

High fat diet increases inflammation in the mouse colon

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(PhysOrg.com) -- In mice fed a diet high in fat and low in fiber, vitamin D and calcium -- the so-called Western diet -- expression of a series of genes collectively associated with immune and inflammatory responses was altered. The findings show that a Western diet induces oxidative stress and alters immune responses in the colon of mice long before tumors occur.

Colorectal [cancer](#), the third most common type of cancer worldwide, has been linked to an increased prevalence of the Western diet: one high in fat and low in fiber, [vitamin D](#) and calcium. Now, a team of scientists led by researchers at Rockefeller University have shown what happens to colon tissue when mice are fed such a diet: an [inflammatory response](#) that could be the trigger for carcinogenic processes. Their results are published in the November 2009 issue of The [Journal of Nutrition](#).

“There is convincing evidence that increased intake of [red meat](#), processed meat and alcohol can increase risk of colorectal cancer, whereas greater consumption of dietary fiber, milk and calcium might decrease risk,” says Peter Holt, a senior research associate in the Laboratory of Biochemical Genetics and Metabolism at Rockefeller. “Our findings show that a Western diet induces oxidative stress and alters immune responses in the colon of mice long before tumors occur.”

The researchers fed experimental mice either a standard diet containing five percent fat and ample amounts of calcium and vitamin D or a Western diet containing 20 percent fat and adequate but marginal levels

of calcium and vitamin D for three or six months.

As expected, animals consuming the Western diet were heavier and had more fat tissue than those on the control diet. Microarray analysis identified 41 genes that were being expressed at significantly different levels between the Western diet and control animals. Most of these genes were related to metabolic processes such as [lipid metabolism](#) and glutathione metabolism, which is important for preventing damage caused by oxidation. In addition, expression of a series of genes collectively associated with immune and inflammatory responses was altered. The Western diet also increased the number of macrophages, cells associated with inflammation in the colon, as well as several proteins such as myeloperoxidase and MCP-1 and colonic oxidative stress genes associated with inflammation.

Taken together, Holt says, these data suggest that macrophage recruitment and oxidative stress is a potential early mechanism underlying the carcinogenic effect of the Western diet.

[More information:](#) *The Journal of Nutrition* [139\(11\): 2072-2078](#) (November 1, 2009) Western-Style Diets Induce Oxidative Stress and Dysregulate Immune Responses in the Colon in a Mouse Model of Sporadic Colon Cancer; Ildiko Erdelyi, Natasha Levenkova, Elaine Y. Lin, John T. Pinto, Martin Lipkin, Fred W. Quimby and Peter R. Holt

Provided by Rockefeller University ([news](#) : [web](#))

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