D. as well as Ph.D. students in the end phase of their Ph.D. project. 56 students had ample opportunity to interact with 17 senior scientists in the field and to present and discuss their results poster sessions and oral presentations.

The FEBS Advanced Lecture Course was co-sponsored by the Society for Free Radical Research – Europe (SFRR-E) and co-organized by two COST actions, “*PROTEOSTASIS*” and “*EU-ROS*”.

The scientific programme focused on recent developments in the field of redox biology. Specifically, it dealt with the drastic changes in understanding of the role of reactive oxygen species (ROS) in metabolism that we have experienced in the last decade: while ROS such as hydrogen peroxide and superoxide were previously widely regarded as mere metabolic by-products with damaging properties, they have now been recognized as important mediators in cellular signalling cascades, as well as modulators of biochemical processes.

Following a welcome address and the opening lecture by Tilman Grune on “proteostasis in oxidative stress and aging” on Monday (Sep 19), each day started out with a presentation on one of the consortia and scientific societies in Europe that foster research in the field of this advanced lecture course (FEBS, SFRR-E and COST actions as well as one consortium planning a COST application). The program then had lectures, outlining the basics and most recent developments in different aspects of redox regulation of metabolism, followed by lunch, poster sessions and a different “meet the experts” session each day. In the afternoon, there were further lectures as well as student short presentations on their posters in the evenings.

Fernando Antunes started Tuesday with an overview on the signalling properties of hydrogen peroxide, a major mediator ROS, and mechanisms behind these. Later, Helen Griffiths introduced metabolic programming in an inflammation context. Rosa Barrio then gave a presentation on the biochemistry of SUMOylation and its biological implications. On Wednesday, Rafael Radi, Uruguay, one of the internationally most prominent and prolific current researchers in the field of oxidative/nitrosative stress and redox regulation, delivered a keynote lecture on the biological chemistry of peroxynitrite. He was present throughout the course for student discussions and poster sessions. Peroxynitrite biochemistry was taken up in the ensuing presentation by Silvina Bartesaghi, who focused on the regulatory aspects of

protein tyrosine nitration as elicited by peroxynitrite. Holger Steinbrenner presented an overview on selenium biochemistry, emphasizing the role of selenoproteins in redox regulation also of insulin signalling and Maria Monsalve focused on mitochondrial ROS and their role in liver steatosis, NAFLD, HCC. Thursday morning was devoted to methodological aspects of redox regulation: Antonio Miranda-Vizuete introduced *C. elegans* as a suitable in vivo model for research on redox regulatory processes, and Vsevolod Belousov then gave an overview on new developments in the field of redox-sensitive fluorescent proteins and their use and application in the analysis of redox regulation. In the afternoon, Andreas Daiber picked up the methods aspect and thoroughly discussed the usefulness of “classical” assays on ROS and oxidative stress in the analysis of processes in the cardiovascular system. Lars-Oliver Klotz gave a presentation on ROS, their formation and action in the context of xenobiotic metabolism. On Friday, the proteasome, its manipulation and effects this has on aging processes were the focus of the presentation by Niki Chondrogianni, which was followed by the seminar by Bertrand Friguet on how oxidative protein modifications relate to the aging proteome. Saturday saw presentations on redox regulation in ER stress and its relation to metabolic disease (Nesrin Kartal-Özer), on ROS as mediators of metabolic zonation in liver (Thomas Kietzmann) and on the analysis of redox transitions and their consequences in an intrinsically disordered protein (Veronique Receveur-Bréchet). The day ended with an extended poster session, closing remarks and a farewell dinner.

In summary, the scientific program covered several aspects of redox biochemistry and the regulation of metabolism by ROS, including (i) general principles of redox regulation, (ii) the relation between reactive species and metabolic processes and signalling cascades, (iii) novel methods and approaches in the analysis of redox signalling, (iv) proteostasis and protein oxidation. Topics were covered in lectures, short presentations and poster sessions.