Extra calcium no help for lactating women

Breast milk is one of nature's great bargains. It's rich in protein, antibodies, and calcium—and it doesn't cost a thing.

Or does it? Studies show that mothers pay a price in making this baby ambrosia: Their bones lose density during lactation.

Although a woman on a sound diet generally replaces lost bone density after weaning her infant, scientists have wondered whether the problem could be avoided in the first place. Supplementing a lactating woman's diet with calcium seemed like a sure way to prevent the loss.

Researchers at Children's Hospital Medical Center at the University of Cincinnati now find, however, that extra calcium does little to prevent bone loss during lactation or to hasten bone regrowth later.

Ironically, these findings emerge as a federal panel is calling for most people to consume more calcium. The Institute of Medicine at the National Academy of Sciences now recommends that people between the ages of 19 and 50 consume 1,000 milligrams a day; the average U.S. adult currently takes in 500 to 700 mg daily. The group says that lactating women need not take any more calcium than other adults their age, a departure from its previous recommendation that such women consume an extra 400 mg daily.

Part of this reasoning stems from studies such as the one in Cincinnati, where researchers compared 97 new mothers who were breast-feeding their infants with 99 who weren't. Half of each group received an additional 1,000 mg of calcium every day for 6 months; the others got an inactive substance. X rays of the lower vertebrae revealed that the bone density of lactating women decreased 4.2 percent, despite calcium supplements. Women not getting extra calcium saw a 4.9 percent drop. Both groups' breast milk contained similar amounts of calcium.

"Women appear to lose quite a bit of bone in the first 3 months of lactation," says nutritionist and epidemiologist Heidi J. Kalkwarf, a coauthor of the study.

Among the nonlactating women, those getting supplements saw bone density rise by 2.2 percent, while those not getting extra calcium saw an increase of 0.4 percent, the researchers report in the Aug. 21 NEW ENGLAND JOURNAL OF MEDICINE.

A second phase of research, lasting from 6 to 12 months after the births, showed that among women who had nursed their babies, those who were still receiving extra calcium regained bone density only slightly faster than those not receiving supplements. Among women who hadn't nursed, those taking calcium also had slightly faster increases in bone density.

The study provides further evidence that hormones largely govern bone loss and regrowth, says Joan A. McGowan of the National Institute of Arthritis and Musculoskeletal and Skin Diseases in Bethesda, Md. "In the absence of hormonal signals in early menopause or lactation, extra calcium doesn't make a difference." Estrogen, in particular, is suppressed during lactation and menopause.

"A picture is beginning to emerge showing that human lactation is associated with alterations in calcium metabolism . . . that are independent of dietary calcium intake," Ann Prentice of the Medical Research Council in Cambridge, England, writes in the same issue of the journal.

Although breast-feeding doesn't seem to put women at risk of developing osteoporosis, or brittle bones, the study could spur research into bone regrowth strategies for older women, teen mothers—whose bones are still growing—and women who nurse twins or triplets, Kalkwarf says.

The study raises hard questions for women who give birth in their forties and want to nurse, even though they may be approaching menopause, McGowan says. Studies show bone rebuilding can take 18 months. Will time run out on these women before they recoup bone density? —*N. Seppa*

Brain doubles up on marijuanalike agents

As neuroscientists have slowly lifted the veils from the chemistry of the brain, they've realized that many powerful, and illegal, psychoactive drugs mimic natural compounds used by the nervous system.

Take marijuana, whose primary active ingredient is delta-9-tetrahydrocannabinol, also known as THC. In 1992, researchers found that THC and anandamide, a naturally occurring brain chemical, bind to the same proteins on the surface of brain cells (SN: 2/6/93, p. 88).

Investigators now report that the brain makes a second THC-like compound, called *sn*-2 arachidonylglycerol, or 2-AG, and it does so in much greater quantities than anandamide. Moreover, the scientists offer several pieces of evidence suggesting that 2-AG plays a role in memory, which may help explain the short-term memory loss often produced by smoking marijuana.

The new study is not the first to bring 2-AG to neuroscientists' attention. In 1995, a research group in Israel and another in Japan discovered that 2-AG binds to the same surface proteins—the cannabinoid receptors—on brain cells as anandamide does, but not as tightly.

Yet doubts remained as to whether the brain uses 2-AG. While the Japanese group had offered some evidence that the brain employs 2-AG, the Israeli group found the compound in intestinal tissue, not in the nervous system.

Danieli Piomelli of the Neurosciences Institute in San Diego recalls that he was very skeptical that 2-AG played any role in the brain. In what he expected would be a short task, he asked his research group to demonstrate that 2-AG is not present in the brains of rats.

Instead, as the group reports in the Aug. 21 NATURE, 2-AG turned out to be 170 times more abundant than anandamide.

The researchers believe that 2-AG can prove difficult to detect in the brain because the compound degrades rapidly after death. Piomelli's team avoided that problem by quick-freezing brain tissue within 10 seconds of a rat's death and then analyzing the tissue.

Other investigators, including the leader of the Israeli group, have also established that the compound is made by the central nervous system. "It's in the brain in high amounts," says Raphael Mechoulam of the Hebrew University of Jerusalem.

The existence of 2-AG may help account for some aspects of marijuana biochemistry that anandamide cannot explain. The smoking of marijuana can produce many effects, including pain relief, motor impairment, appetite stimulation, and loss of recent memories.

Investigators have struggled to link anandamide to memory formation, notes Piomelli. In contrast to anandamide, 2-AG is made by the hippocampus, a brain region crucial to memory. The investigators also observed in test-tube experiments that 2-AG inhibits a phenomenon called long-term potentiation, a strengthening of links between brain cells that may help memories form.

While this finding may suggest at first glance that 2-AG impairs memory formation, Piomelli notes that people do not normally store every fact related to a particular memory. The brain forgets all aspects of a memory except those it somehow deems crucial, he says. The chemical 2-AG may play a role in that deliberate forgetting, speculates Piomelli.

Through studying 2-AG and anandamide, scientists hope to develop drugs that ease pain or muster other therapeutic, marijuanalike actions without the accompanying memory loss or motor impairment. "Our goal is understanding the underlying biology in order to make more selective drugs," says Piomelli.

The influence of 2-AG may go beyond the brain. In addition to intestinal tissue, "we have found it in the spleen and pancreas," says Mechoulam, noting that cells in all three sites also have cannabinoid receptors. —*J. Travis*