

**BIOCHEMICAL STUDIES OF THE HOMOTRANSPLANTED  
CANINE LIVER**

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Earlier studies provide an evaluation of some parameters of liver function after total liver homotransplantation in dogs. The most significant assessment of liver function in these animals is their survival for as long as 20.5 days (3). Biochemical determinations of the liver profile after total homotransplantation show a picture of pro-

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gressive obstructive jaundice (2, 3). In these same studies, determinations of the albumin and globulin content of the serum by routine clinical laboratory methods have not revealed any consistent changes in the plasma proteins, nor were any qualitative changes noted on electrophoresis. After renal transplants in dogs, the alpha-2 globulin was found to be increased and albumin decreased (4).

The availability of more refined techniques for estimating plasma protein biosynthesis has prompted us to apply these techniques to a study of this parameter of liver function after total homotransplantation with 2 objectives: (1) to determine if the homotransplanted liver can synthesize plasma proteins at a normal rate, and (2) to gain more insight into plasma protein abnormalities associated with homograft rejection phenomena.

#### METHODS

Liver function studies were made before and after total homotransplantation of the liver in 4 adult mongrel dogs surviving 6 to 16 days. These studies include liver profiles and synthesis rates of all plasma proteins after the third or fourth post-transplant day. The liver profiles included baseline determinations of the normal liver before transplant, and serial determinations of serum bilirubin, cholesterol, alkaline phosphatase, cephalin flocculation, and thymol turbidity after transplant, by routine clinical laboratory methods.

Estimates of the synthesis rates were obtained by using the incorporation of  $S^{35}$  methionine in plasma proteins as an index of protein synthesis and paper block electrophoresis for separation, as previously described (1). The technique of total homotransplantation of the canine liver into a previously hepatectomized dog was as previously described with the exception that splenectomy was performed in only 1 dog of this series (3). All studies were compared to the same studies in the recipient dogs; thus each liver served as its own control in two carcasses.

#### RESULTS AND INTERPRETATION

The liver profile of dogs with homotransplanted livers shows a progressive obstructive jaundice pattern. This is characterized by a progressive rise in serum cholesterol, bilirubin, alkaline phosphatase, and urinary urobilin. A less consistent increase in thymol turbidity and cephalin flocculation was seen in 2 dogs. This pattern of liver profile is similar to that previously reported (2, 3). The synthesizing capacity of the homotransplanted liver as judged by its ability to manufacture albumin and fibrinogen on the third or fourth day after transplant, showed that the transplanted liver can produce from 60 to 150% albumin and fibrinogen as compared to its normal capacity. Increased synthesis of these proteins in any one dog was

interpreted as a response to acute depletion of these proteins (especially fibrinogen) due to the prolonged surgical procedure of hepatectomy and transplantation of the liver. A significant increase in synthesis of alpha-2 and gamma globulins in all dogs was noted. This may be a nonspecific response to the homograft rejection mechanism.

#### CONCLUSIONS

The full capacity to synthesize all plasma proteins is retained by the dog on the third to fourth days following total homotransplantation of the liver. There is significant increase in alpha-2 and gamma globulin synthesis in these animals. Some excretory functions of the liver show progressive deterioration after the third to fifth days following homotransplantation.

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