

THE INFLUENCE OF YEAST UPON INTESTINAL ACTIVITY IN THE RAT (ISOLATED SEGMENTS).

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Yeast therapy is not new, for Hippocrates employed it as a curative agent, and Pliny, the Elder, during the first century of the Christian era called attention to its use. Although many articles appeared advocating the curative power of yeast for various diseases, it was not until the 19th century that modern medicine looked favorably upon its use for intestinal disorders.

Literature reveals conflicting reports especially concerning the effect of yeast on intestinal motility. Some workers report excellent results with the yeast for relief of constipation while others have found it efficacious in checking diarrhea.

Roos (1) highly recommended yeast as a corrective for alimentary disorders, particularly constipation. Hawk (2) and others of the Jefferson Medical College found that yeast, while not in any sense a cathartic aided in elimination of waste and was an effective remedy in many cases of constipation. Osborne (3) suggested that yeast is a useful laxative and that it should be frequently given where intestinal disturbance is associated with constipation. Beside the laxative effect of yeast, he says that it has the ability to change the flora and to more or less check fermentation. Reeves (4) reported six cases of constipation treated with yeast of which four were cured and two improved. Smith (5) kept several subjects for four weeks on a purin-free diet of bread, milk and cheese which for them was distinctly constipating so long as it was continued without yeast, but when yeast was taken with it, the condition was relieved. Murlin and Mattill (6) found that the administration of yeast not only resulted in greater frequency of evacuation, but also in a measurable increase in the bulk as well as the moisture of the stools. They offer a plausible explanation for their results based on the fact that yeast plants survive alimentary secretion. Therefore, the characteristic fermentation of carbohydrates goes on in the bowel. The resulting gas, by distention possibly induces increased peristalsis. Daniels (7) reports marked diarrhea in infants when yeast is used as the source of Vitamin B. Davison (8) confirms these findings. On the other hand, Thier-

celin and Chevrey (9) reported several cases in infants where diarrhea was suppressed by the use of yeast. Faisans (10) said, "I have been struck with the facility with which the coated tongue, lack of appetite and diarrhea clear up by the employment of brewers' yeast."

The concensus of opinion among the earlier workers favors some laxative action of yeast, either by the carbon dioxide production, high Vitamin B¹ content or change in the intestinal flora.

Thorup and Carlson (11) experimenting with rats concluded that yeast in varying amounts up to 25% of the total diet has no effect on the alimentary peristaltic rate in normal rats on an adequate diet. However, some increase in moisture content of the stools was noted. Concerning prolonged tests on 85 normal human adults, the records of these workers show that in approximately 55% there was a very slight increase in number of stools daily during a period of yeast ingestion. On the other hand some individuals showed a decreased alimentary rate on yeast intake. Therefore, they concluded that the value of yeast as a laxative in adults on average normal diets is questionable.

Allen and Burget (12) designed experiments to test the effect of bakers' yeast on gastric secretion in man and in dogs. A synthetic control meal consisting of 5 grams of powdered soda crackers suspended in 400 cc. of water was taken and on alternating days, a suspension of 20 grams of yeast in a like quantity of water. Their results showed that the bakers yeast did not exert a gastric secretagogue action as great as that brought about by soda crackers or by a synthetic meal consisting of similar amounts of protein, carbohydrate and fat as found in yeast.

So much diversity of opinion concerning the true effect of yeast upon the alimentary system prompted Dr. Erma A. Smith and the writer to test the influence of yeast in the diet of the rat upon the activity of isolated segments of duodenum and colon. The method of Alvarez (13) was employed. Young white rats of the same age were selected and divided into four groups. Each group contained a comparable number of animals as to sex. The basal diet consisted of purified food stuffs free from Vitamin B as prepared by the Harris Laboratories. Fleischmann's yeast, dried at room temperature, supplemented this diet.

BASAL DIET		YEAST SUPPLEMENT
Food	Per cent by weight	
Starch	54	Group I. Basal diet only Group II. Basal diet plus 1 per cent by weight yeast Group III. Basal diet plus 10 per cent by weight yeast Group IV. Basal diet plus 25 per cent by weight yeast
Casein	18	
Lard	16	
Butter fat.....	8	
Complete inorganic salt mixture...	4	
Cod liver oil 2 to 4 drops daily per rat Lemon juice 2 to 4 drops daily per rat		

After 14 days on diets, motility experiments were begun. Experiments were conducted thereafter upon 30 rats subjected to the above diets for varying numbers of days up to 77. Four segments were compared simultaneously.

One animal of similar sex from two groups was decapitated at the same time. Strips of duodenum immediately below the stomach and of colon as low as possible were excised at once from each rat. The 4 segments, each approximately $2\frac{1}{2}$ centimeters in length were suspended in warm oxygenated Locke's solution and arranged in connection with light recording levers of equal weight and length. The strips not used immediately were kept on pads of cotton saturated with Locke's solution at a temperature of 0° C. and tracings made the succeeding day.

The kymographic records were compared as to rate and amplitude of rhythmic contraction also as to duration or the length of time which the isolated segments exhibited spontaneous activity.

The following table indicates the number of experiments in which segments from rats fed diets containing no yeast or 1% of yeast were greater, less or equal in activity to those from rats fed diets having either 10% or 25% yeast content.

Considering both the records of the first day and those made from the refrigerated strips on the second day, segments from rats fed diets containing no yeast or low in yeast total greater activity in 13 experiments, less in 10, and equal in 22.

The number of days on diet is a factor in these experiments because rats fed diets containing no yeast becomes greatly debilitated through lack of Vitamin B. Before the stage of debility, segments from such rats show hyperactivity; and later hypo-

COMPARISONS	Frequency of Contraction			Duration of Contraction			Amplitude of Contraction		
	Greater	Less	Equal	Greater	Less	Equal	Greater	Less	Equal
No yeast vs. 10 per cent yeast.....	1	.....	1	1	.....	1	1	.....	.....
1 per cent yeast vs. 10 per cent yeast	5	2	4	3	.....	4	.....	6	5
No yeast vs. 25 per cent yeast.....	.....	2	2	.....	.....	2	.....	.....	2
10 per cent yeast vs. 25 per cent yeast	1	.....	.....	1	.....	.....	.....	.....	1
Totals.....	7	4	7	5	.....	7	1	6	8

activity. Vitamin B supplement provided by 1% of yeast approaches natural physiological conditions. Therefore, comparisons with these animals are more dependable.

Comparison of records and direct observation of contractions of isolated segments of rats intestine do not indicate increased activity as a result of diets high in yeast. Therefore, the laxative effect of yeast on intestinal motility is doubtful.

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