



DIPARTIMENTO DI FARMACIA E BIOTECNOLOGIE

## Life & Chemical Sciences Seminars

# Effect of Coenzyme Q10 content on cellular energy status

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*Siete invitati a partecipare e a diffondere tra i collaboratori*

### **Abstract**

Mitochondria are both the cellular powerhouse and the major source of reactive oxygen species. These functions are performed by the mitochondrial electron transfer chain in which Coenzyme Q10 plays a key role. In addition, CoQ has also been found to have an antioxidant function. For these reasons, it can be argued that modifications of physiological CoQ levels may affect the cellular energy state and on oxidative stress level. Normally endogenous biosynthesis of CoQ is sufficient to the cellular requirements; however, its content can be decreased by defects in the enzymes of its biosynthetic pathway. Defective levels of CoQ10 are responsible for heterogeneous mitochondrial disorder leading to severe pathologies ranging from fatal multisystem disorders to isolated encephalopathy or nephropathy. We induced cellular CoQ deficiency by chemical inhibition of its biosynthesis using a false substrate (4-NB), while for CoQ10 supplementation we used a water-soluble formulation (QTer®). Our results demonstrate that intracellular CoQ10 content positively correlates with the mitochondrial functionality and resistance to oxidative stress. CoQ10 depletion decreases the respiration rate and ATP level in intact cells, affects the intracellular redox homeostasis, induces oxidative stress and alters membrane physical properties. CoQ10 supplementation can only partially recover the cellular impairment induced by CoQ depletion suggesting that modifications of CoQ levels induce metabolic dysregulations that are beyond the bioenergetics or antioxidant role of Coenzyme Q.

### **Biosketch**

Christian Bergamini graduated in Pharmaceutical Chemistry and Technology from the University of Bologna in 2002. In 2006 received his Ph.D in Biochemistry under the supervision of Professor. G. Lenaz. In 2006 he worked in the laboratory of Prof. Tomoko Ohnishi (UPENN University) as postdoctoral fellow, studying the redox state of sub-mitochondrial particles (SMP, ETPH) treated with different inhibitors by means of low temperature EPR techniques. From 2007 to 2014 he was a post-doctoral fellow at the University of Bologna under the supervision of Prof. Romana Fato. From January 2015, he is fixed term assistant professor at the Department of Pharmacy and Biotechnology of the University of Bologna. His main research interests concern the study of mitochondrial bioenergetics, in particular the electron transfer in Complex I, the mechanism of ROS production and the bioenergetics and antioxidant role of Coenzyme Q10 in mitochondria and cells.

*Commissione Ricerca e Attività Correlate*