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## Cytotoxicity and pulmonary toxicity evaluation of engineered carbon nano-rods in human cell lines and rats

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Engineered Carbon Nanorods (CNRs) have multiple applications. Present study evaluates cytotoxicity and pulmonary toxicity effects of CNRs (50-200 nm) using human cell lines and rat histopathology pulmonary model. CNRs of 1, 3, 10, 100 µg/ml dose were tested on 4 different human cell lines (NCI H-460, Hep 3B, HEK 293 and MCF-7) by MTT method. CNRs were administered at 0.5, 2.5, 5 mg/Kg intratracheally and BAL fluid was collected from particles exposed rats at 24 hours, 1 week, 4 weeks, and 12 weeks, respectively for evaluation of pulmonary biomarkers. The results indicated that CNRs TC50 values 42.46, 42.55, 42.94, 56.78 µg/ml which were less than positive control. The BAL fluid LDH, ALP, Total proteins, MDA values were significant with 0.2 mg/kg ( $p < 0.05$ ), 1 mg/kg ( $p < 0.01$ ) and 5 mg/kg ( $p < 0.001$ ) than control in particle exposed rats. Lung histopathology and gross necropsy study produced a dose dependant pulmonary inflammation, foamy alveolar macrophage accumulation, lymphoplasmocytic infiltration, and fibrosis and diffuse alveolar damage. Finally, study concludes that CNRs exerts a dose dependent cytotoxicity on 4 human cell lines significantly at 100 µg/ml and pulmonary toxicity at 5 mg/Kg.

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