for stabilization before the first test dose is given. A point is selected under Poupart's ligament ¼" medial to the femoral artery, the pulsations of which can be felt. This point corresponds to the femoral vein just proximal to the junction of its great saphenous vein tributary. The point is marked with ink. Over this point is placed the sensitive chamber of the scintillation counter in such a manner that it is as close to the skin as possible without pressing upon it. The strip chart record is set in motion. When the background reading has been stabilized the flow of saline is discontinued and radioactive iodine is injected during an interval of less than 1 second. The time of injection is marked by hand on the moving paper of the recorder with an error in timing estimated to be less than ½ second. Since the time of flow is never less than 7 seconds a mechanical signal device is not essential. In one series of patients (Table I, Group I) the saline was allowed to resume its flow immediately after the test injection. In another group (Table I, Group II) no saline was allowed to flow until after the reading was recorded. The latter procedure would appear to be preferable in that a possible accelerating effect due to the flow of saline is avoided.

The circulation time having been obtained and permanently recorded, various modalities can then be applied to the calf or any other part of the body, and their possible effects upon this circulation time can be ascertained. Table I shows the control circulation times as obtained in patients before the administration of any physical modalities intended to promote venous flow.

Discussion. The saphenous circulation time appears to be reasonably constant for the same individual tested at intervals of 5 to 20 min. One patient (E.C.) showed no change in time when retested after 16 days. Preliminary tests already made, as indicated by one example (Fig. 1), show that saphenous circulation time is affected by various modalities or even by the same modality differently administered. It is hoped in the course of time to study a sufficient number of patients to permit an evaluation of such modalities upon the saphenous circulation time as measured by the present technic.

Conclusion. A saphenous circulation time test using radioiodine which is detected by a scintillation counter has been described, and its possible uses have been indicated.

We wish to thank Dr. R. A. Shipley, Director of the Radioisotope Unit of Crile V. A. Hospital for his constant cooperation and guidance in the development of this test.

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Received December 4, 1951. P.S.E.B.M., 1952, v79.

Acute Arterial Plethora. (19299)

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Byrom and Dodson(1) reported the production of acute necrotizing renal arteritis in 10 of 23 young rats within 3 days after an acute transient episode of hypertension, which had been induced by a series of rapidly administered intra-arterial injections of Ringer's solution. The vascular lesion was described as an acute necrotizing arteritis and was usually limited to one or 2 vessels in each kidney section. The authors concluded from their experiments that a sudden brief rise in intra-arterial tension can cause fibrinoid arterial necrosis in a normal animal and that the smaller arteries of the kidney are selectively

vulnerable to injury in this manner. In view of these findings and the possibility that such a mechanism may operate in the production of the necrotizing vascular lesions seen in malignant hypertension in man, it was felt that these experiments should be repeated.

This report deals with the acute phase of the experiment. The long-term results of a single episode of increased intra-arterial tension will be reported later.

Experimental. Two groups of rats, one comprised of 6 animals 5 months of age, and one of 6 animals 2 years of age, were subjected to acute hypertensive episodes in a manner similar to that employd by Byrom and Dodson. They were of the Sprague-Dawley strain. Intraperitoneal pentobarbital was used instead of ether for anesthesia. Another minor variation was that half of the animals were injected with normal saline and half with Ringer's solution, whereas Byrom and Dodson used Ringer's solution exclusively. The vagus nerve, and, when possible, the sympathetic nerves were dissected off the carotid artery. A cannula, which was made from a 22-gauge needle, was directed proximally into the carotid artery. The contents of a 2 cc syringe were emptied with greatest possible force into the artery. Each syringeful was injected in less than 2 seconds. The solutions were injected at a temperature of 37°C. The number of injections per animal varied between 4 and 14, and the intervals between injections varied between 5 and 15 seconds. The cannula was then removed, the artery ligated, and the incision repaired.

Several animals showed a drooping of the eyelid on the operated side. This was thought to be due to interference with the sympathetic chain. There was obvious respiratory distress with wheezing and dyspnea during and following the injections. This tended to be less severe after 30 minutes. A marked diuresis occurred within 3 minutes after the injections of saline or Ringer's solution. After 3 days the animals were killed, one-half by intraperitoneal injection of pentobarbital, and one-half by ether inhalation. Gross examination of organs was made and the entire animal placed in formalin for fixation. Microscopic examination was done independently by each of us as a method of checking observations. Most organs were examined and multiple sections of both kidneys of each rat were studied. The sections were stained with hematoxylin and eosin. Sections of kidneys were also stained for fat.

