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Development of bio-functional inorganic nanoparticles for efficient delivery of siRNA, therapeutic gene and anticancer drug to breast cancer cells

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Breast cancer mortality is still the leading cause of cancer death among women. The resistance of cancer cells to cytotoxic agents accounting for 90% of treatment failure. There are synergistic cross-talks among the diverse neoplastic cell types acting together on cell cycle to confirm tumor survival, malignancy and metastasis, with the altered signaling pathways. Given these logistics, it is important to undertake pragmatic approaches to synergistically vanquish the synergistic activation between the pathways, in order to combat tumorigenesis and progression. In other words, just concentrating on each isolated path does not seems to be effective, instead it is critical to take account of the maze of networks into which these cross-talks are integrated to favor tumorigenesis. Hence, an efficient multidisciplinary treatment to eradicate tumorigenesis at cellular and genetic level by combining tumor targeted drug therapies with gene therapy (p53 and cyclin D siRNA) could be considered as the unmet need of breast cancer patients. However, due to all of the physiological barriers in the way of such a treatment is the challenge. Engineering an effective delivery device is strongly highlighted. Recently, an efficient macromolecular drug delivery and expression system has been developed based on pH-sensitive inorganic nanocrystals of carbonate apatite with capability of effective intracellular delivery and release of associated drug and genetic molecules leading to very high level of transgene expression in cancer cells. We also aim to further improve drug and gene delivery efficacy of our nanoparticles. Our study in combined therapeutics shows almost 45% toxicity and reduction of cyclin D when compared to controls. First step has been taken towards these goals, but much remains to be achieved.

Biography

Jayalaxmi Shetty is currently pursuing her PhD in Monash University in School of Medicine and Health Sciences. She has also published two papers and a review article in reputed journals.

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