Study shows how high-fat diets increase colon cancer risk

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Epidemiologists have long warned that, in addition to causing obesity, eating too much fat and sugar puts a person at greater risk for colon cancer. Now, researchers at Temple University have established a link that may explain why.

The findings, "Epigenetic Differences in Normal Colon Mucosa of Cancer Patients Suggest Altered Dietary Metabolic Pathways," were published in the March issue of the American Association for Cancer Research's journal, Cancer Prevention Research.

"There have always been questions about why things like diet and obesity are independent risk factors for colon cancer," said Carmen Sapienza, professor of pathology in Temple's Fels Institute for Cancer Research and Molecular Biology, the study's lead author. "This study suggests how and why high fat diets are linked to colon cancer."

The researchers compared colon tissue in non-colon cancer patients with normal colon tissue in patients with the disease. In the normal tissue from patients with colon cancer, they found that epigenetic marks on genes involved in breaking down carbohydrates, lipids and amino acids — abundant in the fatty Western diet — appeared to have been retrained. Epigenetic marks are chemical modifications that serve as on/off switches for many genes.

"These foods are changing the methylation patterns on a person's insulin genes so that they express differently, pumping out more insulin than the

body requires," said Sapienza. "In people that have colon cancer, their glucose metabolic pathways and insulin signaling pathways are running at completely different levels than people who don't have colon cancer."

Sapienza said that cancer cells love insulin and studies have shown that tumors feed off of insulin. "Insulin is only supposed to be expressed in your pancreas, so having this extra insulin is bad," he said.

Sapienza pointed out that people don't usually get colon cancer until the age of 50 or older, so it is unclear when the epigenetic modification of the genes begins.

"The hypothesis is that the changes in the metabolic pathways happen first, and once they occur, if any kind of mutation happens that causes a cancerous polyp, you are going to feed it through this excess insulin," he said.

Sapienza said this study provides the first evidence of widespread epigenetic modification of metabolic pathway genes occurring in healthy colon tissue.

The researchers theorize that if modification in healthy tissue could also be found in other healthy tissues in the body, they might be used to diagnose or determine the likelihood of colon cancer by through a saliva or blood test in addition to a colonoscopy.

Provided by Temple University

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