Biomedicine

Kathy A. Fackelmann reports from Monterey, Calif., at the American Heart Association's Science Writers Forum

Rich foods, clotting, and heart attacks

A high-fat diet may lead to an overly aggressive blood-clotting system, which in turn can lead to a heart attack in people with coronary artery disease.

Fat-laden diets tend to raise concentrations of cholesterol in the blood. Cholesterol is a fatty substance that builds up on the inner wall of the artery and along with other debris hardens into a substance called plaque. If that plaque gets too thick, it can obscure the blood flowing through the heart's coronary arteries and thus cause a heart attack.

However, there's another way for a heart attack to occur: If a hunk of plaque breaks away from the artery wall, the body's clotting system attempts to repair the breach. In arteries already narrowed with plaque, the resulting blood clot can block the vessel, leading to a heart attack. People with a penchant for fatty foods may be at increased risk for a heart attack because their clotting system overreacts to such an injury and builds a monster clot, says George J. Miller of the Medical College of St. Bartholemew's Hospital in London.

In particular, Miller says, a high-fat diet leads to increased activity of a blood protein called factor VII. Miller likens factor VII to the spark that sets off an explosion. His research suggests that people with a fat-filled diet are likely to have more active factor VII than people who eat low-fat foods.

For hours after eating a fat-rich meal, people have high concentrations of fat circulating in their bloodstream, Miller says. Somehow, that fat activates a blood factor that in turn ignites factor VII. Miller believes this scenario explains the observation that heart attacks surge in the predawn and early morning hours. The industrialized world's habit of eating on the run during the day means that most people don't sit down for a large meal until evening. People who eat a high-fat dinner may face an explosive situation when the alarm goes off in the morning, he says.

The best HDL cholesterol for the heart?

High-density lipoprotein (HDL) is a carrier molecule known as the "good cholesterol" for its role in removing fatty debris from artery walls. Researchers now report that some forms of HDL may provide better protection against heart disease than others.

A particular type of HDL, one that contains a particle dubbed apoA-I, seems to provide superior protection against the ravages of heart disease, says H. Bryan Brewer Jr. of the National Heart, Lung, and Blood Institute in Bethesda, Md. His research suggests that HDL with apoA-I collects cholesterol from the inner wall of the artery and transports it to the liver for excretion. Another type of HDL appears ineffective at such cholesterol scavenging.

More evidence on the merits of apoA-I comes from a mouse study. Edward Rubin of the University of California, Berkeley, has put the human gene coding for the apoA-I protein into a strain of mice. The resulting animals have high concentrations of HDL with the human apoA-I particle in their bloodstream.

When Rubin put these mice on a high-fat, high-cholesterol diet, he found that the apoA-I protected them from developing plaque. By contrast, unaltered mice (with normal concentrations of HDL in their bloodstream) did develop coronary artery disease when fed the fatty chow.

Of course, such animal studies do not prove apoA-I's benefits in humans, Rubin notes. But this evidence, as well as data from other studies, suggests that HDL with apoA-I may provide people with a more effective shield against heart disease, he says. Brewer agrees, noting that if further research confirms apoA-I's benefits, physicians may begin to order a more sophisticated cholesterol profile, one that includes a breakdown of HDL types.

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Mud-wrestling can get under your skin

Future Mud-Wrestlers of America, take heed: Your chosen sport puts you at high risk of developing the unsightly ravages of dermatitis palaestrae limosae, loosely translated into layman's terms as "mud-wrestler's rash."

Two physicians at the University of Washington in Seattle have identified this new disease among participants in a "mud-wrestling social event" that took place at the university last spring. Student health center doctors Amanda I. Adler and Jeff Altman uncovered an outbreak of the disease when seven mud-wrestlers showed up the day following the event complaining of an itchy, pus-containing rash on their arms and legs. All of the students — six women and one man — had mud-wrestled wearing either a bathing suit or shorts and a T-shirt.

Adler and Altman found that pus taken from the students' rashes contained fecal bacteria that had presumably penetrated their skin through hair follicles. The researchers isolated similar bacteria from samples of the commercially available topsoil the students had used to make the mud.

By questioning the residents of two dormitories who had attended the mud-wrestling event, Adler and Altman calculated that the 26 wrestlers were 80 times more likely to have developed the rash than another 27 students who had only watched the spectacle. They suggest that more female than male mud-wrestlers developed rashes because all of the women shaved their legs, which could have rendered hair follicles there more vulnerable to infection.

"We suggest that health care providers consider eliciting a history of mud-wrestling from those diagnosed with [pus-containing] rashes," Adler and Altman write in the Jan. 27 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. "Further, we would like to alert those who mud-wrestle — either recreationally or occupationally — to a potential risk."

Killing tumors with fewer side effects

For nearly two decades, biomedical researchers have known that the body produces a substance called tumor necrosis factor (TNF) that can fight — and sometimes kill — cancers. However, attempts to treat cancer patients with extra TNF have been unsuccessful because amounts of the substance large enough to combat tumors can also cause dramatic weight loss and throw patients into potentially fatal shock.

Now, a team of European scientists has discovered a mutant form of TNF that can kill cancer cells without causing such serious side effects. Walter Fiers of the University of Ghent in Belgium and his colleagues have found that the mutant TNF binds to only one of two types of TNF receptors on body cells.

Fiers and his co-workers report in the Jan. 21 NATURE that the mutant TNF binds to receptors that prompt immune-system cells to attack tumors. However, the substance fails to bind to receptors responsible for triggering a toxic reaction.

The researchers have also demonstrated that the mutant TNF can kill cancerous human cells that have been transplanted into experimental animals. They found that injections of mutant TNF plus another cancer-fighting substance called gamma interferon could eradicate human tumors from experimental mice without causing harmful side effects. The treatment "almost completely inhibited growth of the [tumors], and some animals were apparently cured," Fiers' group observed.

The combination of modified TNF and interferon offers promise as a new cancer treatment, says Frances Balkwill of the Imperial Cancer Research Fund in London. "If the complexity and toxicity of [TNF's] action can be restricted by the use of mutant molecules . . . the therapeutic potential of [TNF] may be greatly increased," he writes in an editorial accompanying the new report.