

GLOMERULAR BASEMENT MEMBRANE THICKNESS DISTRIBUTIONS IN FAMILIAL NEPHRITIS

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ABSTRACT

Familial nephritis is a kidney disorder which affects the capillary basement membranes within the glomeruli of the kidneys. Pathological changes include a general thinning of basement membranes, along with occasional focal thickening. Mean basement membrane thickness can be calculated using simple point and intercept counting techniques, but in this instance a better choice of parameter is some measure of the variability of membrane thickness. The following study was undertaken for this reason.

Glomerular basement membrane thickness distributions were calculated by means of computer aided morphometry in five children known to have the renal disease familial nephritis, and in five controls. Basement membranes were modelled by a sheet, and stereological techniques were used to estimate true sheet thickness distributions from intercept length measurements obtained from linear sections. To estimate true sheet thickness distribution, we used the unfolding algorithm presented by Cruz-Orive (1979), which was based on a solution proposed by Gundersen et al. (1978). The algorithm uses $N_L(l)$ to estimate $S_V(\tau)$, where $N_L(l)$ is the number of intercepts of length between l and $l+dl$ produced by a linear probe J , divided by the length of J , and $S_V(\tau)$ is the surface density of that part of the sheet with thickness in the range τ to $\tau+d\tau$.

A digitizer platen (HP 9874A) was used to measure intercept lengths from electron micrographs (14,000X) with test lines overlaid, and intercept length distributions were unfolded by a computer program (BASIC) implementing Cruz-Orive's algorithm on an HP 9816 micro-computer.

REFERENCES

- Cruz-Orive LM. Estimation of sheet thickness distributions from linear and plane sections. *Biom J* 1979; 21: 717-730.
Gundersen HJG, Jensen TB, Osterby R. Distribution of membrane thickness determined by lineal analysis. *J Microsc* 1978; 113: 27-43.