

10th European Nephrology Conference

October 24-26, 2016 Rome, Italy



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Mitochondria in kidney pathologies (ischemic kidney, rhabdomyolysis, pyelonephritis)

Mitochondria play a key role in the pathogenesis of various diseases, including renal pathologies, especially those that occur with the participation of oxidative stress. Among these are kidney ischemia, rhabdomyolysis and pyelonephritis. Mitochondria are not only a cause but also a target of oxidative stress as a result of insufficient tissue supply of oxygen and nutrients, and a hyperinflammatory response associated with these pathologies. As a result, the mitochondria respond by enhanced generation of reactive oxygen species (ROS) (ROS-induced ROS release) and by activation of production of proinflammatory cytokines, whose redundancy is fatal. In the case of pyelonephritis, pathogenic factors are not only bacterial antigens that activate innate immune response through activation of toll-like receptors of leukocytes and epithelial cells, but also proinflammatory cytokines and ROS. The strategy of treatment for such pathologies is that primary targets of pharmacological action must be the mitochondrion with the final goal to retain normal mitochondrial structure and function as a mandatory requirement which can provide renal protection. In the case of ischemic renal damage, one of the most effective approaches to protect the organ is ischemic preconditioning. All protective signaling pathways converge on mitochondria, namely on GSK-3 β , which gives the possibility of targeted influence on the end effector of protective signaling. Pharmacological preconditioning is just an imitation of ischemic preconditioning. In most types of protective and destructive signaling pathways, the key role is played by ROS, the maintenance of which at the optimum level is a primary goal for normal functioning of renal tissue.

Biography

D B Zorov has completed his PhD in 1974 from Lomonosov Moscow State University and his Doctor of Science in 1988 from Moscow University. He is the Chief of the Department of Functional Biochemistry of Biopolymers and the Chief of the Laboratory of Mitochondrial Structure and Functions in A N Belozersky Institute at Moscow State University. He has published more than 150 papers in high rank journals and has been serving as an Editorial Board Member of *Heart*, *Lung and Circulation*. He is a Member of European Academy (Academia Europea).

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