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Targeted drug delivery system through nanoformulations

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Targeted drug delivery is a method of delivering medication to a patient in a manner that increases the concentration of the medication in some parts of the body relative to others. Progress in the field of drug targeting has been slow till thirty five years ago. With the advent of the monoclonal antibody technology in the mid seventies of the last century as well as the development of liposomal and polymeric nanoparticle carriers, the drug targeting field enjoyed a welcoming expansion and the clinical applications of these novel drug delivery systems became a feasible aim. Delivering the drug accurately and safely to its target site at the precise time period to have a controlled release and attain the maximum therapeutic effect remains a benchmark in the design and development of newer drug delivery systems. At present, 95 percent of all new potential therapeutics have poor pharmacokinetic and biopharmaceutical properties. Hence, there is need to develop a suitable drug system that distributes the therapeutically active drug molecule only to site of action, without affecting healthy tissue or organ. The latest research developments of the solid lipid nanoparticles are at the forefront of the rapidly developing field of nanotechnology with several potential applications in drug delivery, clinical medicine and research as well as in other varied sciences. Due to their unique size-dependent properties, lipid nanoparticles offer the possibility to develop new therapeutics. The ability to incorporate drugs into nanocarriers offers a new prototype in drug delivery that could be used for secondary and tertiary levels of drug targeting. Hence, solid lipid nanoparticles hold great promise for reaching the goal of controlled and site specific drug delivery and hence have attracted wide attention of researchers. This presentation will discuss the broad treatment of solid lipid nanoparticles discussing their advantages, limitations and their possible remedies. The different types of nanocarriers, solid lipid nanoparticles, nanostructured lipid carriers, lipid drug conjugates are discussed with their structural differences.

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Chirp coded excitation using nano particle for improving small animal imaging resolution

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Nano particle techniques such as coded excitation methods have become popular in ultrasound imaging due to its capability to improve imaging resolution. The aforementioned techniques require the nano particle to efficiently oscillate by insonation with pulse transmission near to the resonance frequency of the contrast agents. However, for most commercial ultrasound contrast agents, they are originally designed to resonate at lower frequencies ranging and coded excitation methods, thus limiting the spatial resolution of imaging. To overcome this problem, the aim of this research is chirp coded excitation using nano particle as the trigger signal for raising signal energy in high-frequency ultrasound imaging system which can approach to best CTR (Contrast-to-Tissue Ratio), we can acquire the optimal frequency more precisely. Based on the advantages of this technique, the paper further investigates their potential applications. The system scans the zebra fish which plays an important role in regenerative medicine with cardiac regeneration then the nano-particles are injected in zebra-fish, which can efficiently enhance the contrast of tissue signal to observe the heart of zebra-fish easily. The heart model of the zebra-fish is similar to the one of human so that cardiac function of zebra-fish has potentially become an effective tool for the assessment of human cardiovascular regeneration. A high-resolution animal imaging modality is needed for observing the cardiac function of zebra-fish. According to experiment results, there are 15 dB SNR improvement and 1-2 mm penetration depth improvement by chirp-coded excitation with nano particle. It is suitable for ultrasound bio-microscopy applications.

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