

THE EFFECT OF CHRONIC INGESTION OF DIETARY FIBRE  
ON THE RATE OF ABSORPTION OF GLUCOSE IN RATS

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Recent evidence has shown that some forms of dietary fibre can cause an apparent decrease in the rate of glucose absorption from the small intestine, though the mechanism by which this occurs is uncertain (Jenkins et al. 1978). In this study the effect of chronic feeding of dietary fibre, in the form of fine wheat bran, coarse wheat bran and guar gum, on glucose uptake was evaluated.

Four groups of Sprague-Dawley rats were fed different diets from weaning (3 weeks). The test groups received a diet comprising the particular fibre (bran 32 per cent or guar 5 per cent) together with starch, casein, maize oil, vitamins and minerals. A control group received commercial rat pellets. After 8 weeks on the diet, fasted animals were anaesthetised and the duodenum (12 cm) and proximal jejunum (20 cm) cannulated to give separate loops. Glucose absorption was measured by circulating Krebs Henseleit buffer (pH 7.4) containing glucose (1 mg/ml) through the loops (1 ml/min) and sampling from the reservoirs at intervals over a period of 60 min. Glucose was measured by the hexokinase method and a non-absorbable marker, phenylsulphonphthalein (20 mg/l) was included in the medium to enable corrections for water flux to be made. The rates of glucose uptake for the respective groups are shown in the table.

Rate of glucose uptake (Mean  $\pm$  SEM) ( $\mu$ moles/min/g wet weight of tissue)

Diet	Duodenum				Jejunum			
	20	35	50	65 min	20	35	50	65 min
Pellets n=12	2.2 $\pm$ .24	1.53 $\pm$ .20	1.47 $\pm$ .13	1.28 $\pm$ .08	1.40 $\pm$ .11	1.11 $\pm$ .15	0.70 $\pm$ .08	0.52 $\pm$ .07
Fine bran n=11	1.75 $\pm$ .17	1.51 $\pm$ .15	1.37 $\pm$ .17	1.12 $\pm$ .10	1.33 $\pm$ .08	0.98 $\pm$ .06	0.78 $\pm$ .08	0.59 $\pm$ .02
Coarse bran n=6	1.80 $\pm$ .32	0.93 <sup>a</sup> $\pm$ .21	0.69 <sup>b</sup> $\pm$ .21	0.75 <sup>c</sup> $\pm$ .20	0.79 <sup>b</sup> $\pm$ .09	0.62 <sup>c</sup> $\pm$ .09	0.56 $\pm$ .10	0.49 $\pm$ .09
Guar n=11	1.71 $\pm$ .17	1.59 $\pm$ .15	1.40 $\pm$ .16	1.00 <sup>d</sup> $\pm$ .10	1.25 $\pm$ .09	0.84 <sup>a</sup> $\pm$ .06	0.66 $\pm$ .06	0.47 $\pm$ .04
(a) Different from pellets $p < 0.05$				(c) Different from pellets $p < 0.01$				
(b) Different from pellets $p < 0.001$				(d) Different from pellets $p < 0.02$				

Animals raised on a diet containing coarse wheat bran or guar gum showed a lower rate of glucose absorption from both the duodenum and jejunum, compared with animals raised on control pellets or fine wheat bran. The observed effect on the rate of glucose uptake may be the result of adaptive changes in the mucosal surface involving the microvilli or the unstirred layer. It is also possible that altered hormonal responses may be involved.

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