Umbilical clamping affects anemia risk

A team of researchers working in Guatemala says it has found a painless, no-cost means of enriching babies' blood with iron at birth: delaying slightly the clamping of a newborn's umbilical cord.

This change in obstetrical procedure, the group reported last week at the Experimental Biology meeting in Washington, D.C., may cut down on early development of iron deficiency anemia. Rampant in the developing world, anemia robs youngsters of a strong start in life by slowing growth and learning.

Studies conducted more than 30 years ago demonstrated that delayed clamping of the umbilical cord enables newborns to receive far more blood than immediate clamping, a common obstetrical practice in much of the world, including the United States. To investigate whether a delay might also slow the onset of anemia, Rafael Pérez-Escamilla of the University of Connecticut in Storrs and his colleagues initiated a randomized, controlled trial in a village outside Guatemala City.

In roughly one-third of the 69 full-term births, obstetrician Rubén Grajeda, then of the Institute of Nutrition for Central America and Panama, or a colleague clamped shut the umbilical cord immediately. In another third, they delayed clamping until the cord stopped pulsing—about 1 minute—while the baby rested at the level of the placenta. They delayed clamping in the remaining births while holding the baby below the placenta, allowing gravity to assist in bringing blood to the infant.

Two months later, 88 percent of children whose cord had been immediately clamped had signs of early onset iron deficiency anemia—almost twice as many as in either of the delayed clamping groups, reports Pérez-Escamilla.

Though the researchers detected no adverse effects from delayed clamping, Pérez-Escamilla says follow-up work is needed to determine how long the apparent advantages of the procedure last. In the meantime, he is excited about the finding because "it has proven very difficult to prevent the onset of iron deficiency anemia or to correct the problem once it develops. And we didn't want interventions that would go against the World Health Organization recommendation to breast-feed children exclusively for the first 4 to 6 months."

"It makes very clear sense that [delayed cord clamping] will reduce the level of iron deficiency, especially in a country where there is not much supplementation," observes obstetrician Robert Goldenberg of the University of Alabama at Birmingham.

The technique might even aid premature infants in the United States, notes Sharon McDonnell of the Centers for Disease Control and Prevention in Atlanta. Most of the iron that a baby will live on for the first 6 months of life is acquired during the last trimester of gestation. A baby born early, she says, might not have all it needs.

Related studies reported at the same meeting showed that altering some common dietary practices in Central America—such as feeding coffee to infants and toddlers—may further reduce the iron deficiency and stunted growth endemic among this region's poor.

Nutritionist Kathryn G. Dewey of the University of California, Davis, who collaborated on the cord-clamping trial, led another study involving 12- to 24-month-old toddlers in Guatemala City. There, many mothers begin feeding heavily sugared coffee to children as young as 2 months. Dewey's team gave the mothers of 80 such children a 5-month supply of a substitute drink that was just as sugary. Compared to the 80 children who continued their coffee habit of almost 1 liter per week, those on the substitute grew faster and remained healthier, Dewey notes—even though "they didn't have any change in their nutrient intake."

Moreover, among the children who had been deficient in iron and were taking supplements of the mineral, only those who gave up the coffee showed any change in their iron status. She says it appears that coffee interferes with absorption of the mineral. *—J. Raloff*

Holograms serve as guiding light for atoms

Holograms—those ghostly, hovering, three-dimensional images—arise through an optical illusion. They derive from interference patterns created when light diffracts as it passes through a two-dimensional grid.

Scientists have shown that, under certain conditions, they can diffract beams of atoms almost as if they were rays of light. In theory, a beam of atoms passing through a holographic pattern should spread out in a prescribed pattern and settle neatly onto a surface.

Demonstrating this principle for the first time, Jun-ichi Fujita, a physicist at NEC Fundamental Research Laboratories in Tsukuba, Japan, and his colleagues have shown that it's possible to use holograms to place atoms into a pattern on a surface.

The researchers began by etching on a thin sheet of silicon nitride a computer-generated holographic pattern designed to produce an image of the letter F. They then sent a stream of ultracold neon atoms hurtling through the pattern, they explain in the April 25 NATURE. The features of the letter, and of the resulting hologram, measured about 1.2 micrometers high.

After passing through this tiny diffraction pattern, the atoms fanned out onto a detector plate hooked up to a computer, which recorded the position at which each atom landed.

In this way, the scientists produced a series of micrometer-sized neon F's.

"I'm impressed," says Jabez J. McClelland, a physicist at the National Institute of Standards and Technology in Gaithersburg, Md. "This represents a first demonstration of a significant step forward in atomic beam lithography. What's really interesting about this technique is that you can place atoms into virtually any pattern you want.

"I suspect this will amount to a first step on a road toward making nanometer-scale devices," McClelland continues. "Diffracting atoms is a very new frontier. Little has been done and there's much to learn."

One advantage of the technique, says Donald M. Eigler, a physicist at the IBM Almaden Research Center in San Jose, Calif., stems from its flexibility. "It should work for virtually any atom," he says. "It's not limited to neon."

Moreover, "the pattern can be made as complex as one wants," Eigler adds. "This method offers a lot of freedom."

In estimating the technique's capacity to fashion tinier and more detailed pictures, Fujita and his team point out that they managed to form the minuscule F's without using a focusing lens, which limited the resolution they could achieve to the diameter of the atomic beam—roughly 10 to 100 nanometers. "However, it is possible to combine the function of a focusing lens into the hologram," they add, suggesting that it may become possible to carve yet finer details into future patterns.

Possible applications for the new holographic manipulation method may turn up in making circuits, says Hans J. Coufal, a physicist at the IBM Almaden Research Center. "There's potential here to replicate complicated patterns in a simple way."

In addition, he says, because of the way holograms disperse information, they are "relatively insensitive to defects." This characteristic makes them, in principle, more reliable as templates for making microcircuits than existing techniques, which involve etching with masks.

"There's a long way to go before this could lead to a manufacturing tool," says Coufal. "But it's clearly moving in that direction."

"Most of the time when scientists do experiments, they don't make major discoveries," says Eigler. "They just take the next step. But this is a really cool next step." *—R. Lipkin*