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Sericin/Rba Embedded Gellan Gum Based Smart Nanosystem for Ph Responsive Drug Delivery

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Polysaccharides protein complex offers a green alternative to synthetic polymers in the drug delivery system. Sericin (SC), a natural protein, in combination with rice bran albumin (RBA) and gellan gum (GG) forms a green based protein polysaccharide complex. The sericin functionalized gellan gum-rice bran (SC-GG-RBA) Nano composites were characterized by different characterization techniques. It shows their prominent ability in balancing the biocompatibility, stability, biodegradability and functionality of Nano carriers. The Nano composites exhibited spherical shape with core protein-polysaccharide structures and the average size was about 218 nm. High amount of Doxorubicin (DOX) was encapsulated into SC-GG-RBA Nano composites in order to investigate the effective drug release in acidic tumor environment. DOX of 84% was released in vitro condition after 120 h in pH 4.0. DOX loaded green Nano composites shows IC₅₀ 5 µg/mL which was very low compared to free DOX of 9µg/mL after treatment with MCF-7 cells. Only 42% of cells were survived after treatment with green Nano composites. This was due to the effective uptake of Nano material by cancer cells and direct release of DOX in cytoplasmic region. Such high performance green Nano composites have great potential in expanding the utilization of biomaterial from natural resources and development of sensible application in biomedical field. The sericin functionalized GG Nano composites is a simple, safe, economical procedure and which have improved transfection efficiency. DOX loaded in Nano carrier system is a promising therapeutic strategy against breast cancer. RBA protein and sericin functionalized gellan gum prepared by single emulsification solvent evaporation technique showed high drug encapsulation efficiency with desired particle size, polydispersity index and better DOX release profile. As all components are biodegradable, biocompatible and natural polymers show strong cellular internalization without any toxicity to normal cells. Doxorubicin encapsulated SC-GG-RBA Nano composites, where sericin will help in pH dependent drug release and RBA will induce sustained release of drug. These findings desirable the chemotherapeutic features of SC-GG-RBA as a promising strategy for treating breast cancer with high clinical outcome.

Biography:

Arjama Mukherjee is PhD, student (joined January 2018) in University of Madras, Chennai, India. She is an enthusiastic, adaptive and fast-learning person with a broad and acute interest in Nano-Biotechnology. To pursue her research interest she did her M. Tech in Biotechnology from KIIT University, India and qualified GATE Exam (All India Rank 881). She also gained her hands on experience in Molecular Biology, Cell Biology and Cancer Biology field from Central Institutes in India. All of these experiences are helping her to pursue her research on Nanotechnology and to connect these fields so that a new powerful Nano-drug delivery technique can be developed in the field of Cancer.