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Studies of the Effect of Atropine on Gastric Secretion.

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The purpose of the experiments reported in this paper was to determine the effect of small doses of atropine on the total volume of gastric secretion and its content of titratable acidity as these occurred in response to a standard injection of histamine hydrochloride in man.

Keeton, Luckhardt and Koch¹ studied the effects of atropine and histamine on gastric secretion in the dog. They found that the first effect of atropine is to decrease both the total quantity of gastric secretion and the pepsin content, whereas the acid concentration is not decreased until a sufficient amount of atropine has been given to reduce the total quantity of gastric secretion to an amount approximately 20 to 50% of its original value.

Keefer and Bloomfield² studied the effect of the subcutaneous injection of 2 mg. of atropine upon gastric secretion in man in 1926, using 50 cc. of 7% alcohol as the test stimulus instead of histamine. They reported a marked diminution in the total quantity of secretion and also a reduction in the acidity, but no parallelism in the degree of reduction was noted.

Polland³ reported that in man atropine dissociates the normal response to histamine, producing a marked decrease in the volume of secretion and in the concentration and total output of pepsin, but he found a *rise* in the titratable acidity. He attributed this to the relatively slight inhibitory effect of atropine upon the total output of acid with a consequent increase in the amount of acid per cc. of gastric content.

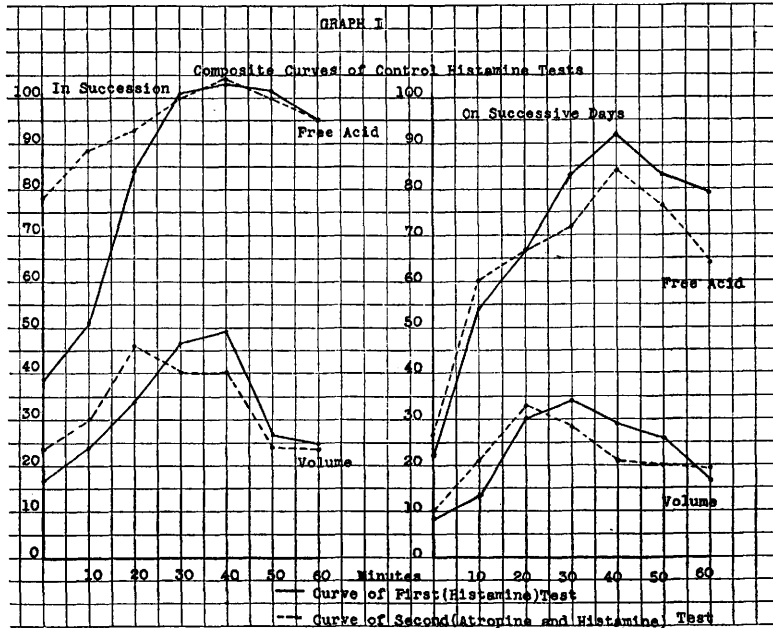
In this work the following procedure was used: The tests were conducted in the morning before breakfast. The test stimulus used was 0.01 mg. of histamine hydrochloride per kilo body weight injected subcutaneously as recommended by Bloomfield and Polland.⁴ The stomach was aspirated completely by means of a Rehfuß tube at 10 minute intervals until the secretion returned to normal, which it usually did within 60 minutes. The patient was warned not to

¹ Keeton, R. W., Luckhardt, A. B., and Koch, F. C., *Am. J. Physiol.*, 1930, **51**, 469.

² Keefer, Chester S., and Bloomfield, Arthur L., *Arch. Int. Med.*, 1926, **38**, 303.

³ Polland, W. S., *J. Clin. Invest.*, 1930, **9**, 319.

⁴ Bloomfield, Arthur L., and Polland, W. S., *J. Am. Med. Assn.*, 1929, **92**, 1508.



