

THE VALUE OF THE FRACTIONAL GASTRIC ANALYSIS IN BRONCHIAL ASTHMA

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"Gastric function tests are carried out for the purpose of determining the variations in gastric secretion. The secretion of gastric juice is subject to three types of action: nervous, gastrogenic and enterogenous.

The quantity of hydrochloric acid secreted by the stomach is also dependent on age. From a certain age onward (about 30 years) the secretion diminishes and at the age of 60 there is a fairly high number (20 %) of healthy individuals with achlorhydria. As a rule women and children also show lower values. Gastric secretion begins soon after the test meal and continues for a while, a peak being attained after an hour. The curve remains at this level for $\frac{1}{2}$ an hour, whereupon it falls and returns to the initial values after $2\frac{1}{2}$ -3 hours. Free HCl 25-40 ml. N/10 per cent. Total acidity 35-70 ml. N/10 per cent" (Gorter and de Graff, Naval Medical Centre). The normal values reported by Simmons and Genzkow are: total acidity 0-110, free HCl 10-30 less.

Besides the academic problem as to whether chronic allergic conditions give rise to changes in the organism, which might be regarded as allergic symptoms, attention is also drawn to the stomach by the complaints of a certain group of asthmatic patients. The complaint of laboured breathing after the midday-meal, associated with a bloated feeling, may very well be due to the fact that a bloated stomach is pressing against the lower pulmonary areas. Patients with emphysema

and elderly patients are particularly susceptible to oppression after meals. These cases are too often attributed to food allergy, whereas it is far more likely that the cause is exclusively mechanical in nature. As a rule treatment either consists in the prescription of frequent small meals or in the administration of acidol pepsin during meals, which usually results in a rapid subsidence of the complaints. In addition there is the question as to whether the digestion is not rendered more difficult by too little hydrochloric acid, so that the intestinal wall has to absorb abnormally large quantities of food to which the patient may become hypersensitive. In that event the hypersensitive symptoms may disappear as the result of a more effective digestion. Finally achlorhydria increases the chances of bacteria entering into the gallbladder etc., with the danger of a focus of infection developing there.

The acidosis-alkalosis problem is not discussed in this connection.

Finding the answer to these questions and the patient's desire for a proper diet (not what he is not permitted, but what he may and must do) render gastric function tests imperative in patients with chronic asthma, as the determination of an achlorhydria or hypochlorhydria calls for additional therapeutic measures. Therefore this means that in some cases acidol pepsin may also relieve the gastric complaints and not merely the gastric symptoms, as mentioned by Unger. Moreover, it is impossible to treat merely a patient's asthmatic complaints without considering and, if need be, also treating his other disturbances, which are dependent upon the same condition.

There is a tendency in the literature to assume that a hypochlorhydria is more frequent in asthmatic patients and chronic allergic patients in general than in normal subjects (Unger, Maxwell, Andresen, Criepe and McElroy, Murdoch, Spiethoff, Ehrmann, Tuft, Urbach, Ayres, Csillag, Duke, Barber Howitt and Knott, Brown, Rowe, Hurst, Criepe and Wechsler, Adam, Bray, Hansel, Walzer and Walzer, Barber and Oriel).

When studying the literature the age group and sex of the majority of patients should be taken into account, as an unequal distribution (e.g. many old patients) may cause the values to appear abnormal, while this is not actually the case.

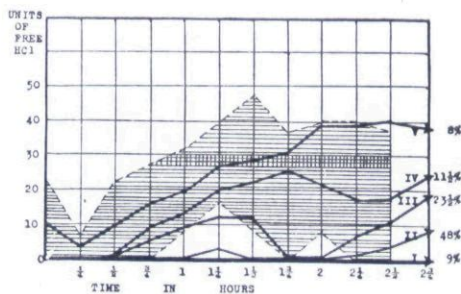
The following values are reported by Crip and McElroy:

	Number	Achylia	Achlorhydria	Hypoacidity	Normal	Hyperacidity
asthma	28	2	10	12	12	0
hay fever	12	0	4	4	4	1
urticaria	6	2	3	1	3	0
vasomotor rhinitis .	2	0	1	0	1	0
Quincke's oedema .	2	0	1	0	0	0
migraine	1	0	0	0	0	1
total	50	4	19	17	20	2

(hypo under 10)

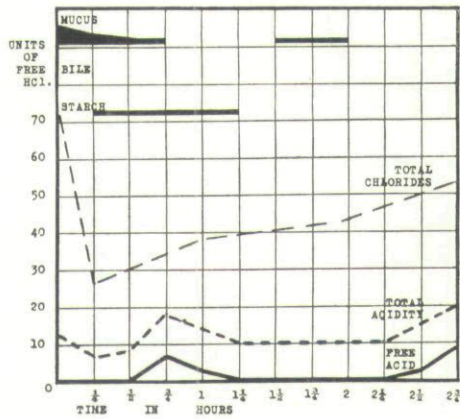
(normal up to 70)

Bray reports a detailed investigation on 200 cases in children. In 9 % he found an achlorhydria, in 48 % a pronounced hypochlorhydria and in 23 % a mild hypochlorhydria (i.e. a too low secretion of hydrochloric acid in 80 % of the cases). See Bray's diagrams (in his book "Recent advances in allergy", 1934, fig. 33 and fig. 34).



