

Nanotechnologies in general and phosphorus dendrimers in particular to treat cancers. Current situation and next steps

Serge Mignani

Formerly Head of Medicinal Chemistry Department and Scientific Director (Sanofi).
Université Paris Descartes, PRES Sorbonne Paris Cité, CNRS, UMR 860, Laboratoire de Chimie et Biochimie pharmacologiques et toxicologiques, 45 rue des Saints Pères, 75006, Paris, France.
serge.mignani@parisdescartes.fr.

The main objective of nanomedicine research is the development of nanoparticles as drug delivery systems or drugs per se to fight diseases, such as cancers, which are a leading cause of death within developed nations.

Nanotechnology, in particular the nanocarrier approach to drug delivery, has attracted much attention in the development of targeted anticancer therapies aimed at avoiding, for instance, the systemic toxicities of classical small molecule cytotoxic drugs. The nanotherapeutic technologies currently used and proposed for anticancer drug delivery therapies are as follows: polymer-drug conjugates, polymer micelles, liposomes, dendrons, dendrimers, mesoporous silica, albumin nanoparticles, metallic nanoparticles, chitosan nanoparticles etc.

Results from pre-clinical and clinical trials using nanoparticles are encouraging, suggesting that nanoparticles provide opportunities to design and tune particular properties of drugs. Such interventions are not possible with other types of therapeutics and have thus fueled much enthusiasm with regards the wealth of opportunities afforded by this emerging field of nanoscience in oncology.

The focus of this presentation will be analyzing the current challenges and remaining issues facing this infinite armada in systematic cancer nanotherapy. The future of cancer nanomedicine will be presented and analyzed with regards nanoparticles such as original phosphorus metalloidendrimers (Fe, Cu and Au) and corresponding free dendrimers developed in collaboration with the Professor J-P. Majoral (LCC, Toulouse, France). Potent anti-proliferative phosphorus (metallo)dendrimers (both solid and liquid tumors), interesting metal type tumor inhibition selectivity, good antiproliferative selectivity versus normal cell lines, and strong combination effects with several known anti-cancer agents will be presented and discussed as well original established mechanism of action.