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## THE EFFECT OF INTRA-GASTRIC INSTILLATION OF A MEAL ON GASTRIC FUNCTION IN MAN

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It seemed possible that afferent impulses from the mouth, pharynx and oesophagus set up during the swallowing of a meal might be of some significance in determining the subsequent gastric response. This paper describes the results of experiments in which the emptying and secretion of the stomach after a swallowed meal were compared with that after a meal introduced into the stomach through a tube.

### METHODS

*Experimental.* The ordinary routine of the Serial Test meal (Hunt & Spurrell, 1951; Hunt, 1951) was used except that on 'Test' days the 750 ml. of pectin meal were introduced into the stomach through the tube previously used to wash out the stomach. Serial withdrawals were made up to 60 min. after the beginning of the meal.

*Statistical.* The data on the volume of secretion and amounts of pepsin for test and control meals were plotted cumulatively against time, for each subject, and a straight line was fitted passing through zero time.

This method has the merit that it completely removes any element of personal bias which may exist in the drawing of cumulative lines by eye.

### RESULTS

The results are described in terms defined in the account of the Serial Test meal method (Hunt & Spurrell, 1951).

In Table 1 the number of withdrawals from each of the 8 normal medical students are shown, together with the 'half-lives' of the emptying process calculated from the data obtained under the control and experimental conditions. In both the emptying was exponential. The values of the log of the ratio of the two 'half-lives' obtained for each subject shown in the last column give equal weight to a doubling or halving of the 'half-life' of the emptying process. The 'half-lives' were not systematically modified by giving the meal down the tube, although there was a tendency, which would occur once in ten by chance, for the mean 'half-life' to be shorter when the meal was put down the tube.

In Table 2 the 'starting indices' of the emptying process for these meals are shown not to have been systematically modified by giving the meal down the tube.

TABLE 1. The influence of swallowing a test meal on gastric emptying

Subject	Method of ingestion				Log B/A
	Swallowed		Down tube		
	No. of with- drawals	'Half-life' (min.) A	No. of with- drawals	'Half-life' (min.) B	
B.A.M.A.	4	34.2	4	25.1	- 0.13
J.B.	4	12.8	4	14.3	+ 0.05
S.F.E.	4	68.4	4	59.0	- 0.07
H.C.C.	5	16.7	4	18.8	+ 0.05
S.M.	4	9.7	4	9.4	- 0.01
R.H.F.	3	14.3	4	6.8	- 0.32
J.N.H.	5	21.5	5	11.5	- 0.28
I.C.F.	3	23.2	2	9.4	- 0.39
	32		31		P = 0.1

TABLE 2. The influence of swallowing a test meal on gastric emptying

Subject	Method of ingestion		
	Swallowed	Down tube	B - A
	'Starting index' (min.)		
	A	B	
B.A.M.A.	- 16.5	- 5.8	10.7
J.B.	8.6	5.0	- 3.7
S.F.E.	- 48.9	- 42.1	6.8
H.C.C.	6.3	- 0.3	- 6.7
S.M.	12.9	17.0	4.0
R.H.F.	- 3.1	8.3	11.3
J.N.H.	6.7	- 2.1	- 8.8
I.C.F.	- 0.5	4.4	4.9
			Mean = + 2.3

TABLE 3. The influence of swallowing a test meal on the secretion of parietal component

Subject	Method of ingestion		Log B/A
	Swallowed	Down tube	
	Volume of parietal component (ml.)		
	A	B	
B.A.M.A.	119	133	+ 0.04
J.B.	80	74	- 0.03
S.F.E.	56	41	- 0.14
H.C.C.	86	77	- 0.05
S.M.	86	55	- 0.20
R.H.F.	149	182	+ 0.09
J.N.H.	131	103	- 0.11
I.C.F.	156	194	+ 0.09
			Mean = - 0.04

In Tables 3, 4 and 5 the data on the secretion of the parietal component, non-parietal component, and pepsin are set out. None of the differences

between the control and experimental series have been found to be significant.

It seemed possible that there might be a relatively small difference in the volumes secreted during the first part of the digestive period which might be masked by considering the data cumulatively up to 60 min. Therefore the data were re-examined to make a comparison restricted to the first 30 min. of the digestive period. It was found that the amounts of pepsin and parietal component secreted during this period were not systematically influenced by giving the meal down the tube.

TABLE 4. The influence of swallowing a test meal on the secretion of non-parietal component

Subject	Method of ingestion		Log B/A
	Swallowed	Down tube	
	Volume of non-parietal component (ml.)		
	A	B	
B.A.M.A.	23	28	+0.08
J.B.	71	66	-0.03
S.F.E.	26	30	+0.06
H.C.C.	25	19	-0.12
S.M.	77	83	+0.03
R.H.F.	35	55	+0.20
J.N.H.	64	57	-0.05
I.C.F.	13	27	+0.32
			Mean = +0.06

TABLE 5. The influence of swallowing a test meal on the secretion of pepsin

Subject	Method of ingestion		Log B/A
	Swallowed	Down tube	
	Amount of pepsin (units)		
	A	B	
B.A.M.A.	21,000	22,800	+0.04
J.B.	15,600	13,800	-0.06
H.C.C.	19,200	16,800	-0.06
S.F.E.	13,800	9,000	-0.19
S.M.	10,800	7,200	-0.18
R.H.F.	31,500	32,850	+0.02
J.N.H.	9,900	6,050	-0.21
I.C.F.	19,200	27,200	+0.15
			Mean = -0.06

DISCUSSION

From the results given above it is plain that giving a pectin meal down a tube did not systematically eliminate any significant fraction of the total stimulation leading to the secretory activity of the stomach. This is in accord with Pavlov's findings in dogs (Pavlov, 1902) and Wolf & Wolff's (1944) work in Tom. Thus the early peak in the rate of secretion of gastric juice after the ingestion of a pectin meal is not the result of afferent impulses initiated by swallowing, nor

does the absence of such impulses significantly modify emptying. The slight shortening of the 'half-life' could be accounted for as the result of the absence of part of the receptive relaxation of the stomach when swallowing is eliminated.

#### SUMMARY

1. The emptying and secretion of the stomach after a swallowed meal were compared with the emptying and secretion after the meal had been introduced into the stomach through a tube in 8 normal subjects.
2. The emptying process, as measured by the 'half-life' and the 'starting index', was not significantly influenced by the test procedure.
3. The amounts of parietal component, non-parietal component, and pepsin secreted in response to the meal were not significantly influenced by the test procedure.
4. It was concluded that the absence of afferent impulses from the mouth, pharynx and oesophagus did not modify gastric digestive activity in response to the pectin meal.

#### REFERENCES

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