

or duodenum. In women the groups studied after operations were so small that no positive conclusions could be drawn as to the slight changes observed in the median concentration of pepsin.

Unfortunately the individual variability in pepsin readings is so large, and the overlapping of distribu-

tions so great, that estimations of this ferment can seldom have much diagnostic value.

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Studies of Pepsin in Human Gastric Juice*

V. Its Prognostic Value**

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IF only the gastro-enterologist could tell in advance which of his patients with ulcer, if sent for surgical treatment, would promptly get well and stay well, and which would soon return with the lesion reactivated or with a new one boring into the jejunum, his life would be much happier, and no longer would he let a small percentage of very bad results restrain him from making use of an operation which, in most cases, works perfectly.

Under the compulsion of this fear, every clinician and surgeon of experience has developed a set of "hunches" which cause him to refuse operation to certain patients, usually the tense, nervous ones with a high gastric acidity. But how many practitioners have taken the time to record their prophecies and then, later, to compare them with what actually happened? Or how many have correlated the degree of gastric acidity found at the time of the first examination with the results obtained after operation?

Because previous studies at this Clinic (1) had shown that there is nothing distinctive about the gastric acidities of the patients who do badly after gastric operations, we were particularly desirous of seeing if analyses of another component of gastric juice, in this case pepsin, would have any better prognostic value. We here report work done to see if there is any correlation between the concentration of pepsin in the gastric juice and the character of the results obtained after operation on the stomach.

TECHNIC

In estimating concentrations of pepsin, we used a modification of the Gilman-Cowgill method, details of which can be found in a paper by Osterberg, Vanzant, and Alvarez, published in 1933 (2). In most cases we used

*Studies I and II of this series bore the general title, "Studies of Gastric Pepsin."

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gastric juice withdrawn one hour after the giving of a test meal consisting of eight arrowroot crackers and 400 c.c. of water. When fasting or histamine juice was used, the figures expressing concentration or amount of pepsin were converted into terms of concentration of pepsin in test-meal juice, with the help of factors given in paper III of this series (3). The median was used instead of the mean as an index of central tendency. The figures for concentration of pepsin for men and women were so different that we studied them separately.

RESULTS

In preparing for the analysis here reported we began a few years ago to study cases in which the concentration of pepsin in the gastric juice was known and in which the patient, after an operation on the stomach, returned to this Clinic with recurrent symptoms of ulcer. When we began to write this paper, we had data from thirty-eight such cases in which a diagnosis of "recurrence" had been made after study here. In order to secure data from a control group of persons who had had, first, the necessary study of the gastric juice, second, an operation on the stomach, and third, a good result, we sent out a questionnaire which brought in 238 replies. These answers were segregated into three groups denominated "entirely satisfactory," "slight indigestion," and "possible recurrence."

All the data analyzed in this paper were from patients with duodenal ulcer; we did not find any case of recurrence following operations for the relief of gastric ulcer or combined gastric and duodenal ulcer. Altogether we had data from 233 men and forty-three women. In 162 cases, the operation performed was gastro-enterostomy; in ninety-two, it was pyloroplasty; in twenty-one, it was resection, and in one case, it was a simple excision of the ulcer.

On examining the data we found that, in the case of the 147 men who secured a perfect result, the median pepsin concentration, before operation, was 433 units. This figure stands halfway between the median of 352 for cases of "medical" ulcer and the

median of 501 for cases of "surgical" ulcer, reported by us in paper IV of this series (4). The men who were suffering with symptoms which suggested the presence of a recurrent or new ulceration were found originally to have had a median concentration of 467 units of pepsin, while those men in whose case a definite diagnosis of recurrent or new ulceration was made, had originally a median concentration of 485 units.

Even if we could be sure that these small differences in the median would be maintained if we were to study thousands of cases, the differences are so small and the overlapping of distributions is so great that we must conclude that the concentration of pepsin in an individual must be without prognostic value. Incidentally, it should be noted that in each group the median value was less than 500 units which marks the upper limit of normal.

In the case of the women, the groups were so small that little can be inferred from the differences ob-

served in the median values for pepsin. Curiously, the highest concentrations of pepsin were found in patients who obtained the best results, and the lowest in patients who suffered a recurrence.

CONCLUSIONS

It is obvious from this work that measurements of concentration of pepsin in the gastric juice have no prognostic value.

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SECTION III—Nutrition

The Effects on the Gastric Juice of Man of Six Weeks' Deprivation of Vitamin B₁*

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SEVERAL years ago, Danysz-Michel and Koskowski (1922) (1) and Farnum (1926) (2) reported a falling off in gastric secretion in animals placed on a diet poor in vitamin B₁. Gildea, Kattwinkel, and Castle (1930) (3), using a similar diet, did not see much change in gastric acidity, and Cowgill and Gilman (1934) (4) had some negative results, but Webster and Armour (1934) (5) and Komarov (1934) (6) reported that the stomachs of their dogs regularly became anacid. This happened usually after the animals had been on the deficient diet for about three weeks, and the gastric mucosa returned to normal within a few days after a complete ration was again supplied.

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These results of Webster and Armour and Komarov were so striking that the senior writer of this paper decided that the experiment should be repeated on men and women. Obviously, if this type of dietary deficiency were promptly to produce anacidity in man, the medical profession might find itself in possession of a convenient method of treatment for intractable ulcer. Fortunately for our purpose, experimenters seemed to agree that lack of vitamins other than B₁ had no effect on gastric juice.

Against the hope that food deficient in B₁ might be helpful in cases of ulcer was the fact, reported by several observers (Sure and Thatcher, in 1934 (7), and Dalldorf and Kellogg in 1932 (8)), that such a diet sometimes seems to produce peptic ulcer in rats. Actually, Sure and Thatcher recommended that attempts be made to treat ulcer with a diet rich in vitamin B₁.