THE EFFECT OF REPEATED INJECTIONS OF CHOLINE AND *B. PYOCYANEUS* IN THE DOG

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HALL, Ettinger and Banting[1] have reported severe myocardial and coronary arterial damage in the dog as an effect of repeated and prolonged intravenous administration of acetylcholine. Death from cardiac failure occurred in from 26 to 235 days. In order to determine whether this damage was due to the choline formed by the rapid hydrolysis of its acetyl ester, the experiments were repeated on two dogs to which choline was administered in place of acetylcholine. Even choline would have a very fleeting effect, as Hunt[2] has shown that it is removed from the blood-stream within a minute after injection.

METHOD

Two male dogs weighing 30 and 32 lbs. were used. Preliminary determinations were made of normal temperature, respiratory rate, heart-rate, blood-pressure (Dameshek and Lomann's method) electrocardiograms, red blood-cell count, hæmoglobin, blood-culture and body-weight. Approximately the choline equivalent of the acetylcholine used in Hall, Ettinger and Banting's experiments, *viz.*, 45 mg. of choline chloride, was dissolved in 500 c.c. of sterile normal saline, and injected from a sterile Mariotte cylinder into a leg-vein at a steady rate which required 90 minutes for the complete injection. This was repeated daily, without anæsthesia. The heart-rate and sounds and respiratory rate were observed during the injection. The rectal temperature was noted each day before injection. The other preliminary observations were repeated weekly.

In the acetylcholine experiments the dog which had the most severe coronary and myocardial damage died within thirty days of the onset of the experiment and had a terminal blood infection with *B. pyocyaneus*. It was therefore decided to seed the choline solutions with this organism for the early part of these experiments. This was done for four months; thereafter the usual sterile precautions were observed.

RESULTS

The injections were given six days in the week, over periods of 153 days (131 injections) and 231 days (198 injections), during which the dogs were well, had normal appetites, and gained in weight. There was no change in the heart-rate during the course of an injection. There were no murmurs nor other clinical evidence of any disturbance or impairment of the cardiovascular system during the course of the experiments. For the first six weeks of the four months during which the solutions were heavily contaminated with *B. pyocyaneus* the bacteria could be recovered from the blood; thereafter the blood was sterile. On the day after the last injection the animals were killed with chloroform. Careful autopsy, including microscopic sections, failed to show any degenerative changes in the myocardium, coronary arteries of the heart, or in the blood-vessels of any other organ.

CONCLUSION

Daily intravenous injection of 45 mg. of choline chloride solution over periods of 153 and 231 days caused no degenerative changes in the heart of the dog. Heavy infection of the solution with *B. pyocyaneus* for four months of these periods did not affect the heart or its blood-vessels.

REFERENCES

1. HALL, G. E., ETTINGER, G. H. AND BANTING, F. G.: An experimental production of coronary thrombosis and myocardial failure, *Canad. M. Ass. J.*, 1936, 34: 9.
2. HUNT, R.: A physiological test for cholin and some applications, *J. Pharm. & Exper. Ther.*, 1915, 7: 301.

SEASONAL CHANGES IN THE BLOOD.—C. Hampf has investigated in Helsingfors the composition of the blood at different times of the year. In one series of observations 22 healthy adults (11 men and 11 women) were examined systematically monthly for a year. Their ages ranged from 23 to 54. The hæmoglobin content of their blood was over 75 per cent (Sahli) in the case of the men, and over 70 per cent in the women. The samples were taken in the morning fasting. It was found that during the winter months the number of the erythrocytes was about 100,000 lower than in the summer months in both sexes. The percentage of hæmoglobin followed a parallel course, being about 4 per cent lower in the winter than in the summer. There was only a small rise in the winter months in the number of the leucocytes, but there was a significant change in the neutrophile count, the cells with rod-shaped nuclei rising abruptly in numbers in the spring, and reaching the maximum level in June in both sexes. In women the eosinophiles reached their maximum number in April. In a second series of observations the author has collected the 4,375 complete blood counts undertaken in his hospital in the period 1930-5, devoting special attention to the 858 counts uninfluenced by such factors as might have a specific effect on the composition of the blood. No uniform seasonal change was demonstrable in the number of the erythrocytes, and the percentage of hæmoglobin varied proportionally with this number. The author is inclined to believe that, as far as Finland is concerned, the seasons of the year impose no profound changes on the blood count.—*Finska Läkaresällskapets Handlingar*, February, 1936, p. 141. Abs. in *Brit. M. J.*