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Commentary

The Impact of Nanosuspensions on Intravenous Formulations

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DESCRIPTION

Nanosuspensions were colloidal systems made up of just stabilizers and pure medication, either alone or after being lyophilized into the solid matrix. Drug solubility is increased by nanosuspensions in both the organic and aqueous phases. Brick dust molecules, or nanosuspensions, are substances that promote a system's dissolution and enhance absorption. Pharmaceutical companies are increasingly using nanosuspensions, which are liquid dispersions with a nanoscale size distribution, to create poorly water-soluble medicines and improve their bioavailability. In general, there are two basic ways to make nanosuspensions: top-down or bottom-up. The first method relies on milling or high intensity homogenization to reduce the size of big particles. The latter is concentrated on the particle growth and nucleation processes.

Many evaluations are done on the use of nanosuspensions in various drug delivery methods, including oral, ophthalmic, brain, topical, buccal, nasal, and transdermal routes. The majority of permeability limiting absorption and metabolic first-pass metabolism associated difficulties that negatively influence bioavailability can be resolved by oral drug administration of nanoemulsions with receptor mediated endocytosis, which is a promising capability. The development of enabling technologies like nanosuspensions can address several formulation issues that protein- and peptide-based medicines now encounter. For poorly water-soluble medicines, nanosuspensions have gained popularity as effective drug delivery systems recently. The successful commercialization of a number of items made using top-down technologies shows that the processing characteristics of the technologies are amenable to industrial level operation and fulfilling strict pharmaceutical quality control criteria.

Nanosuspension acquires potential to address several formulation and drug administration challenges usually associated with poor water and lipid soluble medicines due to the sub-micron particle diameter and unique physicochemical features. To manufacture and scale up nanosuspensions, conventional size reduction tools like media mills and high-pressure homogenizers as well as formulation strategies including precipitation, emulsion-solvent absorption, solvent diffusion, and micro emulsion procedures can be effectively used.

The main aspects to take into consideration for the effective manufacture and scaling up of nanosuspensions are keeping them stable in solution as well as in the solid state and resuspendability without aggregation. The flexibility for surface treatment and mucoadhesion for targeted therapy have substantially broadened the scope of this innovative formulation method as a result of the significant improvement in bioavailability.

The translational evolution of intravenous nanosuspensions is not without its difficulties, though. The current goal is to present a comprehensive picture of drug formulations and desirable features for intravenous nanosuspensions. Improvements in characterization instruments, manufacturing processes, and post-production process intravenous nanosuspensions proceed from the preclinical stage to commercialization, their uses will increase.

CONCLUSION

There are now a lot of possible novel drug candidates with great therapeutic effectiveness but restricted water solubility due to the rapid improvement in the drug discovery process. For a quick beginning of action, to prevent first pass metabolism, and to provide site-specific administration, the Intravenous (IV) route usually favoured. It is difficult to develop intravenous formulations for medications that are poorly water soluble. For solubilization, formulation techniques such as salt production, co-solvents, surfactants, and inclusion complexation employing cyclodextrins are utilized. These methods include restrictions on the degree of solubilization, hypersensitivity, toxicity, and applicability to just particular types of molecules; therefore they are not generally applicable. Attention has been drawn to intravenous nanosuspensions as a potential method for creating IV formulations of medicines with limited water solubility. A weakly water soluble drug's nanocrystals are suspended in aqueous solution and stabilized using a little amount of stabilizers.

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