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# Capillarization of the Hepatic Sinusoid in Failed Liver Grafts

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IN THE NORMAL hepatic acinus, the basement membrane is not seen in the hepatic perisinusoidal space, called Disse's space.[1] However, it has been reported that the hepatic sinusoidal wall has the basement membrane formation and resembles the capillary in chronic liver disease such as cirrhosis of the liver.[2,3] This alteration has been suggested to advance damage of the parenchymal cells due to the disturbed exchange of metabolites between blood and parenchymal cell.[3,4] The aim of this study was to estimate the role of the hepatic sinusoidal capillarization in failed liver grafts from various causes after transplantation.

## MATERIALS AND METHODS

During the 21 months between October 1989 and June 1991, 31 biopsy specimens from human liver allografts which were replaced (failed grafts) within 2 months after transplantation for various causes were frozen and stored. Eight of these failed from acute rejection, 7 from harvest injury, 6 from hepatic artery thrombosis, 1 from portal vein thrombosis, and the remaining 9 from primary nonfunction. Ten liver specimens biopsied from the recipients with successful outcome of liver transplantation served as controls. Frozen specimens were examined with immunohistological staining using monoclonal antibodies of anti-collagen type IV (Accurate Corp, Westburg, NY), antilaminin (Calbiochem, San Diego, Calif), antifibronectin (Dako Corp, Santa Barbara, Calif), and anti-factor VIII-related antigen (Dako Corp, Santa Barbara, Calif).

## RESULTS

Collagen type IV and fibronectin were stained weakly, but laminin and factor VIII-related antigen were not stained in the hepatic sinusoid in all control specimens (Fig 1). In all of the failed grafts, basement membrane formation with collagen type IV, fibronectin, and laminin was observed on the hepatic sinusoidal wall in 7 (88%) of the acute rejection-failed grafts, 6 (86%) of the harvest injury-failed grafts, 5 (83%) of the hepatic artery thrombosis-failed grafts, the 1 (100%) portal vein thrombosis-failed graft, and 3 (33%) of the primary nonfunction-failed grafts. The factor VIII-related antigen was also positive on the sinusoidal endothelium in most failed grafts, associated with development of a basement membrane formation in the hepatic sinusoid.

## DISCUSSION AND CONCLUSION

It has been suggested that one of the causes of failed liver allografts is the alteration of endothelium as a result of immunological injury.[5,6] The basement membrane formation in the perisinusoidal space indicates that the capillarization of the hepatic sinusoid, and subsequently collagen fiber, increases to form an almost continuous barrier.[4] The appearance of factor VIII-related antigen on the sinusoidal endothelium appears to be associated with the basement membrane formation, and thus functional alteration of the endothelial cell may induce the imbalance of the hepatic anticoagulant system or hepatic homeostasis. In conclusion, the continuous capillarization of the hepatic sinusoid appears to be one of the factors promoting the failure of liver allografts.

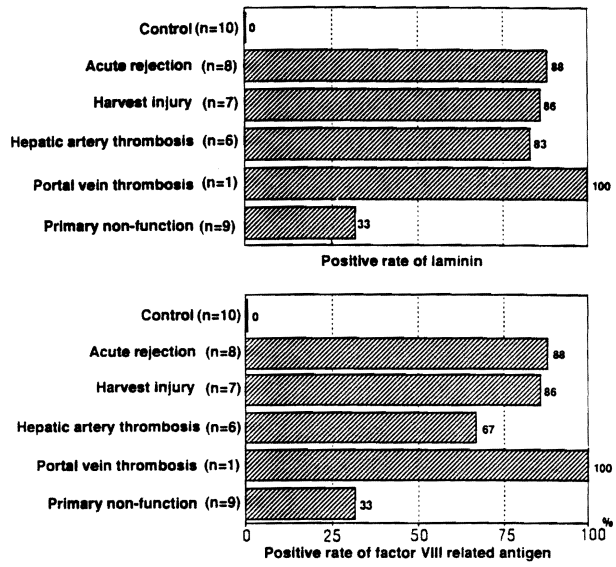


**Fig 1.** Appearance rates of laminin and factor VIII-related antigen in the hepatic sinusoidal wall.

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