SERUM AMINOTRANSFERASES AS BIOMARKERS OF CARBON NANO-TUBE INDUCED HEPATOTOXICITY IN MALE SWISS-WEBSTER MICE

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Abstract: Carbon nanotubes [CNT’s] are an example of a carbon-based nanomaterial, which has won enormous popularity and applications. Due to their unique chemical, physical, optical and magnetic properties, carbon nanotubes have found many uses in industrial products and in the field of nanotechnology, including nanomedicine. Recently, nanomaterials such as nanotubes, nanowires and fullerene derivatives have received enormous national attention in the creation of new types of analytical tools for biotechnology and the life sciences. Despite the wide application of nanomaterials, there is a serious lack of information concerning their impact on human health and the environment. Moreover, very little is yet known about the toxicity of carbon nanotubes. The main objective of this study was to conduct biochemical analyses to determine the effect of oxidized multiwalled carbon nanotube (MWCNT) on the activities of specific enzymes including alanine and aspartate aminotransferases, which may be useful as biomarkers of hepatotoxicity. Three groups of five male mice each weighing approximately 30 ± 2 g were injected intraperitoneally once a day for five days with doses of 0.25, 0.5, 0.75 mg/kg bodyweight of oxidized MWCNT. A control group was also made of 5 mice injected with distilled water without the chemical. Following anaesthetization, blood specimens were immediately collected using heparinized syringes, and enzyme identification and quantification were performed in serum samples by spectrophotometry. Oxidized MWCNT exposure induced dose-dependent increase in the activities of both alanine aminotransferases-glutamate pyruvate transaminase (GPT), and aspartate aminotransferases-glutamate oxaloacetate transaminase (GOT) in the serum of Swiss-Webster mice. However, the highest doses 0.5 and 0.75 mg/kg were found to show statistically significant effect only in elevating the activity of ALT/GPT and not AST/GOT when compared with the control. These results suggest that carbon nanotubes indeed can be very toxic at sufficiently high doses and that aminotransferases can be candidate biomarkers for carbon nanotube-induced hepatotoxicity in Swiss-Webster mice.

Keywords: aminotransferases, alanine, aspartate, carbon nanotube, hepatotoxicity

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