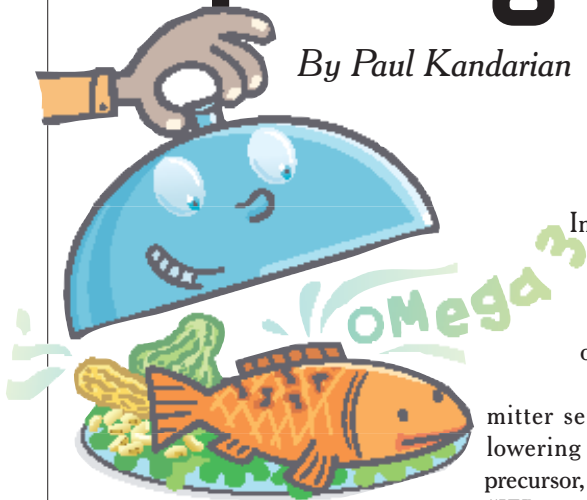


Inquiring Minds

Highlights from UNH

By Paul Kandarian



Up with Fat

Omega-3 fatty acids can help ward off depression

Eating more of anything described as “fatty” is not what you’d expect a health psychologist to advise. But Kathleen Kendall-Tackett, a researcher with the UNH Family Research Lab and the Crimes Against Children Research Center, says there’s a increasingly solid link between not getting enough omega-3 fatty acids and postpartum depression.

Too many of us have diets rich in omega-6 fatty acids—vegetable oils that are found largely in fast foods—which can increase inflammation in the blood stream, leaving us not only vulnerable to depression but a whole host of other things, including coronary heart disease, diabetes and cancer.

When inflammation levels are high, she says, people get the classic depression symptoms such as fatigue, lethargy and social withdrawal. Inflammation increases cortisone levels, a stress hormone that is often elevated in depressed patients.

Inflammation also drops levels of the neurotransmitter serotonin, by lowering levels of its precursor, tryptophan.

“When someone is under psychological and physical stress, the body thinks it’s under attack. It responds by putting out stress hormones and inflammation markers,” says Kendall-Tackett.

“Inflammation in a properly working system is a good thing,” she adds. “Messenger molecules rush to the source of the inflammation, like a wound site, where this response is appropriate. In depression, the inflammation molecules are systemic and run around in our bloodstream, causing damage to blood vessels.

“Inflammation is not simply a risk factor for depression, it is *the* risk factor that underlies all the others,” she says. “Moreover, inflammation explains why psychosocial, behavioral and physical risk factors increase the risk of depression.”

Over the last century, Americans have been consuming more omega-6 fatty acids, found most commonly in vegetable oils such as corn and safflower. A healthier diet reduces the amount of omega-6s and increases omega-3s, which are polyunsaturated fats found in plant and marine sources,

including fatty fish.

Eating a lot of fatty fish isn’t necessarily the answer, she warns. “The main worry about fish is mercury contamination, especially for pregnant women and breast-feeding mothers.”

She also says many products listing omega 3s contain alpha-linolenic acid (ALA), found in flaxseed, walnuts and other plant sources that are good for cardiovascular health but not that helpful for depression.

For preventing or treating depression, the long-chain polyunsaturated fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are important, she says. DHA is particularly good for depression prevention, while EPA helps treat it. Current recommended dosages are 200-400 mg of DHA and 1,000-2,000 mg of EPA; the FDA’s safe levels are 3,000 mg for both combined. For information about specific brands, see the online site of U.S. Pharmacopeia <http://www.usp.org/>. Click on “USP verified.”

Studies in postpartum depression have also found that inflammation increases the risk for depression, she says.

“What’s intriguing is that in pregnant women, inflammation levels naturally rise to get ready for birth, and remain elevated throughout the postpartum period,” says Kendall-Tackett, author of 15 books, including *Depression in Mothers*. “This

pattern of inflammation perfectly fits the pattern you see in depression in new mothers. The highest risk is the last trimester of pregnancy, and that’s when the higher incidence of depression occurs.”

Right, Finally

Researchers prove a new electron wave does exist

In life—and science—determination is a virtue.

A pair of UNH researchers spent three years proving the existence of the acoustic surface plasmon, a new type of electron wave on metal surfaces.

The phenomenon is a new “quasiparticle” that needs very little energy to exist in two-dimensional systems.

