Behavior

Bruce Bower reports from New Orleans at the annual meeting of the American Psychological Association

Setting the stage for infection

Healthy people who show persistent deficiencies in the activity of natural killer (NK) cells — a type of immune cell believed to play a role in the body's initial defense against infection and malignancy — run an increased risk of developing colds, flu and other infections, according to a preliminary study directed by psychologist Sandra M. Levy of the University of Pittsburgh School of Medicine. In young adults who perceive their daily hassles and stress as intense, lowered response rates of NK cells are strongly linked to the contraction of infectious disease, Levy says.

She and her co-workers recruited 106 healthy volunteers between the ages of 18 and 45 from the Pittsburgh area. The sample was predominantly white and college-educated. For six months, the researchers regularly measured NK activity (the ability of NK cells to destroy target cells in a standard laboratory analysis) and numbers of NK and other immune cells. At least once a month, they also gathered participants' self-reports of stressful incidents and their severity.

About one-third of the volunteers had NK activity below the population average throughout the study. NK activity was usually within the normal range, however, and NK cell counts were normal. Participants with low NK activity reported substantially more infection-related illness during the study, including colds, influenza, pneumonia, cold sores, gastrointestinal illnesses, fever and sore throat. The most cases of infectious illness occurred among volunteers with low NK activity who were younger than 29 and reported intense responses to stressful events.

The cause of consistently low NK activity remains unknown, Levy says, but the study results suggest physicians might screen young adults in stressful situations — such as military duty or medical school — for immune patterns and ask them about their perceptions of daily stress. Evidence indicates that marked increases in NK activity can result from relaxation training combined with counseling focused on dealing effectively with stress, Levy notes.

Press the button, depress immunity

Another clue to the complex relationship between stress and immunity comes from a laboratory study directed by psychologist Carol S. Weisse of Union College in Schenectady, N.Y. She and her co-workers find that men who can shut off intermittent mild electrical shocks and loud tones by pressing a button show lowered immune function shortly after the half-hour test session. Immune function remains stable among men with no control over random shocks and tones.

The researchers studied 22 healthy men between the ages of 21 and 36. During test sessions, half the group could stop 7-second shocks and tones by pressing a button four times. Blood samples were drawn two hours after the sessions.

Men in the no-control situation understandably became more frustrated and angry during the test, while the button-pushers reported few mood changes. But only the latter group had lower immune responses after the test, as measured by the numbers of monocytes present and by lymphoctye responses to substances that stimulate their reproduction. Monocytes and lymphocytes are white blood cells important in the immune response.

These results are surprising, Weisse says, given an earlier finding that rat immunity drops only when shocks are uncontrollable. The difference may be due to timing, she asserts. Rat immune function is measured the day after stress tests.

Men who could stop the shocks and tones may have been in a state of alertness that promoted lower immune responses, Weisse notes, although their immune measures remained in the normal range.

Biomedicine

Blue-green algae kill HIV in culture

A laboratory study shows that compounds found in two strains of blue-green algae protect human T-cells from destruction by the AIDS virus, HIV. The findings are very preliminary, and researchers must overcome a number of hurdles before considering the compounds for human trials. Nevertheless, the scientists involved say the compounds represent an important new class of anti-HIV chemicals that eventually could add to the armamentarium against AIDS.

The study is part of the National Cancer Institute's Developmental Therapeutics Program, established to find promising new antiviral or antitumor compounds derived from marine organisms, plants and other natural sources. Michael R. Boyd and his colleagues hit on a potential AIDS treatment when they studied extracts from *Lyngbya lagerheimii* and *Phormidium tenue* algae collected in Hawaii and the Palau Islands. They report their findings in the Aug. 16 JOURNAL OF THE NATIONAL CANCER INSTITUTE.

The researchers found that virtually 100 percent of human T-cells could survive HIV's attack in petri dishes when treated with extracts from these two algae. The compounds responsible for the protective effect, they report, are sulfonic-acid-containing glycolipids, biologically derived chemicals made of sugars and long chains of fatty acids.

Boyd's group isolated the compounds but has yet to unravel the mechanism by which they shield human cells from HIV-induced death. Nonetheless, the researchers hope the compounds will one day offer a therapy to complement other potent AIDS drugs such as zidovudine (AZT).

They caution, however, that chemicals that protect cells in a laboratory dish often fail to work in the human body. The scientists must test the compounds in animals before proceeding to human trials.

Despite a year-long effort, scientists still can't synthesize these chemicals in the laboratory, Boyd says, calling the inability to manufacture large quantities the biggest obstacle to further testing. For now, he says, scientists must rely on algae to produce relatively small amounts of the glycolipids.

Drug combo: Double whammy with a bonus

AIDS patients with Kaposi's sarcoma — a normally rare cancer that strikes many people with AIDS — can benefit from a double-whammy treatment consisting of zidovudine and alpha interferon, a naturally occurring protein. The double-drug regimen inhibits the spread of HIV and shrinks tumors in some patients at doses low enough to avoid the debilitating side effects stemming from standard doses of either drug alone, according to a report in the Aug. 15 ANNALS OF INTERNAL MEDICINE.

H. Clifford Lane at the National Institute of Allergy and Infectious Diseases in Bethesda, Md., and his colleagues studied 22 homosexual or bisexual men with both AIDS and Kaposi's sarcoma. After 12 weeks on the dual regimen, 10 of these patients showed a 50 percent reduction in half their tumors and one showed no evidence of tumors, Lane reports.

In addition, the one-two punch of zidovudine and interferon appeared to stop the spread of HIV. When the researchers tried to culture HIV from the 22 patients' blood samples after 12 weeks of treatment, they found that eight study participants had negative cultures. At the outset of the study, all eight had positive HIV cultures, Lane says.

The findings are significant because many AIDS patients on high doses of zidovudine — and many AIDS or cancer patients on high doses of interferon — develop severe side effects. The drug combination allows doctors to lower the dose of zidovudine while at the same time retarding HIV's spread and attacking the cancerous tumors, the scientists say.