Biomedicine

From Washington, D.C., at the Experimental Biology '99 conference, a meeting of 26 scientific societies

Some fats may ward off colon cancer

Diets enriched with any of several sphingolipids—arcane, ubiquitous fats (SN: 5/31/97, p. 342)—appear to offer potent protection against colon cancer, a pair of animal experiments now indicates. Though sphingolipids occur in many foods, the source in these studies was, ironically, "fat-free" skim milk.

Colon cancers develop within crypts, normal pocketlike structures lining the large intestine. Although young cells in the lower half of crypts proliferate, their growth in a healthy animal stops as the maturing cells slowly migrate upward. When this proliferation is abnormally high and it continues even as the cells enter the upper crypt regions, cancer can develop.

In their new experiments, Eva-Maria Schmelz and Alfred H. Merrill of Emory University in Atlanta fed sphingolipids to mice with this abnormality, called aberrant crypts. In one test, the researchers triggered the precancerous changes with a chemical carcinogen. When these animals later ate sphingolipids for 4 weeks in quantities equal to 0.1 percent by weight of their diet, the proliferation of cells throughout the crypts diminished. Most notably, Schmelz reports, cell-proliferation rates fell by 50 percent to 95 percent in the upper half of those crypts.

In their second study, she and Merrill fed the same amount of sphingolipids to mice that spontaneously develop colon tumors. These animals model a human hereditary condition that can lead to cancer. Mice that downed the sphingolipid-enriched chow for some 2 months developed during that period only about half as many cancers in their intestinal tract—including the colon—as untreated mice did.

What's exciting, Schmelz notes, is that this intervention reverses precancerous changes relatively late in the development of disease. She says that trials in which supplements of the natural fats are given to people could begin within a few years. *—J.R.*

Tuckered out by soccer? Try peanuts

In the days immediately before a strenuous bout of exercise, such as a marathon run, athletes often load their diets with carbohydrates. These foods help build up sugary reserves of energy in the muscle. A new study finds, however, that a little fattening up may prove more advantageous, at least for women.

Nine female soccer players supplemented their diet for a week with an extra 450 calories worth of fat daily in the form of 2.5 ounces of peanuts. Before succumbing to exhaustion, these trained athletes were able to run about 1.5 kilometers further than when they had eaten their usual fare. The women got no endurance advantage from eating an extra 450 calories of carbohydrates daily, reports Peter J. Horvath, a nutritionist at the State University of New York at Buffalo.

After a week on each diet—normal, high-fat, or high-carbohydrate—each woman took part in a 90-minute treadmill test designed to simulate the demands of professional soccer play. The trial started with a progressively increasing workload, slowed for a while, then sped up again as if the player were about to score a goal. For the last few minutes, it called on each athlete to spurt at peak intensity.

Horvath points out that when the women were following the high-fat diet and lasted to run the extra distance, they didn't do it at just any speed. "It was at the highest intensity called for in the workout, a pace of about 14 km per hour," he says.

In each case, he notes, the women chose to compensate for their high-fat or high-carbohydrate energy supplement by cutting back on an equivalent number of calories elsewhere in the diet. "So, they didn't increase their overall energy intake," he says. What changed was the relative share of their calories each day coming from fats versus carbohydrates.

Because women are about 50 percent more efficient at using fat calories than men are, Horvath says, they may reap a selective advantage from this endurance-enhancing strategy. *—J.R.*

Mom's cells tied to autoimmune ills

Just in time for Mother's Day comes news that maternal cells linger in a child's body for years after birth. In some cases, researchers suggest, these cellular mementos of Mom trigger autoimmune diseases in the child.

A few years ago, researchers made the converse discovery: A child's cells can stow away in a mother for decades after pregnancy (SN: 2/10/96, p. 85). Women with the autoimmune disease scleroderma are more likely to have these persistent cells in their bloodstream than women without the disease (SN: 8/2/97, p. 71). This raises the possibility that the fetal cells somehow interfere with the mother's immune system.

Now, J. Lee Nelson of the Fred Hutchinson Cancer Research Center in Seattle and her colleagues report that boys with the autoimmune disease lupus have more maternal cells circulating in their bloodstreams than boys without lupus do.

"Bidirectional trafficking of these cells is much more common than anyone ever anticipated," says study collaborator Diana W. Bianchi of the New England Medical Center in Boston.

Immune-system proteins, which determine whether a transplant patient will accept or reject a donated organ, influence how the body reacts to these foreign cells, Nelson says. In mothers with scleroderma and sons with lupus, the host's immune system is compatible with, but not identical to, the immune system of the cell source, she finds. Those without the disease showed greater differences between mother and child.

"Maybe autoimmune diseases are not entirely self versus self," says Nelson. Cells whose immune-system proteins differ only slightly from the host's may circumvent the body's first-line defenses but then trigger disease by an as yet unknown mechanism.

Women may both inherit cells from their own mothers and pick up additional cells from each pregnancy. The resulting multitude of interlopers may help explain why women are more likely than men to suffer from autoimmune diseases, Nelson says.

Mere presence of someone else's cells isn't enough to disrupt the immune system, comments Carol Artlett of Thomas Jefferson University in Philadelphia. Based on the new findings and her own research, she estimates that 90 percent of the population harbors foreign cells. *—L.H.*

Cells link headache to heart disease

The head and the heart are more closely connected than even bad poets claim, researchers reported this week.

Margaret Chandler and her colleagues at the University of Oklahoma in Oklahoma City have demonstrated in two monkeys that nerve cells at the top of the spinal cord can respond both to head and heart stimulation. This area in the monkey's neck has been known to contain neurons that receive signals from the heart. Out of 19 such neurons tested, 10 also fired when the researchers activated the nerve that communicates with the blood vessel running along the top of the monkey's brain. In people, this nerve registers headache pain.

A nervous-system link between the head and the heart could account for anecdotal reports of people whose only sign of heart disease is a splitting headache, Chandler suggests. In the September 1997 NEUROLOGY, Richard B. Lipton and his colleagues at Albert Einstein College of Medicine in New York reported on two men who developed severe headaches while exercising. Subsequent testing revealed that the men were suffering from heart disease. When the heart disease was treated, the exertion-triggered headaches cleared up.

However, "headaches are not a very sensitive or specific reason to target heart disease," cautions A. Michael Lincoff of the Cleveland Clinic Foundation. If headaches occur exclusively while exercising, however, a stress test to reveal heart disease might be in order, he says. *—L.H.*