

Behavior

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

The hyperactive breakfast

A number of studies have suggested that sugar consumption does not lead to a worsening of hyperactive behaviors. But a carbohydrate-rich breakfast combined with a dose of sugar appears to have a harmful effect on hyperactive children, say C. Keith Connors and his colleagues at George Washington University School of Medicine in Washington, D.C.

The researchers examined 39 hyperactive youngsters and 44 controls with no psychiatric diagnoses, all of whom were between 8 and 13 years of age. Each child was randomly assigned to one of three breakfast conditions: high carbohydrate (two slices of buttered and toasted white bread), high protein (two eggs scrambled in butter) or fasting. On separate days, children in each group also received a nonnutritive orange drink sweetened with aspartame or sucrose. Blood samples were taken just before and up to 4 hours after the meals. In addition, subjects completed a short test at 30 minutes, 2 hours and 4 hours after breakfast. In the test, letters and forms were presented one at a time, and each child was to identify when two items occurred in a row.

When hyperactives consumed the carbohydrate breakfast and sucrose drink, their failure to identify pairs of items increased significantly compared with that of controls. Under other conditions, there was no hyperactive deficit. In fact, hyperactives given the protein meal did substantially better than controls who ate the same meal and hyperactives in the carbohydrate and fasting conditions. In addition, hyperactives given the carbohydrate-sugar meal had a markedly greater rise in blood sugar than the other groups. All of the hyperactives had elevated blood-sugar levels before eating breakfast.

The researchers propose that hyperactive children may be more sensitive to increases in serotonin, a chemical messenger in the brain, brought about by the consumption of carbohydrates and sugar. Sudden surges of serotonin may also throw off-kilter related chemical messengers, such as dopamine and norepinephrine, they add. Protein, on the other hand, tends to increase levels of amino acids that help to block the effects of sucrose on brain serotonin.

The practical implication, say the investigators, is that parents should make sure hyperactive children eat breakfast and that some level of protein is included in that meal.

Taking care of immunity

Tending to a relative with Alzheimer's disease is not just psychologically stressful — over the long run, say researchers at Ohio State University College of Medicine in Columbus, it can undermine a caregiver's immune responses.

Janice K. Kiecolt-Glaser and her colleagues compared 11 men and 23 women caring for family members with Alzheimer's disease with controls matched for age, sex and education. An average of more than five years had passed since the caregivers had noticed the first symptoms of the disease. Subjects caring for an Alzheimer victim reported more distress and poorer mental health than individuals with no such responsibilities. Caregivers, whose average age was 59 years, also had indications of poor immune function: lower percentages of T lymphocytes and helper T lymphocytes than controls, as well as a lower ratio of antibody-stimulating cells to antibody-suppressing cells. In addition, there was evidence of poorer immune system control of the latent Epstein-Barr virus among caregivers. There were, however, no group differences in number of physician visits or sick days in the prior six months.

The most important health consequences of the observed immune changes may occur among older adults who already have age-related drops in immune function, say the researchers. They hope to test this suggestion with long-term studies of middle-aged and elderly caregivers.

Earth Sciences

Historical coral

In recent years, scientists have sought to decipher the mechanisms behind the El Niño-Southern Oscillation (ENSO) events — 12- to 18-month-long periods of climatic havoc in the Pacific that bring drought to Australia and floods to Ecuador and other countries along the eastern Pacific. Although no pattern of ENSO events has yet emerged, researchers cannot be sure whether long-period cycles exist because they lack data for times in the distant past. For example, merchant marine measurements of Pacific sea-surface temperatures and wind go only as far back as the 1840s and are often unreliable.

Those in search of a pattern, therefore, are turning to more long-term records of climate patterns, such as snow accumulation rates atop Peruvian mountains and sediment layers off Baja California. Now, Glen T. Shen of the Lamont-Doherty Geological Observatory in Palisades, N.Y., suggests that scientists can use cadmium levels in coral from the Galápagos Islands to trace an important factor in weather — the vertical movement of water — over periods of several hundred years.

While cadmium is usually depleted in the surface layers of the ocean, in certain areas, such as the eastern Pacific, water from the deep ocean rises and replenishes the nutrients and cadmium levels of the upper ocean. The coral near the Galápagos then incorporates cadmium into its shell as it grows at a rate of up to 2 centimeters a year. During ENSO events, however, wind shifts depress this upwelling and cadmium levels drop in the upper ocean — a change that is recorded within the coral's shell, reports Shen in the Aug. 27 NATURE. Coral records will help reveal any long cycles and in turn might illuminate certain causes of ENSOs, says Shen, who is now working on a coral that started growing in 1583.

The CO₂-people connection

Two scientists have found that the rate of increase of atmospheric carbon dioxide (CO₂) almost exactly matches the growth of the world's human population for at least the last 25 years. "This nearly perfect [statistical] correlation can hardly be fortuitous," write Norman Newell and Leslie Marcus in the journal PALAIOS (Vol.2, No.1). Human production of this gas through fossil-fuel consumption and deforestation is overshadowing CO₂ contributions from volcanoes and other natural sources, reason the researchers, who are from the American Museum of Natural History in New York City. They suggest that frequent measurements of atmospheric carbon dioxide could supplement or even supplant census estimates for the growth of the world population.

Ship exhaust provides cloud experiment

Cloud experts have long suspected that small particles of pollution, called aerosols, could make clouds reflect more sunlight and thereby lower the surface temperature of the earth. Now, satellite images of the tracks of ship exhaust are providing the first



Coakley/SCIENCE

evidence in support of this theory, says James A. Coakley of the National Center of Atmospheric Research in Boulder, Colo.

Although these aerosols on their own might absorb solar radiation, they cause the clouds to absorb less sunlight by serving as the nuclei for developing cloud droplets. In a contaminated cloud, aerosols increase the number of droplets but decrease the average size of the droplets — an effect that makes the clouds more reflective. The tracks of contaminated clouds then appear on satellite images at certain wavelengths, report Coakley and his colleagues in the Aug. 28 SCIENCE.