MESHWORK STRUCTURE OF THE GLOMERULAR BASEMENT MEMBRANE REVEALED BY CHEMICAL TREATMENT

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In order to study the ultrastructure of GBM, GBM was treated with various agents and observed by transmission electron microscopy (TEM).

MATERIAL AND METHODS

1) Isolated rat and bovine GBM were digested with 0.01% elastase (from porcine pancreas), for 24h at 37°C. The specimens were further treated with 1% sodium dodecyl sulfate (SDS) and 2% 2-mercaptoethanol (2ME). 2) Isolated GBM and sliced renal cortex were treated with 1M EDTA for 24h at 4°C and further treated with 4M GuHCl for 48h at 4°C. 3) Isolated GBM was digested with 0.01% bacterial collagenase. These specimens were observed by TEM using an ultrathin sectioning method and a rotary shadowing method.

RESULTS AND DISCUSSION

In the ultrathin section of the GBM treated with elastase, SDS, 2-ME, a meshwork structure composed of the strands was revealed clearly (Fig.1.). The strands were 3.1±0.7 nm in width and the nodular structures were observed on them. In the meshwork structure, numerous small pores were observed. Their shorter dimension was approximately 3-5nm. These results were consistent with our previous results reported by Ota in 19771), and by Ichiyasu in 19872). By a rotary shadowing method, many strands forming large networks were
Shikata, K. et al: Meshwork structure of GBM observed. (Fig. 2) These strands were considered to be type IV collagen molecules. Also in the specimens treated with EDTA and GuHCl, the meshwork structure was observed. Following a treatment with collagenase, the strands were digested and the meshwork structure disappeared. From these results, the GBM was considered to be composed of meshwork structure mainly composed of type IV collagen. This meshwork structure may act as the main filtration barrier against serum proteins in the glomeruli.

Fig. 1 Ultrathin section of the GBM treated with elastase, SDS, 2-mercaptoethanol. (Bar=100nm)

Fig. 2 Rotary shadowing of the GBM treated with elastase, SDS, 2-mercaptoethanol. (Bar=500nm)

REFERENCE