Karsten Pohl, associate professor of physics, and Bogdan Diaconescu ’07G, a post-doctoral research associate in the Condensed Matter Group, aimed a monochromatic beam of low-energy electrons of up to 15 electron volts at the surface of beryllium, the lightest metal on the periodic table.

“The surface has to be atomically flat,” Pohl says. “Preparing a surface like that is rather challenging and requires an ultra-high vacuum chamber, but it’s a prerequisite.” The surface had to be atomically clean as well. The preparation

ILLUSTRATIONS BY MICHAEL SLOAN



research

was time-intensive, and time on the special spectrometers required for the experiment was at a premium: Over the three-year period, there were only narrow windows of opportunity—twice a year for three weeks at a time—at universities in Denmark and Italy, where the equipment was available.

The project was a reflection spectroscopy experiment. When the electrons were reflected back from the metal surface, some lost an amount of energy that corresponded to the excitation of an acoustic plasmon wave. The loss was measured with a detector inside the vacuum chamber. The small loss of energy, and how it changed with electron wavelength, corresponded exactly to the theoretical prediction, the scientists say.

The results showed that when disturbed by light, for example, electrons on the surface of metals behave like waves on a lake, says Pohl.

“It had been assumed, to use the lake analogy, that you needed a pretty heavy rock to excite a wave on the surface,” Diaconescu says. It turned out that “just a light shining on the surface, under the right circumstances” was required.

Discovery of the

acoustic surface plasmon has fundamental implications for nano-optics, high-temperature superconductors and the basic understanding of chemical reactions on surfaces. The novelty of these waves, say the researchers, is that their low excitation energies are more manageable for many technological applications, such as high-speed electronic devices for data processing and storage, optical microscopy at the molecular level, and the creation of new materials.

It was just a year ago, says Diaconescu, that “another group of scientists concluded that these waves do not exist.” Determination, it seems, does pay off in the end.

A Story to Tell

Oral histories help change perceptions about people with brain injuries

Seth Davidson had his own carpentry business. In his off time, he was a musician, skier, mountain biker—more of an adrenalin junkie than social butterfly, he says.

The day after Christmas 2004, Davidson was in a car accident, fracturing his skull and damaging his brain. Six months later, he was still experiencing massive confusion, isolation and loneliness. These days, he’s better, though not yet himself. “So far, so good,” he says. “I’m a little confused, trying to figure out the extent

of my injuries and how to deal with them.”

Ashley Pouliot speaks about being in the top 10 of her high school class, a hard worker, a Sunday school teacher. One day, she woke up incontinent, and a month later was acting like a 2-year-old. She had acute disseminated encephalomyelitis, a neurological disorder characterized by inflammation of the brain and spinal cord.

She’s also been in a car accident, and has been diagnosed with multiple sclerosis. Pouliot’s worked hard to regain some semblance of her former self, and it shows: Despite her travails, she graduated eighth in her high school class.

Both these people—and 28 more—have taken part in the Krempels Brain Injury Foundation’s Oral History Project, and have two things in common: Severe brain injury and a story to tell.

In a research project run by Michael Fraas, assistant professor of communication sciences and disorders, participants are asked a myriad of questions about their lives before the injury, the injury itself, their recovery and the challenges they face. Their stories are posted online at krempelsfoundation.org.

UNH graduate students conduct the interviews at StepInStones, a center for people with brain injuries founded by David Krempels ’73.

“They are really compelling stories,” Fraas says. But

“from a research standpoint, we’re trying to see if the stories have an impact on improving the general public’s attitude toward brain injuries.”

Research shows that there are many misconceptions about people with brain injuries, and those misunderstandings can limit the resources available to them, he says.

Fraas and graduate intern Meg Calvert gave a questionnaire to speech-language pathologists and students about people with brain injuries. Then the pathologists and students listened to some of the oral histories and, Fraas says, their beliefs changed.

“They became much more aware that there are socialization issues that people have, and that vocational needs are a big concern,” Fraas says, adding that while most brain-injured people never make a complete recovery, “in most cases, they can get back to working.”

Every year, approximately 1.4 million Americans sustain traumatic brain injury, Fraas says, and nearly five times that many are living with the long-term aftermath.

“It’s nice to get a sense of who these people are,” says Fraas, “what happened to them and how, in the face of all these tragic hardships and life-changing events, they still manage to have a positive, hopeful outlook on life and a desire to give back to the community.” ~

