

TABLE II.

Day	Mg. Total Pigment	Mg. Bilirubin van den Bergh	% Bilirubin van den Bergh
Dog X			
1	178.4	77.4	43.3
3	169.9	94.3	55.5
4	299.0	162.1	54.3
5	101.0	43.9	43.2
Dog XV			
1	594.0	284.0	47.8
2	362.8	184.0	50.7
3	155.5	85.0	54.6
4	276.5	145.0	52.4

The above values are in terms of milligrams of pigment per 100 cc. of bile.

method with results in Table II. The bile for these comparative tests was obtained daily from 2 total bile fistula dogs. It is interesting to note that the van den Bergh values when compared with total pigment figures agree favorably with percentages reported by Müller and Engel.⁶

The method has been used rather extensively during the past 18 months for assaying pigment in the bile of birds and mammals.

8483 P

Influence of Water Administration upon Oxygen Consumption Rate in Shock.

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The production of water intoxication in human beings is difficult. However, instances of such intoxication have been reported,¹⁻⁴ and it has been the subject of experimental investigation in lower animals.^{5, 6, 7} Recent studies^{8, 9} upon the metabolic effects of water

¹ Larson, E. E., Rowntree, L. G., and Weir, J. F., *Arch. Int. Med.*, 1922, **29**, 306.

² Miller, J. L., and Williams, J. L., *Am. J. Med. Sc.*, 1921, **161**, 327.

³ Trousseau, A., *Lectures on Clinical Medicine*, London, 1867.

⁴ Helwig, F. C., Schutz, C. B., and Curry, D. E., *J. Am. Med. Assn.*, 1935, **104**, 1569.

⁵ Rowntree, L. G., *J. Pharmacol. and Exp. Therap.*, 1926, **29**, 135.

⁶ Misawa, H., *Jap. J. Med. Sc. Tr. VIII*, 1927, **1**, 355.

⁷ Kylin, E., *Z. f. d. ges. exp. Med.*, 1928, **63**, 606.

⁸ Davis, H. A., *Proc. Soc. Exp. Biol. and Med.*, 1935, **33**, 242.

⁹ Davis, H. A., *Proc. Soc. Exp. Biol. and Med.*, 1935, **33**, 245.

have suggested that a definite relationship exists between the initial metabolic rate and the rise in metabolism induced by water. Following hemorrhage, there is a marked diminution in the metabolic response to water and electrolytes.¹⁰ This study has been undertaken to determine whether or not there is an altered susceptibility to water intoxication in animals subjected to experimental traumatic shock.

Healthy dogs weighing between 6-19 kg. were used. Anesthesia was induced by sodium barbital in a dosage of 250 mg. per kilo of body weight. Blood pressure tracings were made in the usual manner before and during the administration of fluid. The metabolic readings were obtained by a Krogh apparatus before, and at 15-minute intervals after, the production of shock. Shock was produced by: 1. massive hemorrhage to the extent of $\frac{1}{3}$ of the calculated blood volume. 2. crushing of the muscles of the hind legs or by prolonged handling of the exposed bowel. 3. ligation of the portal vein. 4. injection of histamine dihydrochloride. The fluid utilized was an isotonic (0.9%) sodium chloride solution heated to 38°C., and given by vein at a constant rate of 16 cc. per minute. The standard amount of solution was 3,000 cc. Ten of the animals were used as controls. The urine output was estimated by a catheter placed in the emptied urinary bladder.

Shock is accompanied by a marked fall in the rate of oxygen consumption. A diminution of 30% to 50% of the original rate was common. This finding is in agreement with the work of other observers.^{11, 12} Shock produced by hemorrhage is characterized by a tendency to a rapid and spontaneous recovery, so that the metabolic rate commences to rise within 15 minutes and, after a few hours, may have reached almost its initial level. When severe trauma was involved in the experiment, the metabolic rate tended to remain fixed at a low level and a spontaneous rise was considerably delayed. Following portal vein ligation the fall in metabolism was delayed but was thereafter progressively downward. The fall in the rate of oxygen consumption after the administration of histamine dihydrochloride was long sustained, and a spontaneous rise was slow to occur.

In the normal control animals, administration of water by vein leads to a gradual prolonged rise in the oxygen consumption rate. The maximal increase in metabolism is reached only after 1,400 cc.

¹⁰ Davis, H. A., *Science*, 1935, **81**, 493.

¹¹ Aub, J. C., and Wu, H., *Am. J. Physiol.*, 1920, **54**, 388.

¹² Henderson, Y., *et al.*, *Am. J. Physiol.*, 1908, **21**, 126.

to 2,400 cc. of fluid have been injected. Thereafter, the rise is sustained. The absolute increase of metabolism is directly proportional to the original rate of metabolism. In shock the maximal metabolic response is reached at an earlier stage of the fluid injection, *i. e.*, after 700 cc. to 1,200 cc. of the solution have been given. Further administration of fluid results in a progressive decrease in the rate of oxygen consumption.

The tolerance of a normal healthy animal for water is great, so that fluid to the extent of 25% of the total body weight of the animal may be given without harmful effects. In shock, the tolerance of the organism is much diminished, inasmuch as the administration of a quantity of water equivalent to only 5% to 12% of the body weight is followed by a fall in the rate of metabolism. Animals suffering from the effects of shock showed a marked reduction in urine secretion. This was most evident where shock was accompanied by a diminution of the total bulk of circulating blood. The administration of water in amounts sufficient to depress the oxygen consumption rate of the shocked animals seemed to delay the establishment of a normal water diuresis.

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Effect of Total Thyroidectomy on Response to Injection of Adrenalin.

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Since Elliot's work in 1907, the increased sensitivity to adrenalin in vessels deprived of sympathetic innervation has been well known. Clinical observations on patients following total removal of the thyroid have suggested a close dependency of adrenalin efficiency on the presence of thyroid hormone. The injection of adrenalin in patients deprived of thyroid secretion seemed to produce less vasoconstriction. This diminished action of adrenalin was very striking in limbs rendered especially sensitive to adrenalin by sympathectomy.

To test the accuracy of these observations the following experiments were performed on dogs:

Dogs were trained to stand quietly in a light overhead harness. Skin temperature curves were made at the same time of each fore