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Biofunctionalized nanoneedles for the direct and site-selective delivery of probes into living cells

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Nanoneedles may be conical or tubular needles in the nanometre size range, made from silicon or boron-nitride with a central bore of sufficient size to allow the passage of large molecules, or solid needles useful in Raman spectroscopy, light emitting diodes (LED) and laser diodes. Accessing the interior of live cells with minimal intrusiveness for visualizing, probing, and interrogating biological processes has been the ultimate goal of much of the biological experimental development. The recent development and use of the biofunctionalized nanoneedles for local and spatially controlled intracellular delivery brings in exciting new opportunities in accessing the interior of living cells. Here we review the technical aspect of this relatively new intracellular delivery method and the related demonstrations and studies and provide our perspectives on the potential wide applications of this new nanotechnology-based tool in the biological field, especially on its use for high-resolution studies of biological processes in living cells. Different from the traditional micropipette-based needles for intracellular injection, a nanoneedle deploys a sub-100-nm-diameter solid nanowire as a needle to penetrate a cell membrane and to transfer and deliver the biological cargo conjugated onto its surface to the target regions inside a cell. Although the traditional micropipette-based needles can be more efficient in delivery biological cargoes, a nanoneedle-based delivery system offers an efficient introduction of biomolecules into living cells with high spatiotemporal resolution but minimal intrusion and damage. It offers a potential solution to quantitatively address biological processes at the nanoscale. The nanoneedle-based cell delivery system provides new possibilities for efficient, specific, and precise introduction of biomolecules into living cells for high-resolution studies of biological processes, and it has potential application in addressing broad biological questions.

Biography

A.Radha Gayathri had completed B.Pharmacy from Vishnu College of pharmacy. She is pursuing M.Pharmacy in Gokaraju Rangaraju College of Pharmacy.

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Niosomes- A novel vesicular system: Review

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Niosomes was first earmarked from cosmetic company, L'Oreal. Niosomes are the vesicular systems like liposomes which are prepared by hydration of non-ionic surfactants with/without use of cholesterol or related lipids. The particle size of niosomes range in from 10nm and 100nm. These systems can entrap amphiphilic, hydrophilic and lipophilic drugs. A small amount of anionic surfactant in the formulation acts as stabilizing agent. They are prepared by Ether injection, Hand shaking, Sonication, Micro-fluidization, Multiple membrane extrusion, Reverse phase evaporation, Remote Loading and Bubble methods. These non-ionic surfactant vesicles are characterized by scanning electron microscopy, angle of repose, optical microscopy, measurement of vesicle size, entrapment efficiency, osmotic shock, stability studies, zeta potential analysis and In vitro methods as dialysis tubing, reverse analysis, Franz diffusion cell. Drug entrapment into these vesicles prolongs drug release, drug retention. This also helps to predict the existence of drug in the body promoting enhanced penetration to targeted tissues. Niosomes have a promising delivery as they reduce toxicity by the modification of vesicles composition or surface adjusts affinity for the drug release and target site. Niosomes has widespread application for the treatment of cancers, viral diseases, and microbial diseases sorting the targeted drug delivery. Different type of drug deliveries that can be possible by Niosomes includes targeting, parentral, opthalamic, topical etc.

Biography

Rakesh Kumar Khuntia is a M.Pharm student at Utkal University, Odisha. He has completed his B.Pharm from UDPS, Utkal University. He has presented papers and qualified GPAT.

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