

the recommended intramuscular doses could cause any change in flow in normal subjects.

Summary. 1. Pancreatic extract in concentrations of 0.2 to 1% causes a transient but significant increase in coronary sinus outflow in the denervated and innervated heart-lung preparation. 2. Femoral blood flow in anesthetized cats may be increased by 100 to 650% following doses of 0.005 to 0.02 cc of pancreatic extract injected intra-arterially. The effect lasts no more than 2 or 3 minutes. 3. Doses of 1 cc of pancreatic extract cause a transient dilatation of the arterial bed of

the perfused dog head. 4. Doses of 0.01 cc have no regular effect upon arterial pressure when injected intravenously into anesthetized cats. Doses of 0.1 cc cause a 50% fall in arterial pressure lasting only one or 2 minutes, followed by a rise of 25 to 30% above the control level lasting for 3 or 4 minutes. Femoral blood flow appears to follow passively the arterial pressure; vasodilatation probably occurs chiefly in the visceral vascular beds.

The authors are indebted to Professor Otto Kroyer for his aid and advice in the preparation of this report.

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Repair of Peripheral Nerves by Grafts of Frozen-Dried Nerve.*

PAUL WEISS AND A. CECIL TAYLOR.

From the Department of Zoology, The University of Chicago.

Orientation, growth rate and grouping of growing nerve fibers are determined by the biophysical and biochemical constitution of the interfaces along which they advance.¹ Their most favorable growth medium is degenerated peripheral nerve.² Accordingly, peripheral nerve fragments are the best means of bridging traumatic nerve gaps.³ In mammals, autografts can be fully, homografts adequately successful;⁴ heterografts are largely discredited.^{4,5} Nerve grafting in man has met

with the difficulties of (1) growth-obstructing fibrosis of the distal suture line, and (2) unavailability of grafts. The former may be obviated by resection of the barrier,⁶ or possibly completely avoided if sutureless nerve splicing by arterial sleeves⁷ should prove as successful in man as it has been in animals. The supply difficulty is more serious, since commonly no source other than the patient's own intact nerves is available. In order to avoid having to sacrifice a "minor" nerve for the repair of a more vital one, several authors have tried preserved or fixed nerves. Storage in petrolatum⁸ leaves the grafts viable, but presumably not indefinitely. Alcohol-fixed grafts^{8,9} lead to poor regeneration,⁵ formalin-fixed grafts to complete failure.⁹

Basically, these past failures are attributable to the denaturation of the grafts. Therefore, one of us (P. W.) thought of trying a preserva-

* Work done under a contract, recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and the University of Chicago; also aided by the Dr. Wallace C. and Clara A. Abbott Memorial Fund of the University of Chicago. The generous cooperation of Professor Robert R. Bensley and Dr. Sylvia S. Bensley in the technical phases of the experiments is gratefully acknowledged.

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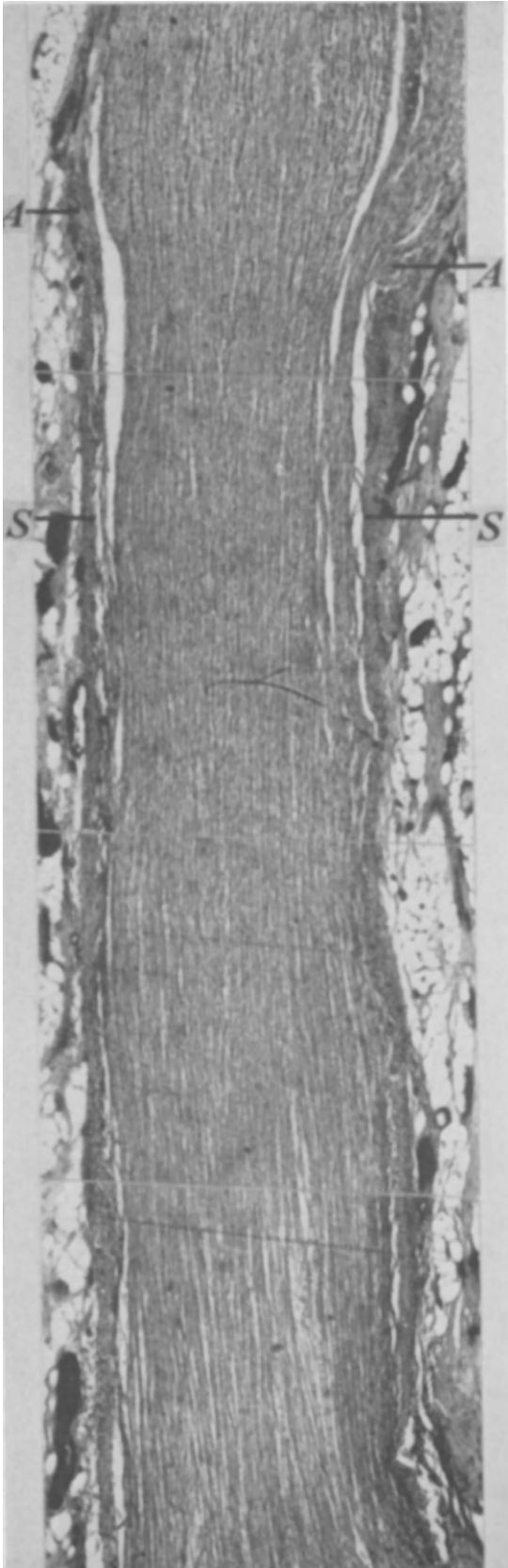


FIG. 1.

