## **GUSTATORY EFFECTS ON INTESTINAL MOTILITY OF DOGS**

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Summary : Trained, unanaesthetised dogs with jejunal fistula and adapted to 2 h meal-time showed transient taste-correlated changes in pressure (mm H<sub>2</sub>O) but not in frequency of intestinal motility. Intestinal pressure was increased on bitter taste both before meal-time (4.7  $\pm$  0.2 mm) and after it (13.1  $\pm$  0.9 mm) over respective basal pressure (before meal 3.2  $\pm$  0.4 mm, after meal 10.6  $\pm$  1.4 mm), whereas it was decreased on sweetness of saccharin (before meal 1.1  $\pm$  0.1 mm, after meal 4.8  $\pm$  0.5 mm), and after glucose (before meal 1.7  $\pm$  0.2 mm; after meal 8.8  $\pm$  0.9 mm). Taste-induced motility changes were more pronounced on starvation than on fed state.

Key words : intestinal motility

taste

## INTRODUCTION

The gastro-intestinal secretions and motility both of which are essential for digestion, absorption and movement of food in the gastro-intestinal tract, are known to be increased in the presence of food in the stomach (1). Further it is also known that before food actually enters the stomach, its fast-acting sensory properties (sight, smell, taste etc.) enhance salivary, gastric (7) and pancreatic secretions (5) thus acting as primers to secretions after the arrival of food. But such anticipatory effects of sensory cues on clinically more important intestinal motility (3) are virtually unknown and hence the present report.

# MATERIAL AND METHODS

Trained young (6-8 months old) 2 h meal-time (1300-1500 h) adapted and conscious dogs (n=6) were used for the investigation. Their intestinal motility responses to taste both before and after meal-time were recorded kymographically using conventional ballon method (2) and water manometer as described by us earlier (10). From a pipette

100 Rao

April-June 1987 Ind. J. Physiol. Pharmac.

with a fairly long (3 cm) nozzle 2-3 ml of any one of gustatory test solutions (18% glucose, 0.8% saccharin and 0.006% quinine in distilled water at room temperature of 24-26°C) on anyone test day was dropped (from 1.0-1.5 cm height) on tongue *in situ* of the dog lying quietly on a table and gently restrained.

#### RESULTS

Taste effects on the on-going (basal) intestinal motility were seen 20-40 sec after placement of test solution and for a period of 30-100 sec, both before and after food (Fig.1). The visually observed smacking, tongue-rolling and swallowing movements

BEFORE FOOD AFTER FOOD TEST SOLU SACH

Fig. 1: Effects of gustation on intestinal motility of fed (after food) and starved (before food) dogs. Arrow (^) mark indicates the point in time at which test solution was placed on tongue.

which started almost immediatelly (5-10 sec) and lasted for nearly 1 min period, following test solution contact with tongue, had no influence on intestinal motility. The sweet taste of a substance whether containing calories (glucose) or not (saccharin) decreased the intra-luminal pressure (mm H<sub>2</sub>O) of on-going basal intestinal activity whereas bitter taste (quipine) increased it. The taste (either sweet or bitter) did not affect the frequency (waves/min) of motility, and in that respect is smiliar to effects after food intake which also did not alter frequency though it caused significant increase in intra-luminal pressure (Table I). The effects of taste on low-amplitude starvation (before food) - correlated,

Gustation and Intestinal Motility 101

Volume 31 Number 2

basal motility were more pronounced, both in force and duration (Fig. 2), than on afterfood-induced high amplitude basal motility.



Fig. 2 : Effects of gustation on amplitude (vertical height of bar), duration (horizontal length) and direction (increase or decrease) of dogs before (■) and after (□) food.

	BASAL	GLUCOSE	SACCHARIN	QUININE
1. Before food	ot of Medical Publice			NH pour in 1
Pressure (mm H <sub>2</sub> O)	3.2±0.4	1.7±0.2*	1.1±0.1*	4.7±0.2*
Freq. (Waves/min)	25.8±1.1	23.8±0.9	21.8±1.2	27.3±1.1
2. After food				
Pressure (mm H <sub>2</sub> O)	10.6±1.4	8.8±0.9	4.8±0.5*	13.1±0.9*
Freq. (Waves/min)	33.4±1.7	31.5±1.5	30.4±1.8	34.8±1.2

TABLE I : Effects of gustation on intestinal motility. (mean  $\pm$  SE) of dog.

\*P < 0.05 compared to basal

April-June 1987 Ind. J. Physiol. Pharmac.

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The present investigation substantiated our earlier observations (10) and the observations of others (1) that frequency of motility is not affected whereas the intra-luminal pressure is altered by hunger and satiety. Further the evidence that force and duration of taste effects are more pronounced before food (state of hunger) than after food (fed state) reinforced our idea that starvation enhances reactions to taste (9). Though effects of distilled water taste on intestinal motility was attempted and found to be not significant, a specific mention of it was thought to be redundant because both sweet and bitter solutions were made in distilled water and yet had contrasting effects on intestinal motility. Reduction in intraluminal pressure on sweet taste may be a sort of receptive relaxation as it is associated with food wheras the contrasting increased pressure on bitter taste could be a reflection of its rejection as bitter taste is associated with toxicity (4).

The mechanism(s) of taste-induced intestinal motility changes is not yet worked out. However it appears to be similar to reported changes in Tom's (human volunteer) gastric motility on the talk and taste of food (11). Probably the hedonics of taste with its known effects on hypothalamic ingestive centres (8) influence the motility via hypothalamic neural connections to gastro-intestinal tract (12).

The present report indicates that taste, like the peptide motilin, exerting its "primary effect on gastro-intestinal motility can have a profound effect on metabolism" (6) through the effects on intestinal transit time and absorption.

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Volume 31 Number 2

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#### NOTOUGORTHI

An apparatus for measuring reaction time to both visual and auditory stimuli with a provision to very intensity of stimuli and with facility for fateralisation of sound to the right or left car has been manufactured. The instrument is being used for the study of medicar time in normals, smokers disbetics, psychiatric patients and neurologically attricted patients.

Description of the reaction time estanticly: The electronic atomictus to measure reaction time has an eight display unit for time interval measurement and intensity controls for visual stimulus by energising an electric lamp (fitted at rear side of the equipment) at the set intensity or alternatively for auditory stimulus by theoretising an audio amplifier at the set intensity or alternatively for auditory stimulus by theoretising an audio amplifier at the set intensity of auditory (e.g. f) when the headphone is connected, the sound can be near by selecting the switch position mathed as for each or the amplifier. Accurate the sound can be averaged on the real of the amplifier is 100 ms (f) or both cars by selecting the switch position mathed as for the source of the amplifier. Accurate resounded in time interval means to  $G_{\rm excertion}$  is provided on the real of the amplifier. Accurate resounded in time interval means to  $G_{\rm excertion}$  is 100 ms (GOED0001s).

Fire flow-refront is constructed using standard I.C.s. and multifunction IC type ICM (216 A manufactured by Intensit, Trie, U.S.A. The ICM 7226 A can function as frequency courter period county, trequency ratio counter or time interval counter.

block diagram of the entire asrembly is shown in Fig. i