

## Dendron-Carbon Nanotubes for Therapeutic Applications

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### Abstract

In the last decade, carbon nanotubes (CNTs) attracted great interest in the biomedical field, beside their potential applications in nanoelectronics or composite materials.<sup>[1]</sup> The ability of CNTs to passively enter into cells and their low cytotoxicity render them a good candidate as drug delivery system. In particular, it was observed that functionalization of the sidewall or the tips of CNTs gives significant advantages, modulating their cytotoxicity<sup>[2]</sup> and permitting to anchor different molecules, like drugs or targeting agents.<sup>[3]</sup> Moreover, the functionalization of CNTs with positively charged groups permits to obtain a promising carrier for genetic material.<sup>[4,5]</sup>

In this communication, the design and synthesis of a new series of cationic dendron-CNTs of first and second generation will be described.<sup>[6]</sup> The dendrons were synthesized inserting at their termini ammonium or guanidinium groups in order to obtain an efficient gene delivery system and at the same time to shed new light on the differences between these two functionalities once present on the CNT scaffold.

To further investigate the potential of this nanomaterial, a targeting peptide for mitochondria was coupled to cationic CNTs. The effective subcellular localization of the material inside the desired organelle was proved by microscopic techniques, highlighting the promising use of these conjugates as drug delivery systems in the treatment of mitochondrial diseases.

The characterization techniques, the cytotoxicity and the complexation studies with genetic material will be also discussed.

### References

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