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Nanoparticles drug delivery– From the bench to the clinic

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Nanoparticles have been applied for the delivery of active agents into tissues and cells. The oral bioavailability of cyclosporin has been improved by a pro-nanodispersion liposphere formulation that form in situnanoparticles in the stomach, allowing >25% oral bioavailability of cyclosporin in humans. Solutions of the active agent, the core solid lipid component and phospholipids in an amphiphilic solvent such as ethyl lactate or N-methyl pyrrolidone were prepared and evaluated for the in situ formation of nanoparticles loaded with the active agent. These liposphere formulations have been used to improve the oral bioavailability of drugs suffering from first pass metabolism such as CBD and THC. The oral bioavailability of these compounds and others was significantly improved when using nano-empty lipopheres co-delivered with the active agent. Delivery of peptidic drugs in the brain is a significant or even an impossible challenge, unless the drug in injected to the brain. Peptide drugs are commonly delivered by IV or SC injections and do not cross the BBB unless there is an active carrier that crosses the BBB and delivers the drug within the brain. The objective of this study was to manufacture TRH loaded nanoparticle in poly (sebacicanhydire), a fast degrading polymer. These nanoparticles are used to deliver peptide drugs directly to the brain neurons via nasal spray through the olfactory site. Thyrotropin-releasing hormone (TRH, protirelin), a brain-derived neuropeptide, have a rapid onset efficacy against suicidal ideation and severe depression. Nanoparticles were prepared under dry conditions by precipitation in an anti-solvent to form 200-500 nm particles and the zeta potential was -50 mV with high TRH loading was obtained. TRH was constantly released for 12 hours while P(SA) being hydrolyzed. These nanoparticles are being considered for clinical trials to reduce the number of suicides in the US army. .

To formulate and evaluate TDDS for sustained release Ondansetron HCl patches

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The skin can be used as the site for drug administration for continuous transdermal drug infusion into the systemic circulation. For the continuous diffusion/penetration of the drugs through the intact skin surface membrane-moderated systems, matrix dispersion type systems, adhesive diffusion controlled systems and micro reservoir systems have been developed. Various penetration enhancers are used for the drug diffusion through skin. In matrix dispersion type systems, the drug is dispersed in the solvent along with the polymers and solvent allowed to evaporate forming a homogeneous drug-polymer matrix. Matrix type systems were developed in the present study. In the present work, an attempt has been made to develop a matrix-type transdermal therapeutic system comprising of Ondansetron-HCl with different ratios of hydrophilic and hydrophobic polymeric combinations using solvent evaporation technique. The physicochemical compatibility of the drug and the polymers was studied by infrared spectroscopy. The results obtained showed no physical-chemical incompatibility between the drug and the polymers. The patches were further subjected to various physical evaluations along with the *in-vitro* permeation studies using rat skin. On the basis of results obtained form the *in-vitro* study and physical evaluation the patches containing hydrophilic polymers i.e. polyvinyl alcohol and poly vinyl pyrrolidone, with oleic acid as the penetration enhancer(5%) were considered as suitable for large scale manufacturing with a backing layer and a suitable adhesive membrane.

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