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# News from Boston University Medical Center: May 9, 1977 no. 1101

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*Boston University*

# News from Boston University Medical Center

Office of Informational Services  
720 Harrison Avenue  
Suite 203  
Boston, Massachusetts 02118  
617/247-5606

After 5 p.m. and weekends:  
617/247-5000

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Rats fed a diet high in polyunsaturated fat developed more large-bowel cancers than either of two groups of rats fed a diet containing saturated fat, when all three groups were given a cancer-inducing chemical in a study reported on today (Wednesday, May 11) by scientists from Boston University School of Medicine (BUSM).

The findings may have possible implications for persons who have switched to polyunsaturated fats in their diets to reduce the risk of developing heart disease. Polyunsaturated fats are more often found in foods derived from vegetables, such as corn oil margarine and safflower oil; saturated fats are more often found in animal-derived foods, such as beef, butter and cream.

Among the rats fed saturated fat, those receiving a high-fat diet developed 175 percent more tumors than those given a low-fat diet. But in both saturated-fat groups, the number of rats developing tumors and the number of tumors per rat were lower than in the group fed polyunsaturated fat. Diets in all three groups were high in cholesterol.

"Extrapolating from animal to human studies always entails some difficulties, but the findings would suggest that diets high in polyunsaturated fats aimed

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at reducing cholesterol levels in the blood might conceivably increase the risk of developing cancer of the large bowel," Selwyn A. Broitman, Ph.D., a BUSM professor of microbiology, said.

In recent years Americans have been urged to switch from saturated fats to polyunsaturated fats in their diets to reduce the risk of cardiovascular disease. While the results of the Boston study seem to suggest that persons who do so may be avoiding heart disease at the cost of increasing their risk of developing cancer of the colon, the BU researchers emphasized that the far smaller incidence of the latter disease makes it substantially less a risk than heart disease for most people.

The findings were reported in New Orleans today (Wednesday, May 11) by Sara W. Rothman, Ph.D., an assistant research professor of microbiology at BUSM, and Broitman at the 77th annual meeting of the American Society for Microbiology. Approximately 8,000 scientists are attending the six-day meeting, which brings together microbiologists, molecular biologists, and other scientists from across the country.

A connection between diet and colon cancer has been established through epidemiological studies showing that in Western countries, such as the United States, where a diet high in fat and cholesterol is common, there is a high incidence of large-bowel cancer, while in countries where a diet low in fat and cholesterol is the rule, such as Japan, people are much less likely to develop the disease.

In the Rothman-Broitman study, rats were divided into four groups, each receiving a different diet: one high in saturated fat (20 percent of the total diet); another low in saturated fat (5 percent); a third high in polyunsaturated fat (20 percent); and the fourth low in polyunsaturated fat (5 percent). All of the diets were high in cholesterol. All four groups of rats were then injected with dimethylhydrazine (DMH), a chemical known to cause cancer in the large and



small bowel.

All of the animals on the high polyunsaturated fat diet developed colonic cancer, with an average of 3.8 tumors for each rat. Eighty-five percent of the rats on the high saturated fat diet developed the disease (average 2.2 tumors per rat), compared with only half the rats on the low saturated fat diet (average 0.8 tumors each). The rats in the fourth group, those on the low polyunsaturated diet, all died, apparently of some dietary inadequacy, and could not be used in the study.

In a control group of rats receiving no DMH, no tumors developed.

The specific focus of the study was to determine whether the effect of diet on tumor incidence might be tied to its role in changing the level of a particular bacterial enzyme, beta-glucuronidase, in the large intestine. The chemical carcinogen DMH, which Rothman and Broitman gave their rats, is detoxified in the liver, which disarms the chemical by hooking it to a sugar molecule, making it harmless. However, beta-glucuronidase splits the sugar off, leaving the chemical free to be converted to a tumor-causing product.

Theorizing that a high-fat diet might cause tumors by causing the bacteria to produce more of this enzyme, the two BUSM scientists measured the levels of the enzyme in all their subject rats, but could find no correlation between levels of enzymes and incidence of tumors.

"It is safe to say that the enzyme level is not the factor that shifts with diet to cause cancer," Rothman said.

The study was supported by the National Large Bowel Cancer Project, of the National Cancer Institute. Rothman and Broitman are currently looking at the role of other intestinal enzymes in cancer production, and are expanding their studies to include a comparison of the effects of diets with and without cholesterol, and with varying ratios of polyunsaturated to saturated fats.