Bray. *Recent Advances in Allergy*, Diagram 33.

(Summarized results of 200 fract. gastr. analysis in asthmatic children).



Bray. *Recent Advances in Allergy*, Diagram 34.
(A typical fract. gastr. analysis in an asthmatic child).

He offers the following possibilities in explanation:

- mechanical (the glandular ducts are obstructed by mucus)
- chemical (the acid is neutralized by alkaline mucus)
- the result of a chronic gastritis
- the body attempts to maintain a normal acid-base equilibrium.

Most cases of hypochlorhydria are stated to have occurred in the last few years (during which food allergy attained its highest incidence). In 51 % of 109 asthmatic patients Gillespie found the free hydrochloric acid content to be too low, the bound hydrochloric acid values being too low in 41 % of the cases.

Rinkel, Randolph and Zeller were unable to find any relationship between the hydrochloric acid content of the stomach and the symptoms of food allergy. Nor could Loveless find any relationship; on the contrary, she even reports a possible tendency to an increase. Likewise Napier and Dharmendra only found 2 cases of achlorhydria and 4 of hypochlorhydria in 68 patients with bronchial asthma. In his cases

of food allergy Hansen usually found a normal gastric secretion. Urbach and Gottlieb have drawn attention to the significance of hypo- and achlorhydria. As a result proteins and carbohydrates are insufficiently broken down and inadequately digested and absorbed. Moreover there is the risk of a pathological intestinal flora. They also draw attention to the frequent co-existence of a pancreatic insufficiency. They recommend the administration of hydrochloric acid-pepsin during meals.

Our personal material comprised 100 patients with chronic bronchial asthma, who had been admitted to the Diaconessenhuis in Utrecht on account of their complaints. Fractional tests were done after the administration of 300 ml. of methylene blue. Pepsin was found in each case.

The following values were found in fasting contents of stomach:

ML. N/10 per cent	Free HCl	Bound HCl
0	67	0
0-10	12	47
10-20	15	19
20-30	2	16
30-40	3	8
40-50	0	6
50-60	0	3
60-70	0	0
70-80	1	
over 90		1

Curves:

no free hydrochloric acid	22	} 48
usually 0 and occasionally less than 10	12	
usually 0 and occasionally less than 20	14	
curve falls again to 0, then rises again	2	
curve remains at 0 a few times, then rises gradually	2	

