

factor, if existing in the blood of the non-irradiated animal, was not transferred in concentration sufficient to ameliorate the pressure drop in the irradiated partner.

Discussion. Results of the present experiments leave no doubt that irradiated and non-irradiated rabbits connected through cross-transfusion behave like independent animals so far as blood pressure is concerned. Although absence of a vaso-depressive factor in the arterial blood does not exclude its existence at the tissue level and or in the venous blood, the findings point to the nervous system as an important participant in the early hypotensive reaction. This view is supported by the facts that atropinization and vagotomy strongly reduce the initial blood pressure response in rabbits(1,3), and that doses between 1500 and 2500 r cause hypotension in normal but not in spinal rats(4).

Summary. A pump for continuous cross-transfusion has been developed, and some studies about the nature of the early blood pressure fall induced in rabbits by x-irradiation have been conducted. Results of the cross-transfusion experiments indicate that the shielded animal does not protect its partner exposed to 900 r, neither does the irradiated rabbit affect the blood pressure of the shielded partner.

1. Painter, E. E., Prosser, C. L., and Moore, M. C., USAEC Report MDDC-761.
2. Brooks, P. M., Gerstner, H. B., and Smith, S. A., *Am. J. Physiol.*, 1956, v186, 532.
3. Strauss, O., and Rother, J., *Strahlentherapie*, 1924, v18, 37.
4. Montgomery, P. O'B., and Warren, S., *PROC. SOC. EXP. BIOL. AND MED.*, 1951, v77, 803.

Received March 29, 1957. P.S.E.B.M., 1957, v95.

Method for Temporary Exclusion of Liver in Dogs.* (23248)

IRVING L. LICHTENSTEIN AND DAVID STATE (Introduced by Alvin Sellers)
*Division of Surgery, and Institute of Medical Research, Cedars of Lebanon Hospital,
 Los Angeles, Calif.*

The major causes of the mortality associated with a one-stage hepatectomy in dogs are hemorrhage and air embolization. Leveen and Lewis(1), by substituting a plasticized vinyl tubing for the glass cannula originally described by Markowitz(2), greatly increased the number of surgical survivals. The liver is a unique organ in at least two respects. First, it has a double blood supply, the hepatic artery and portal vein. Occlusion of the latter results in rapid death, because the inflow of blood into the intestinal area has no return outlet to the general circulation. This loss of effective circulating volume results in irreversible shock. The liver is also unusual in dogs in that it drains directly into the vena cava without benefit of intervening blood vessels. In order to perform a successful total hepatectomy, therefore, the portal blood must be short-circuited into the

vena caval (systemic) system, and a method must be utilized to block the venous outflow from the liver without occluding the vena cava.

Method. By reference to the diagram (Fig. 1) one can see how both these problems are met rather simply by the plastic cannula. A portal-caval anastomosis is established merely by insertion of the side arm of the tube into the distal divided portal vein. The hepatic venous drainage is trapped or occluded between ligatures A and B, while the systemic circulation can proceed unimpeded by the vena cava through the central portion of the tube. If the arterial supply is satisfactorily controlled the liver can now be removed with minimal blood loss and no compromise or block of the animal's circulation. If one desires, however, to reverse the hepatectomy 2 modifications are necessary. The artery must be occluded by means of a

*Supported in part by grant from U.S.P.H.S.

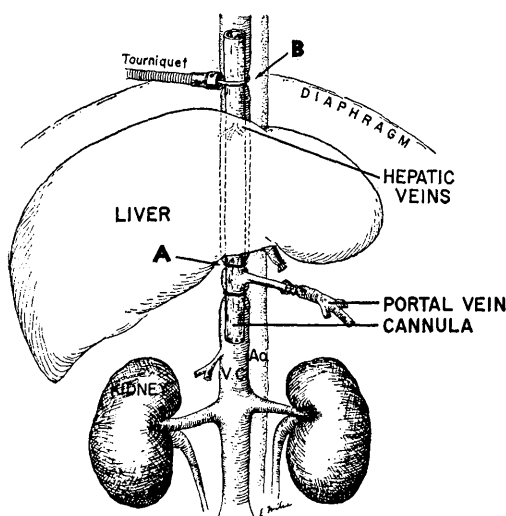


FIG. 1.

non-crushing clamp, rather than divided, so that its integrity can be easily restored. The ligature compressing the vena cava against the tube between the liver and diaphragm should be replaced by a tourniquet; its release immediately reestablishes hepatic out-

flow. The portal circulation, too, may be restored rapidly by interposing a tube between the divided vein ends(3). This avoids the necessity of a suture anastomosis and can be carried out with great facility. All tubes used for vascular anastomosis must be suitably treated with Desicote to prevent vascular thrombosis. With experience, the mortality of this "reversible hepatectomy" should not exceed 15%.

Summary. An experimental technic has been described by which the liver can be excluded from the dog's circulation and returned promptly, as desired, into its normal anatomical and functional position. This method has a low mortality.

1. Leveen, H. H., and Lewis, L., *Ann. Surg.*, 1954, v139, 195.

2. Markowitz, J., *Experimental Surgery*, 1949, 2nd edition, 509, Williams and Wilkins.

3. Lichtenstein, I. L., Drapkin, H., and State, D., *Surg.*, 1956, v40, 503.

Received April 2, 1957. P.S.E.B.M., 1957, v95.

Uptake of Fission Products and Neutron-Induced Radionuclides by the Clam. (23249)

J. K. GONG, W. H. SHIPMAN, H. V. WEISS, AND S. H. COHN
(Introduced by E. M. Jacobsen)

U. S. Naval Radiological Defense Laboratory, San Francisco, Calif.

Detection of sea water contamination resulting from radioactive fallout or disposal of reactor waste products deserves careful consideration(1,2). Assessment of degree of contamination of water in which levels of activity are low, but nevertheless biologically significant, is difficult owing to the large volume of water required for radioanalysis. A biological indicator which rapidly reflects degree of nuclide contamination by virtue of a concentrating ability is of obvious value. Surveys made of the Marshall Islands one and 2 years after their accidental contamination by fallout, revealed the presence of readily detectable levels of radioactivity in clams (3,4). Radioactivity in these animals was

significantly higher per unit body weight than in most marine specimens analyzed. An extraordinary ability to concentrate radionuclides dispersed in sea water was evident from the fact that the level of gamma activity in clams collected at Eniwetok Proving Ground was about 2000 times greater than that of sea water(3). The concentrating ability of the clam probably derives from its mechanism of feeding which involves filtration of large volumes of water. It is estimated that in one year a 3 in. clam filters about 2.3×10^4 liters of water(5).

In the current study, the uptake by the clam of radionuclides was examined under controlled conditions. Groups of clams were