animals. No correlation was found between the responses obtained with the extracts and those obtained with epinephrin, pituitrin, saline, or by induction of the carotid sinus pressor reflex. Atropin has been found to abolish the depressor part of the curve but to have no effect upon the pressor portion. Control injections of saline at times induced a rise of as high as 30 mm. Hg for a period of one or 2 minutes' duration.

Nineteen blood extracts were made on as many patients, using both the Bohn and a modified technique. These patients included normal subjects and hypertensive subjects of the different types. Three extracts of ascitic fluid, chest fluid and spinal fluid were made, by a modified method, on 9 subjects, including both normals and hypertensives in each group of fluids. Using both the original fluid and the extract, we were unable to demonstrate any significant pressor effect. Similar results were obtained in the case of blood. Recently de Wesselow and Griffiths[4] and Page[5] were unable to demonstrate increased amounts of pressor substances in the blood of patients with arterial hypertension.

Our observations fail to confirm the claim of Bohn that increased amounts of circulating substances are responsible for "pale hypertension". The separation of pressor and depressor substances by the alcohol-acetone fractionation method proved to be impracticable.

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Effect of Heavy Water (deuterium oxide) on Viability of Mouse Sarcoma and Rat Carcinoma.

KANEMATSU SUGIURA AND L. C. CHESLEY.

From the Chemical and Biophysical Laboratories, Memorial Hospital, New York City.

It was clearly shown[1] that the proliferating capacity of the mouse sarcoma 180 and the mouse melanoma was unaffected by heavy water (14.8 and 40% H^2_2O) when it contained salts of Locke-Ringer solution in an isotonic amount.

4 de Wesselow, O. L. V. S., and Griffiths, W. J., *Brit. J. Exp. Path.*, 1934, **15**, 45.

5 Page, I. H., Fishberg's Hypertension and Nephritis, Lea and Febiger, Philadelphia, 1934, p. 230; and personal communication.

1 Sugiura, K., and Chesley, L. C., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 659.

We here present the results of experiments to determine the influence of 94% heavy water on the growth of malignant neoplasms in rats and mice. This study was made possible through the courtesy of Dr. Urey of Columbia University who supplied us with the heavy water.

The mouse sarcoma 180 and Flexner-Jobling rat carcinoma were selected for the present study. The behavior of these transplantable tumors in the hosts has been reported elsewhere.

Into each of 2 weighing bottles were placed 2.5 cc. of Locke-Ringer solution which was evaporated to dryness over a covered water bath. One residue was then dissolved in 2.5 cc. of ordinary distilled water and the other in 2.5 cc. of 94% heavy water, thus making isotonic solutions. The solutions were buffered to pH 7.0 approximately by adding 0.088 cc. of 0.2 M KH_2PO_4 and 0.052 cc. of 0.2 M KOH. Small pieces of tumor tissues (each weighing

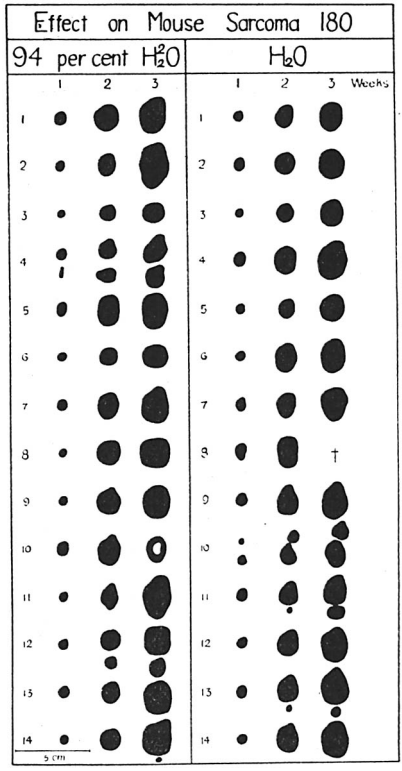

FIG. 1.

The proliferating capacity of the mouse sarcoma 180 was equally unaffected by 94% heavy water and ordinary distilled water when it contained salts of a Locke-Ringer solution in an isotonic amount.

about 6 mg.) were placed in these solutions and left for 24 hours at 4-5°C. At the end of this period of time, the tumor fragments were inoculated into mice. The results are presented in Figure 1.

