Editorial

Scope of nano ophthalmology

Topical eye drops are the most common dosage form for treating disorder related to the anterior segment of the eye. However, a large amount of drug delivered through the eye drops is lost through tear drainage and associated mechanisms that protect the eye against exposure to pernicious substances. An ideal drug delivery system for ocular drug delivery would be the one that increases the stay/contact time of the drug with the eye surface and would provide adequate concentration of drug at the site of action.

Ocular drug delivery is associated with a number of challenges for formulation scientists.[1] The unique structure of the eye and the pharmacokinetically specific environment that exists in the eye is always a challenge for the pharmaceutical scientists. The challenges in ocular drug delivery include appropriate particle size, irritancy to eye, lachrymal drainage, reflex blinking, drug dilution by tears, rapid turnover, limited permeability of the cornea and rapid elimination of the drug through the lachrymal system. In addition manufacturing and packaging of ophthalmic products is done under sterile environment that requires specific facilities and need to be GMP compliant.

Ocular drug delivery can be divided into three categories: topical, which typically targets the anterior segment, intraocular/intravitreal, which typically targets the posterior segment and systemic, which can be used to treat conditions in the anterior and posterior segments of the eye.

Nanotechnology is slowly making its presence felt in the complex area of ocular drug delivery.[2] It has been used to improve the delivery and safety of drugs but ocular drug delivery using nanotechnology is still to be explored to its potential. Nanosystems, such as nanoparticles, nanoemulsions, nanosuspensions, liposomes, and dendrimers, can be used to deliver the drug to eye and improve the bioavailability of drugs. The discussion of all the systems would require a separate article and we will definitely look for such an article from our readers.

Drug-loaded polymeric nanoparticle suspensions for improving the availability of drug at intraocular level has been tried for anti-inflammatory drugs using inert polymer resins such as Eudragit RS100. Surface charge and binding of the drug to the particles rather than the drug loading are important parameters that require consideration for Ocular Drug Delivery. Site specific and sustained release immunoliposomes can be used as improved vehicles for drug delivery in treatment of ocular viral infections. The chemical inert nature, ability to encapsulate both hydrophilic and lipophilic drugs, low toxicity and non-ionic nature of the components gives niosomes an upper hand over liposomes for topical ocular delivery.

Nanotechnology-based delivery systems offer the advantage of sustaining the drug release and improving the ocular availability of drugs. These systems can also be used for targeting specific areas of the eye. Despite the advantages of nanotechnology the impediments associated with manufacturing of nanoparticles and liposomes/niosomes are numerous because of requirement of sterile environment and specific GMP requirements for manufacturing ophthalmic products. Lack of specific regulatory guidance and limited availability of skilled persons in the area is proving a barrier for pharmaceutical companies to invest and explore the area of ocular drug delivery.[3]

International Journal of Pharmaceutical Investigation would appreciate and support manuscripts in this area. As I have mentioned in my previous editorial that *IJPI* would encourage publishing of nanotechnology research. I would welcome suggestions and ideas from all concerned.

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REFERENCES

1. Urtti A. Challenges and obstacles of ocular pharmacokinetics and drug delivery. Adv Drug Deliv Rev 2006;58:1131-5.
2. Sahoo SK, Dilnawaz F, Krishnakumar S. Nanotechnology in ocular drug delivery. Drug Discov Today 2008;13:144-51.
3. Huml RA, Rich C, Chance K. Key challenges to US topical ocular drug development. Regulatory Focus 2009;14: 47-52.

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