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Mechanisms of Arsenic (III) toxicity on isolated rat liver mitochondria

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Background and Aims: Arsenic is well known as serious environmental toxicant pollutants and can be easily accumulated in nature and food chain. Aims: In this research, the mechanisms of arsenic (III) in freshly isolated rat mitochondria were investigated. We have already reported that liver is the storage site and important target organ in its toxicity.
Methods: Isolated rat liver mitochondria obtained by differential centrifugation were incubated with different concentrations of arsenic (10-100μM). In our study, different mitochondrial toxicity factors and mitochondrial sources of ROS formation were determined using specific substrates and inhibitors.
Results: Our results showed that different concentrations of arsenic (III) increased mitochondrial ROS formation, lipid peroxidation and induced mitochondrial membrane potential collapse, cytochrome c release and mitochondrial swelling. Addition of As (III) in to the pyruvate/malate-supported mitochondria, inhibited complex I which caused disruption of mitochondrial electron transfer chain and significantly decreased mitochondrial ATP content.
Conclusions: Finally, our results supported that arsenic liver toxicity is the result of metal disruptive affect at the respiratory complexes I and II which is the obvious cause of metal induced ROS formation, lipid peroxidation and ATP depletion.

Keywords: Arsenic; Mitochondria; Hepatotoxicity; ROS; Mitochondrial membrane potential (ΔΨ)