Abstract

This investigation examined some of the barrier properties of the conjunctival, scleral, and corneal membranes. The diffusion of nadolol, timolol, propranolol, penbutolol, sucrose, and inulin was measured across the isolated corneal and scleral membranes of the rabbit using a two-chamber glass diffusion cell. Drug absorption across the cornea and the conjunctiva was studied in vivo by measuring precorneal drug clearance. The drug samples were analyzed either by HPLC or liquid scintillation counting (LSC). For all the compounds tested, the scleral permeability was significantly higher than the respective corneal permeability. The permeability coefficients of the beta-blockers varied in the following manner: propranolol > penbutolol > timolol > nadolol for the cornea, and penbutolol > propranolol > timolol > nadolol for the sclera. The cornea offered substantially more resistance to inulin, a polar, macromolecular substance, than did the conjunctiva. However, the cornea and conjunctiva offered comparable resistance to the smaller and less polar drug timolol. This information may serve as a basis for optimizing the intraocular delivery of drugs that are poorly absorbed across the cornea due to their physicochemical properties.