

PMS: Hints of a link to lunchtime and zinc

Many women suffer from crying jags, eating binges, anxiety, bloating and other premenstrual symptoms that can disrupt some aspect of their professional and personal lives for a few days each month. At one time, physicians widely considered such symptoms psychosomatic, but accumulating evidence now points toward out-of-kilter hormone levels as the cause. Last week, endocrinologists from Texas reported the first data suggesting that zinc may play a role in premenstrual syndrome (PMS), and a group from Kentucky described an after-lunch progesterone plunge that might help explain some PMS symptoms.

Some researchers suspect that a deficiency of progesterone underlies PMS. The ovaries secrete this sex hormone during the menstrual cycle's luteal phase — the 13 days preceding menstruation, when PMS symptoms typically erupt. Because trace amounts of zinc regulate the secretion of certain hormones, including progesterone, scientists at the Baylor College of Medicine in Houston decided to look for zinc abnormalities in the blood of women with PMS.

C. James Chuong and his co-workers recruited 10 women with PMS and 10 controls who reported no sign of the monthly disorder. They collected blood samples from the volunteers every two to three days during three menstrual cycles and measured zinc concentrations in the clear serum component of the blood. During the luteal phase, the investigators discovered significantly lower zinc levels in blood from women with PMS than in the control samples. Chuong reported

the team's results at the 46th annual meeting of the American Fertility Society in Washington, D.C.

A zinc deficiency might lead to a decrease in secretions of progesterone and certain natural opiates, or endorphins, produced by neurons in the brain, Chuong speculates. In an earlier study, he found that women with PMS have lower blood levels of endorphins during the luteal phase than do women without PMS. The interplay among zinc, progesterone and these morphine-like natural painkillers remains unclear, he adds.

Chuong warns PMS sufferers against popping pills to supply the trace metal — which can be toxic in large doses — until scientists demonstrate a dietary zinc deficiency in women with the monthly disorder. And even if zinc deficiency plays a contributing role, it might affect only a subgroup of PMS patients, he notes.

Another study presented at last week's meeting suggests that an afternoon drop in blood progesterone levels may somehow contribute to PMS symptoms, especially the cravings for sweet or salty foods, which can lead to the eating binges reported by some women with PMS.

Despite widespread suspicion that hormone problems cause PMS, recent attempts to demonstrate a measurable difference in blood concentrations of the sex hormones have yielded little if any support for that theory, notes Ken N. Muse, a reproductive endocrinologist at the University of Kentucky in Lexington. However, Muse speculates that such studies may have missed transient drops in progesterone by relying on once-a-day

blood sampling. He and his colleagues decided to take a different tack, using blood samples drawn at 30-minute intervals from 11 women in the luteal phase.

Those samples revealed that all six volunteers with PMS experienced a steep progesterone drop in the first few hours after lunch, he reports. Healthy women typically show a decline in blood progesterone after eating the midday meal, he says, but the volunteers with PMS showed an exaggerated hormonal response to their repast.

Whether that response leads to eating binges or other PMS symptoms remains unknown, notes PMS researcher Robert L. Reid of Queen's University in Kingston, Ontario. "Further work needs to be done," he says, to draw such a connection and to confirm the proposed link between PMS and zinc.

— K.A. Fackelmann

Egg glitch: Too cold or old

Although human *in vitro* fertilization has become routine, it produces pregnancy only 20 to 25 percent of the time. Researchers have now shown how three factors — lab procedures, the implanted embryo and the uterine lining — can influence the success rate. Moreover, one of their findings may offer menopausal women another chance at pregnancy.

Cryopreservation — freezing embryos in storage — significantly reduces the odds of successful implantation, scientists from Tel Aviv University conclude in the Oct. 25 *NEW ENGLAND JOURNAL OF MEDICINE*. In a study of 57 menopausal women, they found that those implanted with frozen donor embryos showed an overall pregnancy rate of only 15 percent, compared with 37 percent among those receiving fresh donor embryos. Lab manipulations for cryopreservation may impair the embryo's capacity to develop in the uterus, suggests coauthor Laslo Nebel. However, he would not discard cryopreservation altogether because it offers practical advantages and in some cases yields "quite good results," he told *SCIENCE NEWS*.

Another new study, described in the same journal, points to aging eggs and declining hormone levels — not the uterus itself — as reasons for the age-related decline in the ability to become pregnant and bear a healthy infant. Mark V. Sauer and his colleagues at the University of Southern California in Los Angeles treated seven menopausal women, aged 40 to 44, with hormones that restored the uterine lining to its premenopausal state. Then they implanted fresh, fertilized eggs — from donors aged 31 to 34. The result: four pregnancies that went to term. Nine women aged 27 to 39 underwent the same treatment with the same success rate, Sauer reports. Such results, he says, "dispute the idea that the uterus ages in a bad way."

— I. Chen

Quark finders win Nobel

This year's Nobel Prize in Physics honors three researchers whose work demonstrated the existence of the quark, a subatomic particle that is one of the basic building blocks of matter. The Royal Swedish Academy of Sciences awarded the prize last week to Richard E. Taylor of Stanford University and to Jerome I. Friedman and Henry W. Kendall of the Massachusetts Institute of Technology.

The trio studied results from "deep inelastic scattering" experiments conducted at the Stanford Linear Accelerator Center from 1967 to 1973. Electrons were accelerated along a 2-mile-long tube to an energy of 20 billion electronvolts and then smashed into samples of liquid hydrogen or deuterium so violently that their protons or neutrons shattered. Two magnetic spectrometers recorded the electrons' postcollision energy and direction.

To the physicists' surprise, electron-scattering patterns indicated that a

large number of electrons were ricocheting at large angles, as if they had struck hard, point-like objects inside the protons and neutrons. The scientists gradually realized that this discovery "was going to change the way people looked at subatomic particles," Friedman told *SCIENCE NEWS*. The results furnished the first experimental evidence that protons and neutrons, once believed indivisible, are made up of quarks — elementary particles with fractional charges of $+\frac{2}{3}$ or $-\frac{1}{3}$.

The research confirmed the 1964 proposal of quarks' existence by George Zweig and Nobel laureate Murray Gell-Mann, two theorists at the California Institute of Technology in Pasadena. For years, physicists thought of quarks only as "mathematical entities," Friedman says, because they had failed to find these particles anywhere — whether searching in seawater, meteorites or high-energy particle accelerators.

— I. Chen