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First-in-class promising clinical candidates low generation phosphorus dendrimers. A novel strategy in nanomedicine to tackle cancers and tuberculosis

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Extensive studies in nanomedicine concern the development of biocompatible dendrimers as drug themselves or as nanocarriers. Among these dendrimer types, neutral, polyanionic or polycationic phosphorus dendrimers play an important role showing fascinating properties in different therapeutic fields, as for example as anti-prions, anti -Alzheimer, anti- Parkinson diseases, anti-inflammatory and anti-cancer agents. Remarkably, these dendrimers can be administered using a variety of routes including intravenous, intraperitoneal, ocular, transdermal, oral, intranasal, and pulmonary routes allowing to take down diseases such as respiratory infectious diseases. Up to now, some of these activities and properties were found for dendrimers in general and phosphorus dendrimers in particular with high generations (3-5) and more scarcely for dendrimers with low generation (1): this is the case for polyanionic phosphorus dendrimers of generation 1 as anti-inflammatory compound.

As this point an important question arises: is it possible to design and develop first in class new low generation of phosphorus dendrimers (mainly G0) which can be easy prepared in GMP grade, and showed strong stability for several months, high water solubility and of course to be active *per se* against several diseases?

Answers will be illustrated and discussed during this lecture based on recent outstanding results: 1) in vivo properties of polycationic phosphorus dendrimers of generation 0 fighting against virulent forms of tuberculosis with a superior efficacy in comparison with the classical anti-tuberculosis drugs; 2) in vivo activity against triple negative breast cancer; and 3) activity as nanocarriers of siRNAs against glioblastoma (brain tumors).

Keywords
Nanomedicine, phosphorus dendrimers, low generation, triple negative breast cancer, tuberculosis, glioblastoma