POLYMERS IN OPHTHALMIC PREPARATIONS: FROM TRADITIONAL APPLICATION TO PRODUCT INNOVATION

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Drug delivery to the eye is still one of the most important areas of modern ocular therapy, since it encompasses many opportunities and challenges. Traditional use of polymers (both natural and synthetic) as excipients in ophthalmic preparations provides better bioavailability by drug stabilization, viscosity increasing, mucoadhesion and retained elimination rate from the eye, which reduces the frequency of drug administration and enhances patient compliance. Furthermore, some polymers have properties of ocular penetration enhancers or enable the formation of *in situ* gels in contact with various physiological stimuli (ions, pH or temperature) (1). The versatility of biopolymers and synthetic polymers have been applied for formulation of various micro- and nanocarriers (e.g., microparticles, microneedles, nanoparticles, nanocapsules, polymeric micelles, dendrimers, and liposomes) which demonstrate significant potential for treatment of ocular diseases in both anterior and posterior segment of the eye. Processing polymers into fibers, films, contact lenses, or extruded forms allows design of specifically engineered devices enabling accuracy of dosing, prolonged drug release, chemical stability, and absence of preservatives. Although significant effort has been devoted to development of polymer-based ocular drug delivery systems, a key challenge is still the translation of these systems to clinical use (2). Biocompatibility is an essential property for all ocular drug delivery systems since their components should not interact with the surrounding tissue or elicit foreign body reactions through inflammatory or immune response (1). Overall, despite numerous challenges, further investigative research emerging innovative applications of polymeric materials in ocular drug delivery is expected in the near future.

References

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POLIMERI U OFTALMOLOŠKIM PREPARATIMA: OD TRADICIONALNE PRIMENE DO INOVACIJE PROIZVODA

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Isporuka leka u oko je i dalje jedna od najvažnijih oblasti savremene oftalmološke terapije jer obuhvata mnoge mogućnosti i izazove. Tradicionalna upotreba polimera (prirodnog i sintetskog porekla) kao ekscipijenata u oftalmološkim preparatima obezbeđuje bolju biološku raspoloživost stabilizacijom leka, povećanjem viskoziteta, mukoadhezijom i usporavanjem eliminacije leka iz oka, što dovodi do smanjenja učestalost primene leka i poboljšanja komplijanse. Dodatno, neki od predstavnika polimera imaju svojstva pojačivača okularne penetracije ili omogućavaju formiranje *in situ* gelova u kontaktu sa različitim fiziološkim stimulusima (prisustvo određenih jona, pH sredine ili temperatura) (1). Mnogobrojne povoljne osobine biopolimera i sintetskih polimera primenjene su tokom formulacije različitih mikro- i nanonosača (kao što su mikročestice, mikroigle, nanočestice, nanokapsule, polimerne micele, dendrimeri i liposomi) koji pokazuju značajan potencijal za lečenje oftalmoloških oboljenja, kako prednjeg prednjeg, tako i zadnjeg segmenta oka. Prevođenje polimera u vlakna, filmove, kontaktna sočiva ili ekstrudirane oblike omogućava dobijanje različitih specifično dizajniranih terapijskih sistema, koji omogućavaju precizno doziranje, produženo oslobađanje lekovite supstance, hemijsku stabilnost i odsustvo konzervansa. Iako je uložen značajan napor u okviru razvoja oftalmoloških terapijskih sistema, ključni izazov je još njihova primena u kliničkoj praksi (2). Osnovni zahtev koji ovi sistemi moraju ispuniti odnosi se na biokompatibilnost, jer njihove komponente ne bi trebalo da stupaju u interakciju sa okolnim tkivom ili da izazovu reakcije stranog tela putem inflamatornog ili imunološkog odgovora (1). Konačno, uprkos brojnim izazovima, dalja istraživanja usmerena ka razvoju inovativne primene polimernih materijala za oftalmološku primenu očekuju se u bliskoj budućnosti.

Literatura

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