

Nanosuspension – A Transformative Approach for Enhancing Drug Bioavailability

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Dear Editor,

Nanosuspensions have emerged as a novel drug delivery technology, particularly for drugs that are not highly soluble in water. By enhancing solubility, dissolving rates, and oral bioavailability, these colloidal dispersions—whose particle sizes are usually smaller than one micrometer—help BCS class II drugs overcome their challenges [1].

Significance and Scope of Nanosuspensions

Poorly soluble drugs can now be administered through nanosuspensions, due to the progress of pharmaceutical nanotechnology. Nanosuspensions offer a versatile platform by enabling flexible dose forms and multiple administration pathways, such as oral, parenteral, ophthalmic, pulmonary, and cutaneous [2]. Stabilisers, surfactants, and co-surfactants are all necessary ingredients in their production. They are typically created utilizing procedures such as precipitation, high-pressure homogenization, media milling, and microemulsion templates. Each strategy has its benefits, especially in terms of reliability and scalability [3].

Applications and Future Potential

Nanosuspensions have enormous potential for the treatment of disorders such as Dry Eye Disease (DED) and drug delivery to the eyes due to their rapid drug clearance and limited corneal permeability. Nanosuspensions improve therapeutic efficacy by increasing drug retention and eye penetration, while reducing pain and dosage intervals. Furthermore, site-specific therapy, particularly in anti-inflammatory and anti-infective medicines, can be improved by targeting drug distribution by surface changes. Its performance in commercial products emphasizes its industrial use [4].

Challenges and Way Forward

Despite their numerous benefits, nanosuspensions pose formulation challenges such as physical stability, crystal formation, and scale-up repeatability. It is necessary to solve difficulties utilizing trustworthy characterisation techniques, such as zeta potential, particle size analysis, and crystallinity assessment [1].

To summarize, nanosuspension technology represents a substantial advancement in resolving formulation problems caused by weakly soluble medicines. Nanosuspensions improve solubility,

absorption, and therapeutic response and are suitable for a variety of delivery techniques. With additional study and development, nanosuspensions have the potential to drastically transform medication delivery methods and dramatically improve patient outcomes. Nanosuspensions represent a significant step toward overcoming solubility-based pharmaceutical delivery difficulties. Further clinical proof, a better preparation procedure, and increased regulatory transparency will all help to accelerate their adoption in routine therapy.

References

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