

fast group possess filtrable phases, biologically distinct, should settle this moot problem of the filtrability of acid-fast bacilli; it explains in addition the origin of certain non-acid-fast strains and may lead to their better evaluation in certain atypical forms of tuberculosis.

5800

Effect of Giving Digitalis on the Volume Output of the Heart and its Size in Normal Individuals.

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It was first shown by Harrison and Leonard¹ that digitalis decreased the cardiac output in normal dogs. In repeating these experiments, Cohn and Stewart² were able to confirm the observation that digitalis decreased the volume output of blood from the heart in normal dogs, but that at the same time it *decreased* the size of the heart although it *increased* the extent of ventricular contraction. Results similar to these were obtained when the drug was given to dogs in which the hearts had become pathologically enlarged, but in which there were no signs of heart failure.³ In a parallel study, Burwell, Neighbors and Regen⁴ by an unsatisfactory method published data which suggested that taking digitalis decreased the cardiac output of normal men. Since the publication of their paper, Grollmann^{5, 6} has introduced a more accurate method of measuring the cardiac output than that formerly used. In the study here reported, this method has been used, which so far as can now be judged gives accurate and reliable results. The nature of the changes which Burwell, Neighbors and Regen found resemble those described in this report.

There are observations on 4 subjects. Digitan (Merck) 0.8 to 1.0 gm. was given in a single dose. Observations were made immediately before the drug was given and at frequent intervals afterward. All observations were made with subjects in a basal

¹ Harrison, T. R., and Leonard, B. W., *J. Clin. Invest.*, 1926, **3**, 1.

² Cohn, A. E., and Stewart, H. J., *J. Clin. Invest.*, 1928, **6**, 53.

³ Cohn, A. E., and Stewart, H. J., *J. Clin. Invest.*, 1928, **6**, 79.

⁴ Burwell, C. S., Neighbors, D. W., and Regen, E. M., *J. Clin. Invest.*, 1928, **5**, 125.

⁵ Grollmann, A., *Am. J. Physiol.*, 1929, **88**, 432.

⁶ Baumann, H., u. Grollmann, A., *Z. f. klin. Med.*, 1931, **115**, 41.

metabolic state. In addition to measurements of cardiac output, the size of the heart was measured in x-ray photographs taken at a distance of 2 meters. Electrocardiograms were made; the heart rate was counted; the blood pressure was estimated.

Records secured in studying one subject illustrate the course of events. The cardiac output before the administration of digitalis was 3.84 liters per minute. Two hours following the administration of digitan (Merck) 0.9 gm. the cardiac output remained unchanged; 4 hours afterward it had decreased to 3.68 liters per minute. Progressive decrease then occurred; 24 hours afterward the volume output measured 2.54 liters per minute, or 66% only of what it had been at the beginning. The cardiac output from this time returned slowly toward its initial value, although even at the end of 2 weeks, when it was 3.11 liters per minute, this had not been attained. The size of the heart decreased in a parallel fashion; 24 hours after the drug had been given its size had decreased from 105.8 sq. cm. to 97.7 sq. cm., that is to say, it measured 91% of its initial size. Although its size gradually increased, as in case of the cardiac output, the initial size had not been attained 2 weeks later, when it measured 102.8 sq. cm. The heart rate decreased following the administration of the drug. The electrocardiograms showed alterations in form of the T-wave. Curves showing this alteration will be published later. Both the systolic and diastolic blood pressure increased. At the time the cardiac output was lowest and the size of the heart smallest the subject experienced dyspnoea and cardiac pain on slight exertion.

The results in the 3 other cases are similar to those now reported, with this exception, that the effects of the drug in them was of shorter duration and passed off within 48 hours.

It seems clear, now that a reliable method of study is available, that with the administration of digitalis to normal men (1) the cardiac output *decreased*; the cardiac size *decreased*; (3) the cardiac rate *decreased*; (4) alterations of the T-wave of the electrocardiogram occurred; (5) the blood pressure was usually elevated; (6) the maximum effects were observed 9 to 24 hours after the drug had been given and had usually passed off at the end of 48 hours.