Biology

From Miami Beach, Fla., at the Society for Neuroscience annual meeting

Does March Madness need a time-out?

Leonard Kass, a neuroscientist at the University of Maine in Orono, is a fan of his school's women's basketball team. An unexpected defeat suffered several years ago in the National Collegiate Athletic Association (NCAA) tournament disappointed Kass, but it also made him wonder about the team's poor showing. "They just looked like they were out of phase," he says.

Kass' comment is more than a fan's analysis. He has an interest in circadian rhythms, daily cycles of physiological activity that every organism experiences. Since the Maine team traveled to the West Coast for their game and played earlier in the day than normal, Kass speculated that the players suffered from a disruption in their biological clocks, a phenomenon commonly called jet lag. Other researchers have suggested a similar jet lag effect in professional baseball and football.

Kass has now backed up his hoops hypothesis with hard data and calls upon the NCAA to avoid having tournament teams travel across multiple time zones. "Travel is a part of every NCAA sport, during regular season and championship competition," responds NCAA spokesperson Jane Jankowski, noting that NCAA has not yet had a chance to review Kass' work.

Kass turned to the men's collegiate basketball tournament nicknamed March Madness to provide the statistical power to address his premise. The men's competition has 64 teams divided into four regional tournaments. Since the NCAA ranks the 16 teams in each region, Kass had a simple way to evaluate whether a game's outcome was an upset.

Over the past 5 years, higher-ranked teams that had to travel across the country to play were almost twice as likely to be upset in first-round games as those playing in their own time zone, Kass and a colleague found. "The kiss of death is shifting three time zones," says Kass. "If [higher-ranked teams] shift across three time zones, they have a better than 50 percent chance of losing."

The investigators also looked at whether the time of the game influences the outcome. Their initial analysis shows that higher-ranked teams lose more frequently in afternoon games than in evening ones. The scientists next plan to incorporate home-court advantage into the analysis. Accounting for factors such as injuries, extraordinary coaching, and inaccurate rankings by the NCAA will be more difficult, if not impossible, he notes. —*J.T.*

A lead on why lead hurts the brain

Scores of studies have linked excessive lead exposure, especially during childhood, with mental retardation, growth defects, high blood pressure, and various other woes. As a result, the United States and many other countries have gone to great lengths to eliminate lead from gas, paints, window blinds, and many other products. At the same time, scientists have struggled to understand how this metal causes so many problems.

Christopher M.L. Bouton of the Johns Hopkins Medical Institutions in Baltimore and his colleagues may be on the verge of explaining, on a molecular level, how lead affects the brain. They report that the metal appears to bind to a cell-membrane molecule called synaptotagmin, which plays a key role in releasing chemical messages, or neurotransmitters, from nerve cells. Normally, calcium binds to synaptotagmin to control this secretion. "We think lead is binding to the same pockets where calcium ions usually sit," says Bouton.

Lead, however, doesn't trigger synaptotagmin to perform all the molecular actions that calcium prompts. The metal doesn't, for example, promote the binding of synaptotagmin to a protein called syntaxin, one of the steps that normally lead to a release of neurotransmitters. "It's an imperfect mimic," says Bouton. He and his coworkers believe that lead also targets calcium-binding pockets on other crucial proteins in nerve cells. —*J.T.*

Biomedicine

Supplement could fight cystic fibrosis

Preliminary studies in mice suggest that a common dietary supplement might ward off the debilitating effects of cystic fibrosis, a genetic disease marked by life-threatening accumulations of mucus in the lungs.

Using mice carrying the genetic defect that causes the disease in people, Boston researchers showed that cell membranes in the lungs, pancreas, and intestines—the organs most affected by cystic fibrosis in people—have abnormally low levels of a fatty acid called docosahexaenoic acid (DHA). Feeding the mice large doses of DHA for a week not only corrected the imbalance but also reversed signs of the disease, Juan G. Alvarez and his colleagues at Beth Israel Deaconess Medical Center reported in Seattle last month at the Cystic Fibrosis Foundation's annual meeting.

To examine the human respiratory and digestive tracts, the researchers took nasal and rectal samples. Their preliminary evidence shows lower DHA concentrations in cells of the six people with the disease than in those of six healthy volunteers.

Trials in which people with cystic fibrosis will receive DHA as a dietary supplement are slated to begin as early as next year. Meanwhile, researchers are warning people with cystic fibrosis not to start taking supplements, such as fish oil, that are rich in DHA. Other components of the supplements might harm people with the disease, say the researchers.

DHA caused no obvious side effects in the mice. "So, the treatment should be safe in humans, but we don't know that for sure," cautions Steven D. Freedman of Beth Israel.

Decreases in DHA concentration in cell membranes tend to translate into increases in a fatty acid called arachidonic acid. This compound promotes inflammation and immune responses, reactions that are overactive in people with cystic fibrosis. The researchers propose that the imbalance between these two compounds is the source of characteristic symptoms such as chronic lung inflammation and excess mucus.

Unlike most cystic fibrosis drugs under development, DHA could be taken orally to treat disease symptoms throughout the body, not just in the lungs. —*D.C.*

Clogged arteries block hormone effects

Most studies of hormone-replacement therapy for postmenopausal women suggest that the treatment wards off heart disease. Last year, however, this theory suffered a blow. Among 3,000 women who already had heart disease, researchers found that the ailment progressed at the same rate in those given estrogen as in those not given the hormone-replacement therapy (SN: 10/16/99, p. 252).

A new study may help explain that finding. According to a report in the Sept. 1 CARDIOVASCULAR RESEARCH, the build-up of fatty plaques in blood vessels might muffle the gene that's responsible for making the receptors that recognize estrogen and trigger its effects in a cell. In the absence of such receptors, the tissue would, in effect, not be aware of the hormone's presence.

Tissue samples from 17 men and women with detectable buildup of fatty plaques in their coronary arteries, or atherosclerosis, showed that about 10 percent of the estrogen-receptor genes were blocked by a process called methylation, says Pascal J. Goldschmidt of Ohio State University in Columbus. In contrast, in tissue taken from the coronary arteries of 27 men and women without atherosclerosis, only about 4 percent of the estrogen-receptor genes were inactive, he says.

Further work, not yet published, shows that mimicking atherosclerosis in cell cultures increases methylation, putting more estrogen-receptor genes "out of service," Goldschmidt says. His findings suggest that compounds that activate estrogen-receptor genes might offer a novel way of treating heart disease, he adds. —*D.C.*