

ULTRASTRUCTURE OF GLOMERULUS IN TRICHOSURUS VULPECULA (POSSUM)

NALINI EDWIN

INTRODUCTION

THE STRUCTURE of the glomerulus in higher mammals has been described by many workers, using both light and electron microscopy.

The following is an account of the study in the marsupial (*Trichosurus vulpecula*).

MATERIALS AND METHOD

Two animals were used for light and electron microscopy. For electron microscopy, the fixatives were 4% glutaraldehyde (buffered at pH 7.3 with phosphate) followed by 1% osmium tetroxide. Tissues were embedded in Epon-Araldite mixture and sections were stained with uranyl acetate and lead citrate.

RESULTS

The glomerulus of marsupials closely resembles that of higher mammals. The endothelium is discontinuous presenting endothelial pores, and consists of simple squamous endothelial cells. The fenestration rests on a basal lamina (Fig. 1). At their margins, the inner and outer endothelial cytoplasmic membrane becomes continuous. The nucleus are ovoid and do not contain nucleoli. This extensive fenestration implies an important role in facilitation of glomerular filtrate.

The basement membrane is composed of three layers, an outer and inner less dense and a middle dense layer (Rhodin 1955).

The visceral epithelial cell layer seems to fill most of the filtration space between the capillaries. Some of the foot processes of the podocytes interdigitate with adjacent ones. They are applied closely to that of the exterior of the basement membrane (Fig. 1). The opposite sur-



Fig. 1 Endothelium is discontinuous and presents endothelial pores, and consists of simple squamous cells. The fenestration rests on a basal lamina, x 10,000.

face of basal lamina is covered intermittently by foot processes of podocytes. Capillary plasma passes through endothelial cell fenestra through the basal lamina, between the foot processes into the urinary space. The fluid is 'glomerular filtrate'. There is a sub-podocytic space enclosed by part of podocyte cytoplasm. It may or may not be in continuity with the urinary space.

The parietal epithelial cell layer consist of a reflection of cell bodies upward and along the stalk of the glomerular capillaries for a short distance. It is composed of a dense homogenous layer on which rest flattened epithelial cells.

Senior Teaching Fellow, Department of Anatomy & Histology
University of Adelaide, South Australia 5001.

NALINI EDWIN, M.B.B.S., M.S.C. (Anat)

DISCUSSION

Electron microscopy shows that the renal glomerulus of the opossum (*Trichosurus vulpecula*) has a very similar structure to that of higher mammals. The capillary basement membrane has an outer less dense layer, a middle dense layer and an inner less dense layer and is continuous with the intercellular material of the intercapillary tissue. Lining the capillary lumen is a thin sheet of endothelial cytoplasm which is perforated by numerous 'pores'. Epithelial cells have the same pedicellar arrangements as in higher mammals (Rhodin 1955). Cells exist between peripheral capillary loops and are separated from direct contact with blood by endothelial cells in the place of sections.

SUMMARY

Two animals were used for light and electron microscopy. For electron microscopy the fixatives were 4% glutaraldehyde (buffered at pH 7.3 with phosphate) followed by 1% osmium tetroxide. Tissues were embedded in Epon-Araldite mixture, and stained in uranyl acetate and lead citrate.

The usual fine structural details described in higher mammals were observed. Lining the capillary lumen is a thin sheet of endothelial cytoplasm which is perforated by numerous 'pores'. The basement membrane consists of an outer and inner less dense layer and a middle dense layer. The visceral layer seems to fill most of the filtration space and the foot processes of podocytes interdigitate with adjacent ones. The parietal epithelial cell layers are composed of a dense homogenous layer on which rest flattened epithelial cells.

REFERENCES

- Johnston, W.H. *et al.*, (1973). Variations in glomerular ultrastructure in rat kidneys fixed by perfusion. *J. Ultrastruct. Res.*, **45**, 149-67.
- Pease, D.C. (1954). Studies of kidney cortex by electron microscopy. *Ant. Rec.*, **118**, 339-340.
- Pease, D.C. (1955). Fine structure of kidney seen by electron microscopy. *J. Histochem. Cytochem.*, **3**, 295-300.
- Rhodin, J. (1955). Electron microscopy of glomerular capillary wall. *Exp. Cell Research*, **8**, 572-578.
- Skaaring, P. (1974). Scanning electron microscopy of podocytes of rat kidney. *Acta. Anat.* **87**, 394-403.