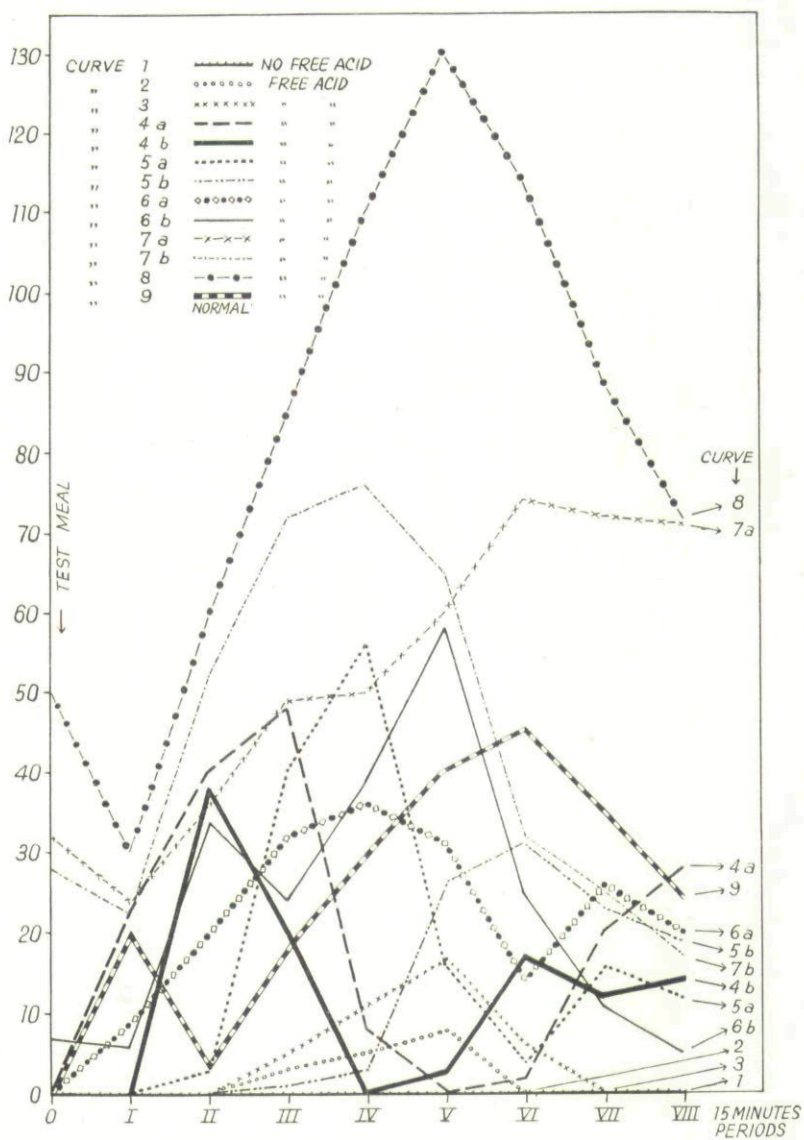


Diagram 1

too high curve	3
total acidity less than 10	11
less than 20	15
less than 30	12
less than 40	9
less than 50	2

Thus too low free hydrochloric acid values were found in 48 cases (48 %), the values being too high in 3 cases (3 %). In 45 % the curve took a normal course. See diagram I, p. 128.

A survey of the age groups, both with regard to too high and normal values, shows that both in children from 9 to 15 years of age (lower ages were not included) and in the groups 15-30, 30-50 and 50-70 too low and normal values occurred in a equal percentage of cases.

No mutual differences were found for the various ages.

To the patients with hypochlorhydria the use of acidol pepsin (acid hydrochlor. 2, Syr. rhoead. 75, aq. ad 300, pep-sini 2) during meals was prescribed. This frequently resulted in the disappearance of the oppressions after meals.

Also the history of the patients was studied with regard to the relationship between gastric ulcer and bronchial asthma.

In 1000 asthmatic patients the number of cases in which gastric operations were done or the patients placed on a diet for gastric ulcer was determined. There was only one known case. It was also remarkable that practically no one (only 8 patients) complained of pains in the stomach.

The family history included more cases of gastric ulcer. But the data were so frequently unreliable and incomplete, that no statistics could be based upon them.

The question as to whether gastric ulcers may be of allergic origin, continues to be highly controversial. Ehrenfeld, Brown and Sturtevant, Hansen, Kern and Stewart assume about 25 % of all cases of gastric ulcer to originate in a food allergy. Kämmerer draws attention to the action of histamine on gastric secretion, with an increased motility and acidity.

De Langen also points to the increased secretion of gastric juice as one of the physiologic effects of histamine.

Now naturally the question arises as to how we can reconcile these two findings: a) the too low hydrochloric acid values in bronchial asthma and b) the fact that our theories on the rôle of histamine in allergy should actually have led us to expect a hyperchlorhydria (an increased histamine content of the blood ought to result in increased hydrochloric acid values). De Langen has reported other effects of histamine (increased basal metabolism, diminished arterial pressure), which are indeed found in a large number of cases of asthma. But here we encounter a discrepancy. We have to assume a hyperchlorhydria and we find a hypochlorhydria. This means that there are two possibilities: either histamine is not the essential factor in asthma which we now believe it to be in allergic diseases, or the production of mucus resulting from the bronchitis inhibits the secretion of gastric juice or neutralizes it. If the latter is correct, then we ought to expect an increased acidity of the stomach in patients with chronic asthma without bronchitis.

In the former case the problem of the action of histamine becomes even more interesting and we shall, above all, have to await the results of determinations of the concentration of histamine in the blood. The same problem exists with regard to vagotonia. Gastric ulcers are treated with vagotomy and one wishes to regard asthma as a vagotonic condition. Thus this subject raises the same questions, the action of the mucus being the only explanation which might possibly eliminate the discrepancy.

SUMMARY

The literature on determinations of gastric acidity in bronchial asthma and other allergic diseases is discussed. Achlorhydria or hypochlorhydria are reported in a considerable number of cases. This could be verified by personal investigations in 100 patients with bronchial asthma (48 %). Treatment with hydrochloric acid and pepsin is recommended, especially

in patients who complain of a feeling of oppression after meals. It is very difficult to explain the low values. If they are due to the bronchitic mucus, then the acidity of the stomach in patients with extrinsic asthma (without any bronchitis complication) should be normal or increased as a result of the histamine stimulus (provided an increased concentration of histamine in the blood is indeed found in the future).

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