Biomedicine

Two dozen eggs please . . . hold the bacon

An elderly man with a mammoth appetite for eggs serves as an extreme example that some people can eat large amounts of cholesterol-laden foods without harming their health.

In the March 28 NEW ENGLAND JOURNAL OF MEDICINE, gastroenterologist Fred Kern Jr. of the University of Colorado School of Medicine in Denver describes an 88-year-old retirement-home resident who has consumed an average of 25 eggs daily for more than 15 years – yet maintains normal levels of blood cholesterol. The man, diagnosed with a compulsive eating disorder, keeps a running tally of the two dozen soft-boiled eggs he methodically ingests throughout the day. He eats an otherwise normal diet and is of average weight.

Kern says the man's body has "extremely efficient compensatory mechanisms" that allow him to cope with the quantity of cholesterol he consumes. Not only do his intestines absorb only 18 percent of the cholesterol he ingests – 50 to 60 percent is more normal – but his liver also produces twice the normal level of bile acids, breakdown products of cholesterol.

Margaret Flynn, a clinical dietitian at the University of Missouri in Columbia, says the man's healthy cholesterol level is not surprising. "All of the studies we have done showed no effect [on blood cholesterol] of high egg consumption in a normal diet," she told SCIENCE NEWS.

New candidate for chronic fatigue

Researchers have fingered a new suspect in their search for the cause of a mysterious, debilitating disorder called chronic fatigue immune dysfunction syndrome (CFIDS).

Elaine DeFreitas and her co-workers at the Wistar Institute in Philadelphia used three types of tests with 30 people suffering from CFIDS and found that the majority of the volunteers showed some sign of infection by human T-lymphotropic virus type II (HTLV-II), a suspect in a rare form of leukemia. A separate group of 20 healthy individuals showed no sign of the virus, the team reports in the April 1 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

CFIDS – characterized by extreme fatigue as well as immunologic and neurologic abnormalities – was once thought to be caused by the Epstein-Barr virus, the agent responsible for infectious mononucleosis.

The new finding, though "very provocative," will require validation, says Stephen E. Straus of the National Institute of Allergy and Infectious Diseases. Studies led by Straus in 1988 helped overturn Epstein-Barr as a cause of CFIDS.

If drugs are drying your mouth. . .

Many prescribed drugs reduce the production of saliva – the mouth's first line of defense against tooth decay. Athena Papas of Tufts University in Boston has now correlated saliva flow with tooth decay in 60 people taking such medications.

Papas, who plans to present her findings next week at the International Association for Dental Research conference in Acapulco, Mexico, reports that drug-induced dry mouth can double a person's risk of developing surface cavities and triple the risk of root decay.

Among the more commonly used drugs that can cause dry mouth, antipsychotics for treating schizophrenia show the greatest mouth-drying effect, with antidepressants and ulcer drugs at the middle of the scale and antihistamines near the bottom, Papas says.

"What's tragic is that most people on medication don't know they're dry," because their rate of saliva flow slows so gradually, she says. Their dentists usually miss the problem too, since the dental examination itself spurs saliva production. Papas notes that dry-mouthed patients can help combat cavities by chewing gum – preferably sugarless – to increase their saliva flow.

Technology

Glass tubes for concentrating X-rays

The control and manipulation of X-rays requires optical components considerably more sophisticated than the types of lenses and mirrors typically used to guide visible light. Soviet physicists have now developed a way of producing a concentrated X-ray beam by channeling X-rays through a bundle of hollow glass tubes, or capillaries. By guiding X-rays down their lengths, the tubes convert an initially diverging beam of X-rays into a converging beam. A prototype X-ray "lens" unveiled last week consists of 2,000 capillaries, each about 70 microns wide. This lens focuses X-rays to a spot a little less than 300 microns across.

Developed by Muradin A. Kumakhov and his colleagues at the I.V. Kurchatov Institute of Atomic Energy in Moscow, this technology may prove useful for medical imaging and the treatment of tumors in the human body, permitting clinicians to use more tightly focused X-ray beams to minimize damage to healthy tissue. Improving the technology to reduce the spot size to just a few microns would also open up the possibility of using X-rays for manufacturing integrated-circuit chips more densely packed with components than today's versions.

"We're in the process of developing the supporting technology to make these [X-ray lenses] here," says Walter M. Gibson, who heads the newly formed Center for X-ray Optics at the State University of New York at Albany. Gibson and Kumakhov head a joint research program aimed at developing the technology further and demonstrating its feasibility for commercial applications.

Mirror coatings: Cold reflections

The most comprehensive tests to date of how well various mirror coatings reflect radiation over a wide range of wavelengths and temperatures have uncovered some surprising effects. The tests, conducted by Virgil E. Sanders of the Los Alamos (N.M.) National Laboratory and his co-workers, reveal that the ability of silver, gold and copper coatings to reflect ultraviolet light unexpectedly declines when they are chilled to 80 kelvins. In the infrared range, metal coatings show the opposite behavior, becoming better reflectors at lower temperatures.

"The big surprise was that it was the same for all the metal coatings," Sanders says. "It seems to be some general phenomenon that is not well understood. It's not talked about in the literature."

The testing was part of a Strategic Defense Initiative program to evaluate coatings for use as mirrors in high-powered lasers. Such lasers generate so much energy that mirrors and other optical elements absorb significant amounts of light, converting it to heat. The heat often distorts the mirrors and sometimes even melts them. The new tests confirm that at the infrared wavelengths at which high-powered lasers would operate, silver consistently reflects light better than the other metal coatings, but a layered hafnia-silica glass coating performs even better than the metals.

Laser power on a table

Just as computer manufacturers are packing greater computational power into increasingly compact packages, scientists at the Lawrence Livermore (Calif.) National Laboratory have designed and built an extremely powerful tabletop laser that produces short, intense light pulses previously achievable only in much larger machines. Such a laser, which fits on a table 20 feet long and 10 feet wide, may prove useful in university laboratories for investigations of plasmas and for fundamental studies in atomic and molecular physics. The Livermore researchers have already used the laser's power to strip electrons from helium and neon atoms.