

observations^{4,5} that the administration of adrenal cortex extract to force-fed rats immediately following adrenalectomy tends to suppress the post-operative increase in urinary nitrogen as compared with that of the untreated animal. The adrenalectomized rat usually shows a temporary decrease in urinary nitrogen which is not shown by sham-operated animals. This may possibly reflect a difference in the breakdown of thymus and other lymphoid tissue or it may reflect an increase in nitrogen retention in the body fluids. Noble and Toby⁸ reported a temporary decrease in loss of nitrogen after adrenalectomy followed by a rise above the pre-operative values.

Koelsche and Kendall² found that adrenal cortex extract tended to inhibit the catabolic effect of thyroxine in the adrenally insufficient dog. Berman *et al.*³ noted that regeneration of liver is suppressed in the adrenalectomized rat and that regeneration is supported by treatment with adrenal cortex extract.

The possibility must be considered that adrenal cortex extracts favor anabolism under certain conditions because of the presence of androgenic steroids. However, such extracts

have never been shown to possess androgenic properties.

The average level of urinary nitrogen was higher in all phases of Experiment 1 than in Experiment 2. Such shifts in the average level of constituents of blood, urine and tissues are not uncommon in this laboratory. The reasons have never been elucidated beyond the demonstration that even small variations in temperature are important. Values on the nitrogen content of our fluid diets, on standards and unknowns have remained uniform. Because unknown variables influence the results of experiments which are thought to be under rigid control, it is essential that all control studies be done in parallel with the experimental study.

Summary. Two experiments were carried out as follows. Force-fed rats given saline to drink were subjected to adrenalectomy or to sham operations. Half of the adrenalectomized rats were treated with 4 cc of beef adrenal extract per day. All of the animals showed an increase in urinary nitrogen following operation but it was significantly less in those animals which either had their adrenal glands intact or were treated with adrenal cortex extract.

⁸ Noble, R. L., and Toby, C. G., *J. Endocrinol.*, 1948, 5, 303.

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Augmentation of Femoral Venous Flow in the Dog by Electrical Stimulation of Muscles.

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The procedure was performed 6 times on 2 mongrel dogs, weighing approximately 11 kg. They were anesthetized with intravenous nembutal. Eighteen mg of heparin was given intravenously at the beginning of the procedure. The femoral vein was exposed and cannulated. On one dog a straight glass cannula was used. On the other a T-shaped cannula was inserted, so that no backing up of blood was allowed between periods of flow. The diameter of the T-cannula was smaller

than that of the straight one; consequently the minute flow was less. The blood was caught in a sterile graduated cylinder, filtered and reinfused at the end of the experiment.

The stimulation was achieved by means of faradic current. The intensity of the current and the placing of the electrodes on the limb were so arranged that a gentle contraction of the muscles of the whole limb was obtained. The stimulation was intermittent, 2 seconds of exercise being alternated with 3 seconds of

rest. The total period of repeated stimulation was 30 seconds and the flow per minute was calculated.

The flow of blood from an open free flowing cannula was caught and measured, both during a period of control when the limb was resting and flaccid, and during a period of stimulation as described above. Near the end of one of the procedures, the cannula became partially occluded by clotted blood, and the flow was reduced to a slow drip. The flow during both exercise and rest was also recorded under these circumstances. Several observations were recorded on each dog, and averages were computed as shown in the tables. Measurements during stimulation were alternated with measurements during rest in an effort to eliminate after-effects of stimulation on blood vessels.

Results. Measurements are recorded in the

¹ Krogh, August, *The Anatomy and Physiology of the Capillaries*, New Haven, Yale University Press, 1927.

² Bülbbring, Edith, and Burn, J. H., *J. Physiol.*, 1939, **95**, 203.

TABLE I.

No obstruction	At rest cc	With stimulation cc
Dog No. 1	45	90
	39	79
	33	74
Avg	39	81
Dog No. 2	30	53
	27	50
Avg	28.5	51.5

table. The venous return was increased from 80 to 100% by stimulation of the muscles when the cannula was flowing freely. When there was a partial obstruction, the increase was considerably greater, in one observation.

Conclusions. From these observations it is concluded that the venous flow of blood from a limb is increased by muscular contractions elicited by periodic electrical stimulations. The increase in flow was from 80 to 100%. Results suggest that increased blood flow is one of the reasons why similar methods, when applied to a large number of postoperative patients, have effected a marked reduction in the incidence of venous thrombosis.

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Protection of Gastric Mucosa of the Rat against Ulceration by Prefeeding with Protein Hydrolysates.

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The beneficial effects which Co Tui and his associates¹ reported to have resulted from the addition of large amounts of protein hydrolysates to the dietary of patients with gastric or duodenal ulcers have been amply corroborated by subsequent clinical experience. However, no adequate explanation of the action of such preparations has as yet been found. It has been thought that the buffering action² of the protein hydrolysates and/or the re-

sultant improvement in the nitrogen balance^{1,3,4} may be responsible for the beneficial effects observed. Opinions based on clinical studies have been expressed in favor of each of the above mechanisms, but the evidence presented cannot be regarded as conclusive. While the administration of protein hydroly-

² Levy, J. S., and Siler, K. A., *Am. J. Digest. Dis.*, 1942, **9**, 354.

³ Hodges, H. H., *Gastroenterology*, 1947, **8**, 476.

⁴ Kenamore, B., Lonergan, W., and Shy, J. C., *Gastroenterology*, 1948, **10**, 177.

¹ Co Tui, Wright, A. M., Mulholland, J. H., Galvin, T., Barcham, I., and Gerst, G. R., *Gastroenterology*, 1945, **5**, 5.