

The international debate on Investigating brain tissue damage following respiratory contact with carbon nanotubes in rat using isolated lung mitochondria

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Objective: The main aim of this study is to investigate the lung toxicity following the respiratory contact with Multi-Wall Carbon Nanotubes (MWCNTs) in male Wistar rats.

Method: Rats were exposed to 5 mg/m³ MWCNT aerosol in different size and purity for 5 hours/day, 5 days/week for 2 weeks in a whole-body exposure chamber. After two weeks exposure, the rats of all groups was necropsied the animals lungs were removed. Then we separated the left and right lungs and mitochondria of them were isolated and parameters of mitochondrial toxicity including mitochondrial succinate dehydrogenase (complex II) activity, generation of Reactive Oxygen Species (ROS), Mitochondrial Membrane Potential (MMP) collapse, mitochondrial swelling and cytochrome c release were

evaluated.

Result: Our results demonstrated that MWCNTs with different characteristics, in size and purity, significantly ($P < 0.05$) decreased mitochondrial succinate dehydrogenase activity and mitochondrial ROS production. Induced mitochondrial swelling, MMP collapse and cytochrome c release mitochondria and right lung had seen more damage.

Conclusion: We concluded that MWCNTs with different characteristics, in size and purity because damage in varying degrees on the mitochondrial respiratory chain and induce ROS mediated cytotoxicity by directly targeting mitochondria lung tissue. It seems that the right lung has been more damaged due to the larger size of the left lung.