Abstract

The main reason for cornea graft failure after keratoplasty is related to graft rejection. Comparable to the situation after solid organ transplantation, activation of T cells may be involved in this rejection process. The aim of the present study was to investigate the possibility of T cell activation by corneal cells

At first, the expression of HLA antigens was studied in cultured human corneal endothelial and epithelial cells. This examination revealed that HLA expression occurred in corneal epithelial and also endothelial cells. Therefore these cells may serve as antigen presenting cells. In a second step the human corneal cells were co-cultured with peripheral blood cells. Activation of T lymphocytes purified from peripheral blood cells was analysed by immunohistochemical staining and FACS analysis. The co-culture of corneal cells and peripheral blood cells led to expression of CD69, a marker for activated T cells, in part of the peripheral blood cells population. Furthermore expression of CD80 and CD86 was found on human corneal epithelial cells. Human corneal endothelial cells expressed only CD80 but not CD86. CD80 and CD86 may serve as the second signal for T cell activation. Another molecule that can serve as the required second signal for T cell activation is CD154-a ligand of CD40. This molecule could be detected on human corneal epithelial cells but only after prolonged co-culture time of six days.

Additionally to the cell culture experiments, human corneal grafts were investigated that were exchanged after transplant failure. These investigations revealed CD4 positive T cells participated in the corneal graft rejection. Furthermore, CD40 positive cells were determined in the superficial epithelium.

This study has shown that human corneal epithelial cells seem to participate in the corneal transplantation rejection process, as potential antigen presenting cells. The corneal transplant rejection may be initiated by corneal epithelial cell contact with T lymphocytes. The current studies have demonstrated the activation process of T lymphocytes. The costimulatory molecule which participate in T lymphocyte activation, such as CD80, CD86, CD40, CD154 was also exhibited on human corneal epithelial cells, HCEC. The results were consistent with former report that cytotoxic T cells ($CD8^+$) play no essential role in rejection of orthotopic corneal allografts in mice.