

ABSTRACT

Purpose: The aim of this work was to characterize the healthy human cornea and the cornea of patients suffering from posterior polymorphous corneal dystrophy (PPCD) using different antibodies. Despite the fact that PPCD is a very rare disorder, one of the largest groups of PPCD patients in the world comes from the Czech Republic. This offers us the opportunity to investigate the changes on the clinical, cellular and molecular levels.

Material and Methods: A collection of 25 control corneas as well as 16 pathological corneas from PPCD patients were used. Epithelial (cytokeratins) and mesothelial markers (mesothelin, calbindin 2, HBME-1 protein) were detected in all layers of the healthy corneas using immunocyto- and immunohistochemistry. The expression of all markers was confirmed using molecular methods as well (RT-PCR and Western blot). Changes in the expression of cytokeratins and changes in the extracellular matrix structure (collagen IV and VIII) were studied in the PPCD corneas. Combined fluorescent immunohistochemistry with fluorescence in situ hybridization were used in order to characterize the origin of abnormal cells on the posterior graft surface, which cause the recurrence of the PPCD after penetrating keratoplasty surgery.

Results: Changes in the cytokeratin expression (strong positivity for cytokeratins 7, 19, 8 and 18; weaker positivity for cytokeratins 1, 3/12, 4, 5/6, 10, 10/13, 14, 16 and 17) and changes in the localization of individual collagen IV and VIII chains were described in the PPCD corneas. Although PPCD affects primarily the Descemet membrane and the endothelium, changes in the basal membrane of the epithelium and posterior stroma were also detected. The exact origin of the abnormal endothelial cells, which cause the recurrence of PPCD in some cases, was established. These abnormal cells migrate into the donor graft from the non-transplanted peripheral part of the recipient cornea.

A whole spectrum of cytokeratins was described in the individual layers of the healthy human corneal, limbal and conjunctival epithelium. I considered a strong signal for cytokeratin 8 in the basal layer of the limbal epithelium to be a key finding, which could play a role in the differentiation processes by corneal epithelial renewal. Epithelial (cytokeratins 8 and 18) and mesothelial markers (mesothelin, calbindin 2 and HBME-1 protein) were detected in the human corneal endothelial cells.

Conclusions: Characterization of the healthy human cornea is a prerequisite for characterization of pathologies. Knowledge about changes in PPCD corneas could be helpful for more precise diagnosis and prognosis; moreover it could be a basis for new therapeutical procedures.

Key words: *cornea; posterior polymorphous corneal dystrophy; endothelium; epithelium; cytokeratin; collagen*