

5th International Conference and Exhibition on

Pharmaceutics & Novel Drug Delivery Systems

March 16-18, 2015 Crowne Plaza, Dubai, UAE

Diatomite nanoparticles as new promising biocompatible nanomaterial for drug delivery

N M Martucci¹, I Rea², N Migliaccio¹, I Ruggiero¹, M Terracciano², R Tatè, L De Stefano², I. Rendina², P Arcari¹ and A Lamberti¹

¹University of Naples Federico II, Italy

^{2,3}National Council of Research, Italy

Diatomite is a natural porous biomaterial of sedimentary origin, formed by fragments of diatom siliceous skeletons, called “frustules”. Due to large availability in many areas of the world, chemical stability, and non-toxicity, these fossil structures have been widespread used in lot of industrial applications, such as food production, water extracting agent, production of cosmetics and pharmaceutics. However, diatomite is surprisingly still rarely used in biomedical applications. In this work, diatomite nanoparticles for small interfering ribonucleic acid (siRNA) transport inside human epidermoid cancer cells (H1355) were exploited. Nanometric porous particles were obtained by mechanical crushing, sonication, and filtering of micrometric frustules. Morphological analysis performed by dynamic light scattering and transmission electron microscopy revealed a particles size included between 100 and 300 nm. siRNA bioconjugation was performed on nanometric fragments by silanization and after poly D-Arg peptide functionalization. In-vitro experiments showed very low toxicity on exposure of the cells to diatomite nanoparticles whereas confocal microscopy imaging performed on cancer cells incubated with siRNA conjugated nanoparticles demonstrated a cytoplasmatic localization of the uptaken vectors. Furthermore, the release profile in solution of siRNA, conjugated with diatomite, showed an initial burst phase followed by slow and sustained release phase. Gene silencing by delivered siRNA is also demonstrated. The results obtained endorse diatomite nanoparticles as innovative nanocarriers for siRNA transport in cancer cells and provide a new basis for the development of unique tools for the delivery of antitumoral molecules to cancer cells.

Biography

Nicola M. Martucci graduated in Biological Science at Federico II University of Naples in 2007 and from 2007 to 2009 he was post-graduate fellow at Department of Biochemistry. In 2012 he got the PhD degree at “Magna Graecia” University of Catanzaro defending a thesis on “Interaction between some eubacterial antibiotics and an archaeal elongation factor”. Since 2012, he is post-doctoral scientist at Department of Molecular Medicine at Federico II University. His research interests were in the fields of biosensors and drug delivery. He is author/co-author of 10 peer-reviewed scientific papers published on indexed journals ISI and 16 conference proceedings.

nicolamassimiliano.martucci@unina.it