Scanning electron microscopy of the corneal endothelium of ostrich

A área celular média foi de 269±18 μm² e a densidade celular foi de 3717±240 células mm⁻². O coeficiente de variação foi de 0,06 e o percentual de células hexagonais foi de 75%. Não foram observadas diferenças significativas entre os parâmetros avaliados entre os olhos esquerdo e direito. Este estudo demonstrou que o endotélio corneano de avestruz é semelhante ao descrito em outros vertebrados.

Palavras-chave: endotélio, córnea, avestruz, Struthio camelus.

The corneal endothelium is a single layer of polygonal cells covering the posterior surface of the cornea (TUFT & COSTER, 1990). The structure of the normal corneal endothelium has been documented in humans (ABIB & BARRETO, 2001), dogs (GWIN et al., 1982; PIGATTO et al., 2006; RODRIGUES et al., 2006), horses (ANDREW et al., 2001) and other animal species (YEE et al., 1987; COLLIN & COLLIN, 1998; Pigatto et al., 2004; Pigatto et al., 2005a; Pigatto et al., 2005b). The ostrich (Struthio camelus) is the world’s largest living bird. Native of Africa, these flightless bird are important animals in many livestock industries. However, studies about the corneal endothelium of the ostrich (Struthio camelus) have not been reported previously, in the referred literature. The aim of this study was to examine the surface morphology and to
perform a morphometric analysis of the normal corneal endothelial cells of ostrich by using scanning electron microscopy (SEM).

These findings help to establish the normal appearance of ostrich corneal endothelial and can be used for comparison with other animal species.

Twenty-four normal eyes from 12 Ostriches (Struthio camelus), males, with 1 year old and about 100kg of body weight, were studied. These eyes were obtained from a licensed Brazilian commercial company that breeds ostriches for meat production. All procedures were performed in compliance with the Association for Research in Vision and Ophthalmology statement regarding the use of animals in ophthalmic and vision research. Ostriches were killed in a commercial abattoir, using a standard slaughter protocol. After 1 hour of death, eyes were enucleated and those one that showed evidence of ocular disease were excluded. The posterior endothelial surfaces were examined and photographed using a scanning electron microscope operated at 15kV. Ten photomicrographs were taken from each cornea with magnifications of X 750, X 1,000, and X 1,500. The photomicrographs were scanned into the computer, and polygonality was determined. With image analyzer software, the cell area of 100 endothelial cells from each cornea was measured, and the cell borders showed few protusions on cell surface. Cilia were not observed. Small pits were observed scattered over the cell surface. Microvillous appeared as multiple microvilli distributed over the surface of each endothelial cell. The small microvilli observed scattered over the cell surface probably represent pinocytotic vesicles, previously documented in other vertebrates (COLLIN & COLLIN, 1998). Density of corneal endothelial cells using SEM has previously been reported in other species (COLLIN & COLLIN, 1998; ANDREW et al., 2001; PIGATTO et al., 2005a; PIGATTO et al., 2006). The pleomorphic characteristics of ostrich corneal endothelium are similar to those of man, cat, dog, and other vertebrates, where 65-80% of corneal endothelial cells area hexagonal (DOUGHTY, 1989; PIGATTO et al., 2005a). This study shows endothelial cells with minimal variation in size and shape, probably because all animals were of the same age, and only healthy corneas were studied. In other species, endothelial morphologic features and cell densities are dependent on age, with a decrease in endothelial cell density and corresponding increases in cell size and variation in shape with age (GWIN et al., 1982). The coefficient of variation in cell area observed in this study was similar to those described in normal corneal endothelium of other avians (YEE et al., 1987; PIGATTO et al., 2005).

Our results regarding the ultrastructure of the corneal endothelium of ostrich agree with those reported by other authors (YEE et al., 1987; DOUGHTY, 1989; COLLIN & COLLIN, 1998; PIGATTO et al., 2004; PIGATTO et al., 2005a; PIGATTO et al., 2006). Our study confirmed the presence of microvilli distributed over the surface of each endothelial cell. The small microvilli projected from all the endothelial cells have been described in other vertebrates (COLLIN & COLLIN, 1998). In the current investigation, we did not detect cilia in the corneal endothelium. However, this structure, protruding into the anterior chamber, was occasionally found in the endothelial cells of humans as well as in other animals (GALLAGHER, 1980). The small pits observed scattered over the cell surface probably represent pinocytotic vesicles, previously documented (SVEDBERGH & BILL, 1972). Density of corneal endothelial cells using SEM has previously been reported in other species (COLLIN & COLLIN, 1998; PIGATTO et al., 2004; PIGATTO et al., 2005a; RODRIGUES et al., 2006). The cell densities of the representative species of birds ranged from 4.413±766cells mm^-2 to 11.734±1.687cells mm^-2 (COLLIN & COLLIN, 1998). Our results showed that cell density is similar to that found by COLLIN and COLLIN (1998). This study showed that the parameters evaluated did not differ significantly between both eyes from the same ostrich. Such findings are in agreement with previous studies (TUFT & COSTER, 1990; ANDREW et al., 2001; PIGATTO et al., 2004; PIGATTO et al., 2005b). The ultrastructure and the morphometric parameters of the

Ostrich corneal endothelium are similar to those described in other vertebrates. Furthermore, these data will increase our understanding about the environmental constraints placed on the non mammalian cornea and the evolutionary development of this tissue.

REFERENCES


