Bio-hybrid of silica nanoparticles and sodium alginate as drug carrier for doxorubicin

Archana Mishra[ab]* and Jose Savio Melo[ab]

[a]Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, Trombay, Mumbai, India

[b]Homi Bhabha National Institute, Anushakti Nagar, Mumbai-400 094, India

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Mesoporous silica nanoparticles (MSNs) have been widely used as drug carriers [1]. Beneficial characteristic like high surface area, biocompatibility, ease of functionalization and high drug loading capability, make silica NPs promising drug carriers [2]. However, there are some limitations associated with MSNs which discourages its application like large scale production of MSNs, functionalization of MSNs that causes immunogenicity and poor penetration capability within the tumor mass [3]. To overcome, the limitations associated with MSNs and improve its efficacy, a bio-hybrid of silica nanoparticles and biopolymer could be pivotal.

In this study, an efficient and simple route of spray drying using evaporation induced self-assembly process was devised to synthesize a drug carrier of silica nanoparticles-sodium alginate entrapped with doxorubicin (Dox), a conventional chemotherapeutic drug. The successfully synthesized carriers were characterized by SEM, FTIR, DLS and drug loading efficiency was studied. Drug release profile of the entrapped Dox was studied at two different pH i.e. at pH 7.4 (physiolocal pH) and at pH 5.4 (pH in tumor microenvironment).The *in vitro* cellular uptake and *in vitro* cytotoxicity of Dox-loaded bio-hybrid carrier were analyzed against A549 lung carcinoma cells.

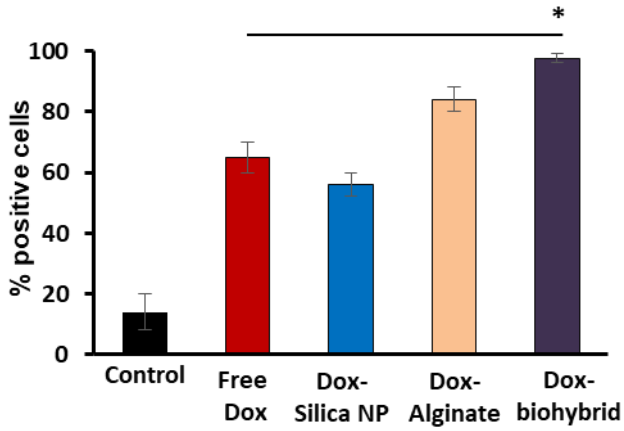


Fig: Percent positive cells with Dox expression analyzed through flow cytometry. (*p<0.05)

References

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Biography

Dr. Archana Mishra is currently Scientific Officer E in Bioscience Group, Bhabha Atomic Research Centre, Mumbai, India. She obtained her M. Sc. Biotechnology Degree from Banaras Hindu University, India in 2009 and received her Ph.D. from Homi Bhabha National Institute, Mumbai India in Life Sciences. Her research is focused in the area of development of novel silica based biohybrid materials, nanomaterials, hybrid materials and their further applications in biosensor, environmental biotechnology, bioprocess development and drug delivery. Dr. Mishra has published high quality international peer-reviewed articles, reviews, book chapters and has developed technology in her area of research.

Presenting author details



Name: Dr. Archana Mishra

Tel.: +91 22 255923832; Fax: +9122 25505151.

Email: archanamishra56@gmail.com; archanam@barc.gov.in