Effect of intra-arterial injection of fluid on blood pressure. A preliminary exploratory experiment was undertaken to investigate the nature and magnitude of the rise in arterial pressure that occurs in the rat incident to rapidly repeated 2 cc injections of fluid into the arterial system. Normal adult rats were anesthetized by intraperitoneal injections of sodium pentobarbital, after which a blood pressure cuff was placed on one of the hind limbs of the animal. Systolic pressures were recorded by means of a photoelectric tensometer(2-4). Injections of 2 cc of fluid into the carotid artery were then made and blood pressures were recorded during and immediately after the injections. Six animals were tested in this manner. In each instance the animal was normotensive prior to injection. In no animal was there an increase in systolic pressure, though as much as 18 cc of fluid were injected in repeated 2 cc amounts. The average time interval between injections was 10 seconds. Although this is an indirect measurement of blood pressure it has the advantage over direct aortic measurements as used by Byrom and Dodson(1) in that there is no disturbance of the circulation except for the one carotid artery used for cannulation and injection of fluids. It permits recording of pressures in branches of the arterial tree which more closely parallel the pressures transmitted to visceral organs. From these results it follows that no marked increase in pressure is transmitted far beyond the aorta and that in the normal rat the compensatory changes to increased fluid volume of the vascular bed are immediate.

Pathological changes encountered in rats three days after experimental induction of acute arterial plethora. The total amount of fluid that was injected into each animal of the younger age group (5 months) was: 16, 18, 18, 18, 18, and 20 cc. A careful search of multiple sections disclosed no vascular abnormalities in the kidneys of any of the 5-

months-old animals. Moderate to marked passive hyperemia was observed in the liver, spleen, kidneys and lungs. In one animal there was a recent, small intra-alveolar pulmonary hemorrhage. The total amount of fluid that was received by each animal of the older age group (2 years) was: 10, 16, 18, 20, 24, and 28 cc. Acute necrotizing renal arterial changes of the kind described by Byrom and Dodson were not observed in any of these animals. However, all of these animals were found to have focal or diffuse chronic pyelonephritis with renal parenchymatous atrophy, interstitial exudation and fibrosis and chronic degenerative and proliferative changes in both arteries and arterioles in the regions of inflammatory change. Examination of the other organs of these animals failed to disclose evidence of acute vascular injury. The only change observed was hyperemia of liver, spleen, kidneys and lungs.

Pathological changes encountered in control series. Eighteen rats served as a control series. Six of these were approximately 5 months of age and 12 were approximately 2 years of age. These were presumably normal animals that were sacrificed for the purpose of determining whether or not the pathological changes observed in the experimental group were significantly different from those which occurred spontaneously in animals of the same strain and of comparable age which had been maintained on the same diet and in the same environment. No renal or arterial abnormalities were observed in the 6 young (5 months) animals. In 7 of the 2-year-old control animals pyelonephritis and associated vascular lesions similar to those observed in the older experimental group were seen. The incidence of active degenerative and vascular changes in the control animals was comparable to those seen in the experimental group.

Summary. (1) These experiments were carried out in an effort to confirm a previous report of the production of an acute arterial and arteriolar necrosis in the rat by sudden brief increases in intra-arterial pressure. Twelve rats were subjected to such an experiment. These animals were given rapid injections of saline or Ringer's solution into the common carotid artery. Increases in peripheral arterial pressure during and immediately following injections of fluid were not detected by indirect measurement of blood pressure. (2) In no instance was there evidence of vascular abnormalities other than those which could be explained on a basis of pre-existing pyelonephritis. The existence of pyelonephritis in both experimental and control groups depended on the age of the animals and was seen exclusively in the older age groups. There was no correlation between the vascular lesions and the total volume of fluid injected in the experimental group. (3) Neither acute necrosis nor inflammation of the arteries or arterioles was produced in the rat by a sudden brief episode of hypervolemia. The brief rise in intra-arterial pressure that occurs during the rapid injection of fluid does not produce detectable changes in peripheral arterial pressure. These observations are not in accord with the report of Byrom and Dodson.

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Received December 10, 1951. P.S.E.B.M., 1952, v79.