Use of SIRC Rabbit Corneal Cell Lines Grown on Polycarbonate- or Polyester-Based Filters to Assess the In Vitro Corneal Transport/Toxicity Screening Using Pilocarpine With or Without Benzalkonium Chloride

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The objective of this study was to assess and compare the morphologic and permeability characteristics of SIRC rabbit corneal cells grown on two filter types, polycarbonate-based Costar Transwell and polyester-based Costar Transwell Clear using pilocarpine in presence and absence of benzalkonium chloride. Technically, the microwell inserts were seeded with SIRC rabbit corneal cells and suspended in growth medium. The inserts were covered and kept in a humidified incubator for 10 days. The inserts were rinsed with Dulbecco's phosphate buffered saline at pH 7.3 and placed into microwell plates containing buffer at the same pH. Formulations containing pilocarpine with and without benzalkonium chloride were inoculated into each insert. The inserts were covered and incubated for the predetermined time period. The cell lines were examined with a light microscope using hematoxylin and eosin-stained cross-sections. The permeabilities of
pilocarpine across the SIRC cell layers grown on the two filters were quantitatively determined. The results of these experiments show no significant differences in the morphological characteristics between the two filters exposed to either pilocarpine alone or to pilocarpine with benzalkonium chloride. The apparent permeability coefficient values for pilocarpine from both formulations across Costar Transwell-grown SIRC cell layers were relatively higher than that with Costar Transwell Clear-grown layers, and the flux enhancement ratios in the presence of benzalkonium chloride across the two filter types were comparable. These results revealed that the morphologic and the permeability data of SIRC rabbit corneal cells grown on the two filters are comparable for the compounds tested, suggesting their interchangeable use in assessment of the in vitro corneal drug transport and toxicity screening studies for ophthalmic drugs and additives.