Regeneration through frozen-dried-rehydrated nerve graft sleeve-spliced to proximal stump of tibial nerve in rat, 127 days after operation. A, proximal end of arterial splicing sleeve. S-S, original level of fusion of proximal stump and graft.

tive, but non-denaturing treatment: the Altmann-Gersh freezing-drying method¹⁰ used with great success in histology and histochemistry.¹¹ This method preserves microstructure and major biochemical (*e.g.*, enzyme) constitution without essential alteration. This very feature determines its suitability for the preparation of nerve grafts.

Our procedure is as follows: Nerves dissected aseptically are dropped into Isopentane¹² immersed in liquid nitrogen (-195°C), where they freeze instantaneously, and transferred to high vacuum and mercury pumps for about one week of dehydration over P_2O_5 at -40°C . The dry specimens are stored in sealed sterile containers. Before use, they are rehydrated in vapor at -40°C or in Ringer's solution *in vacuo* at room temperature. They resume their normal appearance and major histological characteristics,¹³ including specific staining reaction (silver impregnation and Mallory Triple Azan).

Segments of these "devitalized" nerves of about 1-2 cm length were grafted into gaps of hind limb nerves of 38 rats, 4 cats, and 18 monkeys. These grafts were spliced to the nerve stumps by 2 short arterial sleeves,⁷ or a single long sleeve containing the graft. Twenty-nine rat nerves (21 homoplastic, 8 cat-to-rat) have thus far been studied microscopically, and a few oscillographically, from 6 days to 18 weeks after the operation.

Homoplastic grafts heal and promote regeneration much as does live nerve. The regenerating sheath cells and nerve fibers invade them promptly, traveling in straight parallel courses, without appreciable branching or confusion. Fig. 1 shows a typical case, 4 months after grafting: regeneration is so perfect that there is no evidence of the old proximal "suture line" (level marked S-S). The regenerated fibers regain caliber (Fig. 2), impulse conduction is restored, and motility and sensitivity return. Nerves predegenerated

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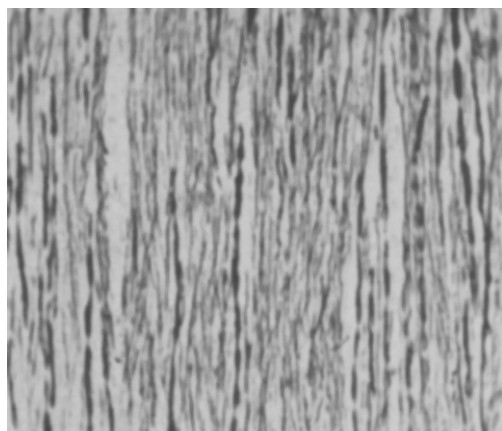


FIG. 2.

Detail from Fig. 1, showing the regenerated nerve in the zone of the graft. $\times 230$.

before treatment do not seem superior to undegenerated ones. Details will be reported later. Sclerotic islands present in a few grafts may tentatively be ascribed to imperfections in the freezing or rehydration process.

Most devitalized heteroplastic grafts behave like foreign bodies. However, masses of nerve fibers use their oriented surface as pathway.

The results indicate that the biophysical and biochemical benefits to regenerative nerve growth inherent in peripheral nerve are essentially preserved in the freezing-drying process. The fitness of devitalized nerve as graft brings the supply problem in nerve grafting nearer its solution. Banks of assorted nerve sizes stored in the dry condition could readily fulfill a steady demand.

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Hepatic Injury in Dogs Resulting from a Vitamin B Complex-Free Diet.

VICTOR A. DRILL, C. BOYD SHAFFER, AND JAMES H. LEATHEM. (Introduced by W. W. Swingle.)

From the Section of Physiology, Biological Laboratory, Princeton University, and Department of Zoology, Rutgers University, Princeton and New Brunswick, N.J.

Various authors have studied the effect of administration of the B vitamins in cases of hepatic cirrhosis,^{1,2,3} and experimental studies on the relation of the B vitamins, choline, methionine and cystine to hepatic damage have been reported.⁴⁻⁹ In this paper prelim-

inary studies were made on the effect of a vitamin B complex-free diet on the hepatic function of dogs.

Methods. Seven adult dogs, weighing between 7.9 and 14.3 kg, were used as experimental animals. When first obtained they were placed on a diet of Purina chow, and 2 weeks before the experiment was started they were fed on a modified form¹⁰ of Cowgill's casein diet No. 3,¹¹ plus a daily yeast supplement. The diet used was free of the B vitamins, the only source of these vitamins in the diet being supplied by the daily yeast supplement. The dogs had access to their food for a 3-hour period each day. The amount of food eaten was measured. Following control measurements of liver function, the yeast was removed from the diet of 5 of the dogs and the liver function, food intake and weight changes studied. The other 2

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