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Microbivores: Artificial mechanical phagocytes using digest and discharge protocol

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Nano medicine is the medical application of nanotechnology. Nano medicine ranges from the medical applications of nano materials, to nano electronic biosensors, and even possible future applications of molecular nanotechnology Nanomedicine offers the prospect of powerful new tools for the treatment of human diseases and the improvement of human biological systems using molecular nanotechnology. This presents a theoretical Nanorobot scaling study for artificial mechanical phagocytes of microscopic size, called "microbivores," whose primary function is to destroy microbiological pathogens found in the human bloodstream using a digest and discharge protocol. . A benefit of using nano scale for medical technologies is that smaller devices are less invasive and can possibly be implanted inside the body, plus biochemical reaction times are much shorter. These devices are faster and more sensitive than typical drug delivery. The microbivore is an oblate spheroidal nano medical device measuring 3.4 microns in diameter along its major axis and 2.0 microns in diameter along its minor axis, consisting of 610 billion precisely arranged structural atoms in a gross geometric volume of 12.1 micron. The device may consume up to 200 pW of continuous power while completely digesting trapped microbes at a maximum throughput of 2 micron of organic material per 30-second cycle. Microbivores are up to ~1000 times faster-acting than either natural or antibiotic-assisted biological phagocytic defenses, and are ~80 times more efficient as phagocytic agents than macrophages, in terms of volume/sec digested per unit volume of phagocytic agent.

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Role of proteins and peptides in drug delivery

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Till recent, injections remained the most common means for administering therapeutic proteins and peptides because of their poor oral bioavailability. However, oral route would be preferred to any other route because of its high levels of patient acceptance and long term compliance, which increases the therapeutic value of the drug. Designing and formulating a polypeptide drug delivery through the gastro intestinal tract has been a persistent challenge because of their unfavorable physicochemical properties, which includes enzymatic degradation, poor membrane permeability and large molecular size. The main challenge is to improve the oral bioavailability from less than 1% to at least 30-50%. Consequently, efforts have intensified over the past few decades, where every oral dosage form used for the conventional small molecule drugs has been used to explore oral protein and peptide delivery. Various strategies currently under investigation include chemical modification, formulation vehicles and use of enzyme inhibitors, absorption enhancers, mucoadhesive polymers, polymer microspheres, and nanaospheres. This review summarizes different pharmaceutical approaches which overcome various physiological barriers that help to improve oral bioavailability that ultimately achieve formulation goals for oral delivery.

Biography

Deepthi Suda completed Bachelors in Pharmacy from Sri Venkateshwara College of Pharmacy affiliated to Osmania University ,Hyderabad and now pursuing Masters in Pharmacy (second semester) from Department of Pharmaceutics, Anurag group of institution, School of Pharmacy.

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