Summary. Strain-differences in Group A hemolytic streptococci evoke marked differences in the inflammatory cell-response in mice undergoing treatment of experimental peritonitis with sulfanilamide. Some mucoid strains are readily phagocyted by the neutrophils; others seem to require the presence of macrophagic cells almost to exclusion in order to dispose of them. Some non-virulent strains, even in the absence of treatment, are phagocyted and destroyed by the neutrophils alone. Phagocytosis of virulent strains is conditioned by the previous bacteriostatic action of the drug, which appears as an indirect one.

9561

A Comparison of the Effectiveness of Alpha and Beta Lactose in the Control of Intestinal Reaction.*

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The reaction of the intestinal contents and its control has assumed increasing importance during recent years with the growing realization that acidity and alkalinity are important factors in the digestion and absorption of food and in the progress of various pathological conditions of the intestinal tract. With this knowledge has come an increased interest in the factors influencing the reaction and the methods for their control. One of us[1] has published data indicating that there is a certain constancy about the reactions of the various sections of the intestine which have the appearance of physiological constants and which the body strives to maintain. Unpublished results have confirmed this and demonstrate a rather efficient mechanism for the accomplishment of this end. Apparently changes of long duration are difficult to maintain. The only method whose effectiveness has been adequately demonstrated is that of increasing the acidity by the administration of large amounts of lactose. Several studies have been made of this process.[2, 3]

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1 Robinson, C. S., *J. Biol. Chem.*, 1935, **108**, 403.

2 Robinson, C. S., Huffman, C. F., and Mason, M. F., *J. Biol. Chem.*, 1929, **84**, 257.

3 Robinson, C. S., and Duncan, C. W., *J. Biol. Chem.*, 1931, **92**, 435.

Presumably it depends on the alteration of the intestinal flora in such a way that the acid-producing organisms predominate and by the production of lactic acid produce their effects. Lactose, and to a lesser extent dextrine, are the only 2 substances which accomplish this. Most of the results have been secured on carnivorous or on omnivorous animals like the dog, cat and rat. The ordinary alpha lactose has always been used.

It occurred to us that in an herbivorous animal with a longer intestinal tract the effects of lactose feeding should be emphasized by the longer time required for the passage of material through the gut. It was also thought that beta lactose, whose nutritional status has become of interest since processes for its manufacture have made it available might, because of its greater solubility, be less effective than the alpha form.

The general plan was that followed in previous work. Three groups of about 15 rabbits each were fed the same basal ration, 40% alfalfa, 40% oats to which was added 20% dextrose, alpha lactose or beta lactose respectively for each group. They were maintained on these diets for at least two weeks and then killed. The intestines were immediately dissected out, tied off into sections (five for the small intestine between the pylorus and ileocecal valve, one for the cecum and 2 for the colon) and the reaction of the contents determined. The measurements were made electrometrically with the quinhydrone or glass electrode. Table I shows the differences of the means and the probable errors of these differences.

The results were unexpected for several reasons. Thus, contrary to previous results, the alpha lactose produced a higher pH in the small intestine than did the dextrose although the differences were not generally significant. In rats this happened only with diets high in animal protein.[3] In the cecum and colon the normal relationship was restored and the lactose-fed rats produced the more acid

TABLE I.

Section of Intestine	Dextrose and α-Lactose			Dextrose and β-Lactose		
	Means Dex. Lac.	Mean Deviation	Probable Error	Means Dex. Lac.	Mean Deviation	Probable Error
1*	6.76-6.75	—.01	±.05	6.76-6.72	—.04	±.06
2*	6.88-6.97	+.09	±.05	6.88-6.83	—.05	±.04
3*	7.00-7.17	+.17	±.06	7.00-6.95	—.05	±.04
4*	7.20-7.37	+.17	±.05	7.20-7.06	—.14	±.05
5*	7.27-7.36	+.09	±.06	7.27-7.15	—.12	±.05
6	6.07-5.76	—.31	±.10	6.07-5.56	—.51	±.07
7	6.62-6.16	—.46	±.09	6.62-6.05	—.57	±.07
8	6.73-6.57	—.16	±.10	6.73-6.11	—.62	±.09

*Small intestine.

contents. The other outstanding feature of the picture was the effectiveness of the beta lactose in producing a more acid condition throughout the whole length of the gut.

Although in general the reaction of the contents of the rabbit's intestine is more acid than that of the rat, the differences in the large bowel between the dextrose and alpha lactose are of approximately the same order of magnitude as those found in previous work. Unfortunately a strict analogy cannot be drawn because in the work with rats dextrose was not added to the control diet, but other workers have failed to find any change under its influence. In the case of the beta lactose, however, the differences exceed those found with rats. This is apparently due to the greater effectiveness of the beta form of the sugar. It may be that its greater solubility makes it more available for bacterial action.

The unique behavior of lactose in passing through the upper intestine has usually been ascribed to its comparatively low solubility. It may, however, be partly due to the relatively small amounts of lactase in the intestines of mature animals, particularly the rabbit. The failure to split lactose into the constituent monosaccharides perhaps hinders its absorption and allows it to reach the lower section of the bowel to become available there for bacterial consumption.

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Cutaneous Absorption of Insulin.

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In a recent article on the cutaneous absorption of insulin Bruger and Flexner[1] came to the conclusion that "the absorption of insulin by the skin of rabbits is dependent upon the integrity of the integument. The intact skin shows little or no absorption, whereas a recently abraded skin, such as produced by shaving permits the absorption of an appreciable amount of insulin."

While there can be no doubt that actual abrasion of the skin permits absorption of insulin, there is evidence that absorption may occur under conditions where no abrasion can be detected or even

[1] Bruger, M., and Flexner, J., PROC. SOC. EXP. BIOL. AND MED., 1936, **35**, 429.