Each set of experiments included the inoculation of animals of about the same age with untreated tumor tissue immediately after removal from the tumor-bearing animal.

It is evident that the transplantability of mouse sarcoma 180 was not destroyed by 94% heavy water, the growths being practically the same as in the controls. Histological examinations of these treated tumor tissues showed no definite changes. It may be noted that the growth capacity of the mouse sarcoma 180 was markedly destroyed when subjected to hypotonic media for 24 hours, both in ordinary and heavy water. (Both ordinary distilled water and 40% heavy water were buffered to pH 7.0 but neither of which had been brought to isotonicity by the addition of the Locke-Ringer salts.) Fig. 2.

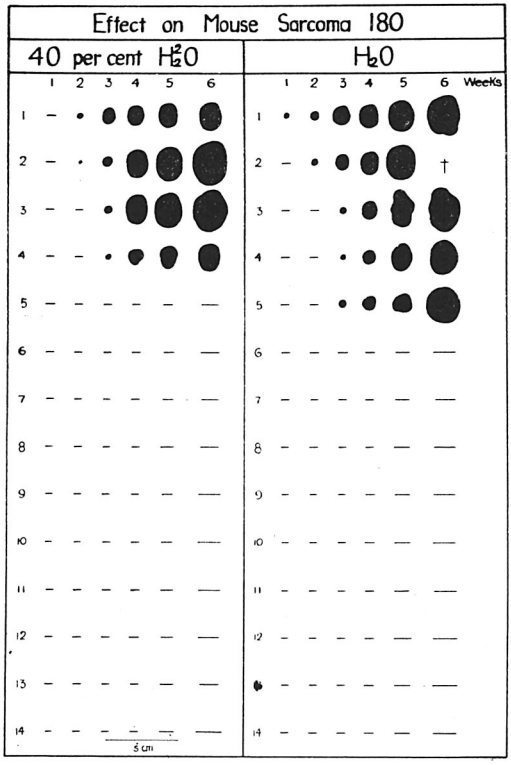

FIG. 2.

The growth capacity of the tumors was equally markedly destroyed when subjected to hypotonic media for 24 hours at 4-5°C., both in ordinary and heavy water.

It is interesting to note that an increase of the temperature to 37°C. from 4-5°C. produced a marked change in the action of both ordinary and heavy water upon the growth capacity of mouse sarcoma 180. Thus immersion of tumor fragments 6 hours or more in either 94% heavy water or ordinary distilled water, both containing salts of a Locke-Ringer solution in an isotonic amount and both adjusted colorimetrically to pH 7.0, resulted in complete inhibition of the growths.

The results of a comparative study upon the transplantable tumors indicate that the Flexner-Jobling rat carcinoma is highly sensitive to various chemical and physical agents. For this reason experiments duplicating those with mouse sarcoma 180 were made with the Flexner-Jobling rat carcinoma.

As before, fragments of fresh tumor tissue were placed in either 94% heavy water or ordinary distilled water both containing salts of a Locke-Ringer solution in an isotonic amount and both adjusted colorimetrically to pH 7.0. After standing for 24 hours at 4-5°C. the tumor fragments were implanted into young adult rats in the usual way. This study consisted of 2 groups of experiments involving a total of 72 implants. The results showed that the 94% heavy water appeared to have no inhibiting effect on the growth capacity of the Flexner-Jobling rat carcinoma. The number of tumor takes of the tumor grafts previously treated with 94% heavy water was practically the same as that obtained from ordinary water-treated tumor grafts, 67 and 75% respectively. The growth of the positive transplants in the rats in both cases was equally rapid. The microscopic examination of tumor tissues immersed in 94% heavy water for 24 hours at 4-5°C. showed a picture similar to that of the untreated tissues; the nuclei retained their staining reaction.

Summary. 1. The proliferating capacity of the mouse sarcoma 180 and the Flexner-Jobling rat carcinoma was unaffected by heavy water (94% H^2_2O) when it contained salts of a Locke-Ringer solution in an isotonic amount. 2. The growth capacity of the tumors was equally markedly destroyed when subjected to hypotonic media for 24 hours, both in ordinary and heavy water.