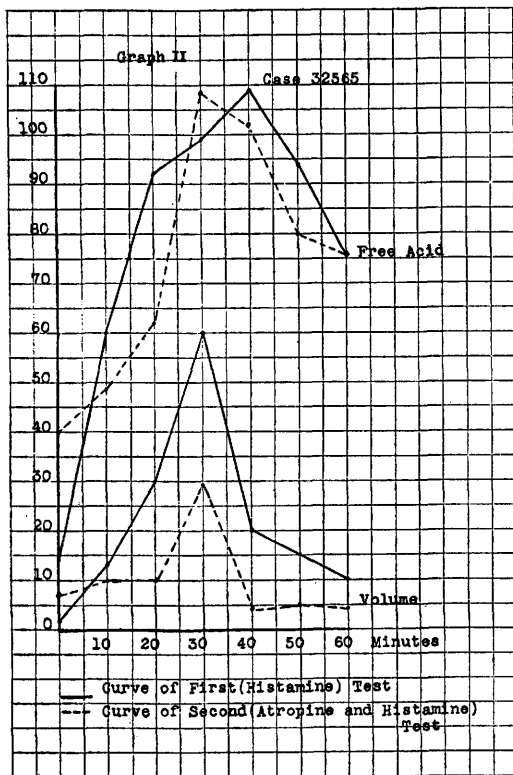
GRAPH 1.

swallow saliva during the test. In 4 control cases the test was repeated after about 90 minutes and in 4 other control cases it was repeated on the following day. In both cases the second curve was practically identical with the first. The first graph shows the composite curves of the control histamine tests; first, those run on the same day; and, second, those run on successive days.

The results from both methods were the same, showing that 2 histamine tests could be run on the same individual on the same or on successive days and give results with a variation of not more than 5 to 10%. This is in accord with the findings of Pollard.⁸

The atropine experiments were carried out on 20 patients. In 8 of them a histamine test was first given and the gastric secretion allowed to return to normal. A subcutaneous injection of 1 mg. of atropine was then made, followed 15 minutes later by a second histamine injection. In 12 of the reported cases, 24 hours were allowed to elapse between the 2 tests. They are reported together because the results were the same.

The results of the tests, as shown in Graph 2, which is the chart of a single atropine test, and in Graph 3, which is the chart of the combined results of the 20 atropine tests, show that the height reached by the free acidity (Topfer's Reagent) is not affected by

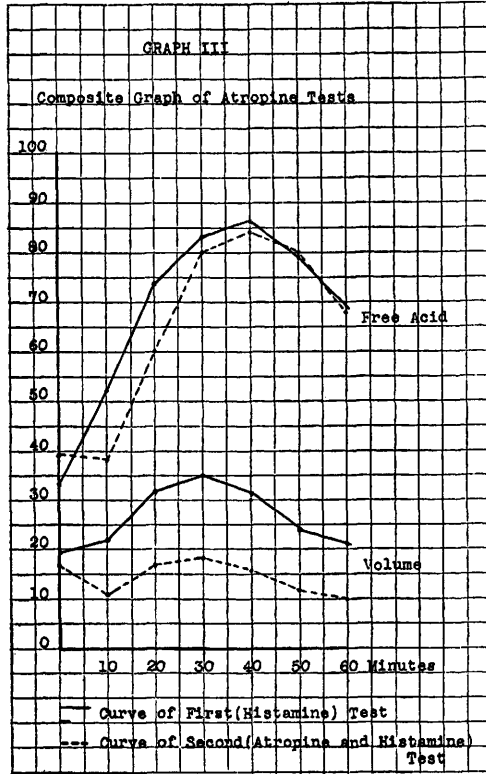


GRAPH 2.

atropine in the dosage used but the volume is quite definitely decreased, the reduction varying from 40 to 60% with an average reduction for the 20 tests of 51%.

These findings are quite in accord with those of Keeton, Luckhardt and Koch in the dog, and of Keefer and Bloomfield in man, but differ from those of Polland in that the latter reported a rise in the titratable acidity after atropine. This discrepancy is probably not due to a difference in the amount of atropine used, 1 mg. in these experiments as compared with 0.2 mg. per 10 kg. body weight in those of Polland. It may be due to the fact that a longer interval was allowed to elapse between the tests, 90 to 120 minutes in this series as compared with 50 to 60 minutes in that of Polland. The findings, however, are compatible with Polland's suggestion that water and acid may have different mechanisms of secretion.

Conclusions. 1. Gastric secretion obtained by histamine stimulation (0.01 mg. per kilo) under standard conditions, seems to be quite constant for the same individual, both as to volume and height



GRAPH 3.

of free acidity. 2. Histamine tests repeated in succession and on succeeding days give practically identical results. 3. Atropine, in doses of 1 mg., decreases the volume of gastric secretion obtained by histamine stimulation in man, approximately 50%, but does not affect the free acid content appreciably.