Anti-tumoral effects of MWCNTs in solid melanoma tumor models

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Abstract

Multi-walled carbon nanotubes (MWCNTs) have been shown to penetrate tissues [1] and translocate across cellular membranes [2,3]. *In vitro*, intracellular MWCNTs interfere with the cellular cytoskeleton [4–6] producing severe biomechanical alterations leading to anti-proliferative [2], anti-migratory [7] and finally, cytotoxicity [8] in cultured cancer cells. From the cellular biology point of view, these effects resemble those of traditional microtubule-binding agents such as taxol® [9,10].
Here we evaluate the anti-tumoral effects of serum dispersed MWCNTs on actual solid melanoma tumours in a murine model. Using different approaches, our results show how MWCNTs have the intrinsic ability to trigger a highly significant anti-tumoral effect in solid tumor models. Our results also suggest that the interaction of MWCNTs with the microtubule cytoskeleton can boost the response to traditional microtubule-binding chemotherapies, hampering the drug resistance mechanisms in cancer cells. Understanding and improving the biocompatibility of MWCNTs can serve to develop new anticancer therapies to be used as broad-spectrum cytotoxic nanomedicines against cancer in the nearest future.

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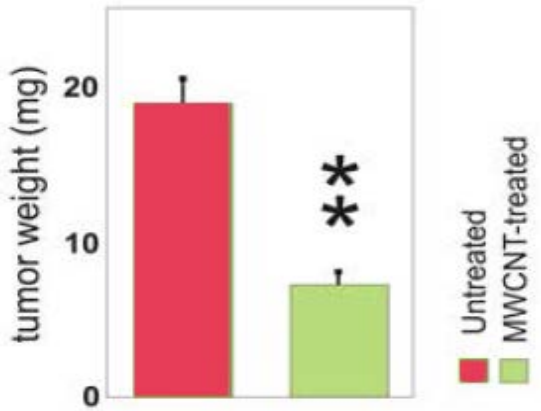
Figures



Statistical analysis of the antineoplastic effect of MWCNTs. Average tumoral mass weights (in mg) in melanomas control (untreated, pink) and treated with MWCNTs (green) (t = 5.38; n = 77; *confidence level* >99.9%).