

RESISTANT STARCH FROM CORN BEHAVES LIKE SOLUBLE AND NOT INSOLUBLE FIBRE IN A RAT MODEL OF LARGE BOWEL CANCER

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Starch escaping digestion in small intestine (resistant starch, RS) might act like certain nonstarch polysaccharides (dietary fibre) and protect against colorectal cancer (CRC). Thus we compared the effect on tumorigenesis of high-amylose corn starch, a source of RS, to that of wheat bran (an insoluble) and guar gum (a soluble) fibre in the rat-dimethylhydrazine (DMH) model of CRC.

Four groups of rats (n=20) were fed one of the following nutritionally-balanced, modified AIN76™ diets using high- and low-amylose corn-starches as the carbohydrate source: 98% digestible starch plus 10% guar gum (GG) or 10% wheat bran (WB) fibre, 80% digestible starch with no fibre (RS) or RS diet plus 10% wheat fibre (RS-WB). DMH (20mg/kg/week) was given during weeks 3-12; colons were examined at week 32 for malignant tumours. In a separate experiment, numbers and size of aberrant crypt (AC) foci were determined four weeks after a three-week course of DMH.

Diet	GG	RS	RS-WB	WB
Faeces, g/24h	2.3±0.3ab	1.5±0.3cd	9.5±2.1ac	9.1±1.7bd
Faeces pH	6.4±0.1a	6.3±0.2b	5.7±0.5abc	6.1±0.5c
AC foci	86±19a	58±8ab	43±10b	28±7
Tumours: /group	47 ^{ad}	60 ^{bc}	24 ^{ab}	28 ^{cd}
size (mm ² , log _e)	4.2±2.0 ^{ab}	4.1±2.1 ^{cd}	2.8±2.2 ^{ac}	2.9±2.3 ^{bd}

Table shows mean±SEM; shared superscripts denote P<0.05. Rats in each group gained weight at similar rates. The most acid faeces were seen with the RS-WB diet. Weight of caecal contents was significantly increased by RS compared to the other diets but this was largely reversed by addition of bran. Faecal concentrations of acetate, propionate and butyrate were relatively low in the GG group compared to the other diets. AC foci were not only more numerous but also larger (i.e. more crypts per focus) with the RS diet. The lowest tumour number and size was seen in the RS-WB diet.

Twenty percent RS in the diet acidifies stools to the same degree as soluble and insoluble fibres but, like guar, has a minimal laxative effect. Addition of bran to RS causes very acid faeces and better laxation. Relative to RS and guar, wheat bran suppresses tumorigenesis, the effect being evident as early as the stage of AC formation, when the fermentable substrates are given throughout the initiation and promotion phases. The suppressive effect of wheat bran is maintained in the presence of RS. RS influences tumourigenesis in the rat in similar fashion to the soluble fibre, guar gum.

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