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MitoPBN prevents reactive oxygen species-mediated mitochondria abnormalities and metabolic reprogram in diabetic mice

Dong-Yun Shi, Meiling Hu, Mengdan Xie, Kelei Dong, Gonghao Zhang and Jianmin Shang
Shanghai Medical College of Fudan University, China

Mitochondrial dysfunction and reactive oxygen species (ROS) have been implicated in the diabetes process; however the underlying mechanisms are still unclear. Our previous result has shown ROS-mediated glucose metabolic reprogram induces insulin resistance in type 2 diabetes. In this study, we used MitoPBN, a mitochondrial targeted free radical scavenger and we studied the role of mitochondrial-derived ROS in the occurrence of diabetes. By using STZ-induced type 2 diabetic mice, we found that the diabetic mice showed an increased oxidative stress level in parallel with the raised blood glucose and impaired glucose tolerance. Meanwhile, the mitochondria-related protein, such as SIRT3, mitochondria fusion protein MFN-1 and MFN-2 was dysregulated thus contributing to the impaired respiratory ability and declined adenylate energy charge. In concordance with the mitochondria dysfunction, the glucose metabolism was disordered. MitoPBN treatment: reduced NADH; NAD+ ratio activated the SIRT, PCG-1α and phospho-AMPK; enhanced respiratory ability and; increased adenylate energy charge in order to dysfunction the alleviated ROS induced-mitochondria. MitoPBN also increased glycolysis while decreased the gluconeogenesis, reversing the ROS induced-metabolic reprogram in diabetic mice. Our study suggests mitochondria-derived ROS play an important role in occurrence of diabetes. MitoPBN could be a potential drug to treat diabetes by improving mitochondrial bioenergetics ability and preventing ROS induced metabolic disorder.

Biography

Dong-Yun Shi has completed her PhD degree from Kings College, University of London. She is currently an Associate Professor and a Principal Investigator at Department of Biochemistry and Molecular Biology, Shanghai Medical College of Fudan University. Her current research interests focus on "the relationship of redox regulation and the metabolic diseases, including diabetes and cancer". She has published more than 20 papers in reputed journals and has been serving as committee member of *Chinese Free Radical Biology and Medicine*, Associate Deputy Director of Shanghai Free Radical Biology and Medicine Committee.

dyshi@fudan.edu.cn

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