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Multi-walled carbon nanotubes (MWCNTs) as cytotoxic drug delivery systems in the treatment of cancer

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Our laboratory has focused on the intrinsic anti-proliferative, anti- migratory and cytotoxic effects of carbon nanotubes (CNTs). We have shown how MWCNTs interact with microtubules assembling biosynthetic polymers triggering serious biomechanical cellular defects that lead to cancer cell death. These properties of CNTs produce antitumoral effects in solid melanoma tumors *in vivo*. The huge surface area of CNTs maximizes their ability to interact with many biological components and different chemicals, constituting their biocorona. Taking into account these surface properties, we aimed to increase these intrinsic antitumoral effects of CNTs functionalizing these nanomaterials with a well-known anti-tumoral drug (5-fluoracil) *in vitro* in melanoma cells and *in vivo* in solid malignant melanomas produced by allograft transplantation in murine recipients. We have double-coated CNTs with an internal chemical layer surrounded by a second coat of proteins. The first layer carrying chemicals, either a dye (as a proof-of-concept) or a drug (5-fluoracil) and the second being a serum protein coating layer, both assembling the biocorona. The protein coating serves for (1) CNTs recognition by cellular receptors, (2) endocytosis, (3) protection of the chemical component attached to the nanotube surface until protein degradation that takes place at the lysosome, and (4) the release of the transported drug during the first 5-9 hours next to the internalization process. CNTs loaded with 5-fluoracil double coated with serum proteins display a significantly enhanced antitumoral effect *in vitro* and *in vivo* in mice bearing solid melanoma tumors.

Biography

Eloisa Gonzalez-Lavado is a PhD student in the Nanomedicine Group of the University of Cantabria (Spain). I did a chemistry Bachelor's degree at the University of Extremadura (Spain).I have an european interuniversity master's degree in theoretical chemistry and computational modelling. Currently I am working with carbon nanotubes and their biomedical aplications, especially in Cancer, studying their biocompatibility, their capability as nanocarriers and their own antitumoral effect.

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