LETTERS TO THE EDITOR

Amitosis in human donor corneal endothelium – a serendipity?

Sir,—It is generally accepted that the human corneal endothelium does not usually replicate, Kaufman et al1 described a single dividing (amitotic) cell in the donor cornea of a 50-year-old man, and more recently Laing et al2 reported a putative mitotic figure by clinical specular micrographs in a case of graft rejection. They suggested that mitosis represents an additional healing mechanism to repair by cell reorganisation, migration, and enlargement. Since the human endothelium cannot at present be studied continuously but at short intervals in vivo, a given cell cannot be monitored at different phases of division. Hence evidence for mitosis or amitosis must be circumstantial and based on isolated clinical or histological observations. Any report of suspected cell division adds to this circumstantial evidence.

We wish to report the finding of binucleate cells by scanning electron microscopy (SEM) in the endothelium of purportedly normal adult and infant donor corneas. One cornea was from a 65-year-old woman with a normal ocular history. The cause of death was cardiac failure, and the globe was enucleated 12 hours post mortem. The other was from a case of cot death at the age of 3 months. The eye was enucleated four hours post mortem. A corneoscleral button was excised from each and prepared for SEM. During random scanning a single binucleate cell was found in the adult corneal endothelium. It was larger than the adjacent cells and its posterior plasmalemma appeared intact. At higher magnification, an apparent cleavage line was visible between the nuclei (Fig 1). Owing to the suspicion that mitosis occurs in infant corneas used for keratoplasty,3 dividing cells were specifically sought in the infant endothelium. A single binucleate cell was found (Fig 2).

Recently coalescence of endothelial cells, which creates bi- or multinucleate cells, has been implicated as a repair mechanism.4 However, as indicated by other observers,5 the binucleate state is equally explained by nuclear division. A consideration of the binucleate state should include normal mitosis, amitosis, cell fusion, cell rest, or indeed artefact. The lack of cytoplasmic cleavage in the cases reported here suggests incomplete mitosis or amitosis—a process in which the nucleus divides without cytoplasmic cleavage.

It is not known when human corneal endothelial cells lose their ability to divide, and conclusions regarding endothelial cell regeneration cannot be drawn from the chance findings of binucleate cells. However, the circumstantial evidence to date indicates that complete cell division, if it occurs in the mature corneal endothelium in vivo, is very infrequent and cannot adequately replace damaged or dead cells. Therefore all care should be taken to avoid the loss of cells during the preparation of donor corneas for transplantation, and, if methods of handling infant corneas (which possess twice the number of cells of adult corneas and which may be in the process of cell multiplication) can be improved, then the very young donor corneas is to be recommended.

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Measurement of corneal diameter

Sir,—The measurement of corneal diameter was the subject of a recent paper by Robinson et al.1 The ocular dimensions, and changes due to normal or abnormal processes, are of particular interest to ophthalmologists.2 While Robinson et al3 address important issues, several aspects of their paper deserve further comment.

The definition of corneal diameter is critically important to the resultant measurements and, arguably, to the biological import of such measurements. Previous values of corneal diameter reflect a lack of uniformity in definition and method.1 Robinson et al3 apparently adopted the horizontal visible iris diameter (HVID) as their definition of the horizontal corneal diameter (HCD).

Figure 1: SEM of adult corneal endothelium (x 860). Arrowhead indicates binucleate cell.

Figure 2: SEM of infant corneal endothelium (x 2800). Arrowhead indicates binucleate cell with cleavage line.