

## *From small molecules to bioconjugates via nanoparticles as new anticancer agents: feasibility, challenges and opportunities. Fox against Mammoths!*



**Serge MIGNANI**

Laboratoire de chimie et de biochimie pharmacologiques  
et toxicologiques, CNRS UMR 860, Université Paris  
Descartes, FRANCE

In the late 20<sup>th</sup> century, drug discovery has focused on the development of macromolecular substrates that serve as targets for drug design. The advents of molecular biology tools, genomics and new technologies including, for instance, *in silico* drug design approaches, imaging and nanomachine delivery systems have greatly impacted the finding and the development of new drugs such as anti-cancer agents. These advances will have been made possible by a remarkable series of scientific discoveries made over the past 25 years such as those obtained within the whole-genome sequence projects.

In the pharmaceutical industry, drug innovation is the key word throughout R&D organizations to increase their output of original drug candidate molecules. Thus, in the oncology domain, considerable effective therapeutic development advances have been already done. These advances are based on the development of small-molecules, mimetics (constrained secondary structure and mimetic approaches), macromolecules and nanoparticles (supra molecular multivalent scaffolds), miniature proteins, therapeutic monoclonal antibodies, biosimilars and bioconjugates etc. In addition, nanomedicine represents an important current approach for the delivery of anti-cancer agents and therapy techniques *per se*. Finally, personalized medicine has strongly influenced the contemporary drug discovery.

This presentation focuses on recent advances and challenges to find and to develop new anti-cancer agents both as 'first-in-class' molecularly targeted drugs or 'best-in-class' bioactive compounds. Comparison of a selection of several and representative examples of new anti-tumor types and approaches will be presented and analyzed. Evaluations of challenges and opportunities of new cancer treatments will be also highlighted. The second part of this presentation focuses on the synthesis of anti-tumoral activities of novel nanoparticles based on phosphorus dendrimers. *In vitro* and *in vivo* anti-tumoral activities will be described and discussed.