Job stress: A risk for pregnant workers?

A pilot study indicates that pregnant women in high-stress jobs secrete elevated amounts of catecholamines, the so-called "fight-or-flight" hormones. Some scientists suspect that elevated blood levels of these hormones can sometimes trigger premature labor and early delivery of very small babies, who risk breathing troubles and other serious health problems.

The new report may help explain previous findings linking stressful jobs with an increased threat of premature labor and delivery of low-birthweight babies. Experiments with pregnant animals have shown that elevated catecholamine levels can decrease blood flow to the uterus, in some cases leading to premature labor.

Obstetrician Vern L. Katz noticed among his patients that pregnant physicians with demanding work schedules seemed to deliver prematurely more often than women in less stressful jobs. That observation prompted Katz and his colleagues at the University of North Carolina in Chapel Hill to explore the connection between catecholamines and stress in a study of 10 physicians and three intensive-care-unit nurses, all in their third trimester of pregnancy. The 13 women had jobs requiring long and irregular shifts, prolonged periods of standing, and mentally taxing duties such as decisions about patient care.

The researchers instructed the women to collect urine samples during a typical workday and again, about a week later, on a non-workday. In analyzing the urine samples, the team discovered that catecholamine levels averaged 58 percent higher on workdays than on non-workdays.

They went on to compare these levels with those of a control group of 12 women in their third trimester of pregnancy who worked in lower-stress jobs. The 12 women collected urine during a typical workday, and again the team analyzed the samples for catecholamines.

In the March OBSTETRICS & GYNECOLOGY, the researchers report that workday catecholamine values among the group with stressful jobs averaged about 64 percent higher than those of the lower-stress group.

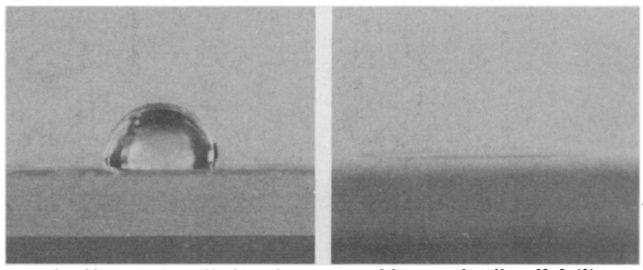
The investigators emphasize that their small study is only a pilot and does not settle the troubling question of whether on-the-job stress can cause difficult pregnancies. "I certainly wouldn't want anyone to think that we've found the link between work and poor pregnancy outcome," says study coauthor Watson A. Bowes Jr. Katz adds that stress may represent just one of many factors that could increase the risk of premature labor and other pregnancy problems.

Indeed, the team has yet to show that elevated levels of stress hormones in pregnant women can precipitate premature delivery or difficulties during gestation, says obstetrics researcher A. Brian Little of McGill University in Montreal. In a larger study, Katz and his colleagues hope to determine whether catecholamine levels affect the risk of such problems.

Research reported last fall indicated that highly stressed female physicians ran no greater risk of preterm delivery than a control group of women with less stressful jobs. However, the study did reveal that premature labor—which often requires bed rest or hospitalization to prevent early delivery — was twice as common among female physicians than among the controls, according to a report in the Oct. 11, 1990 NEW ENGLAND JOURNAL OF MEDICINE.

The report's lead author, Mark A. Klebanoff of the National Institute of Child Health and Human Development in Bethesda, Md., concludes that working long hours in a stressful environment has "little effect on the outcome of pregnancy in an otherwise healthy population." Klebanoff concedes that increased catecholamine levels may contribute to the higher incidence of early labor found in his study, but he says further research must prove that link. — *K.A. Fackelmann*

Wettable latex makes for drier surroundings



Noda/NATURE

Left: Water normally beads up on rubber and rolls off, failing to wet the surface. Right: A new latex ingredient makes the droplet spread out and stay put.

Diapers absorb urine, but they don't hold it very well. To keep babies' bottoms drier, one needs a material that likes being wetter.

Disposable diapers, like many consumer products, contain elastomer — a stretchable material made of chain-like molecules called polymers. Elastomers make room for urine as the baby wets. But because elastomer surfaces lack the energy to hold on to water, droplets bead up and spill off, and the diaper leaks.

Adding soap can lower the surface tension so that the drops stay on longer, but eventually the soap washes off. Thus, most elastomers are swellable but not "wettable," says Isao Noda, a polymer scientist with Procter & Gamble in Cincinnati.

A new latex film promises to fix that, he says. In the March 14 NATURE, Noda describes an elastomer that any water molecule can love. Unlike other rubber materials, its surface attracts water. So instead of rolling off, the droplets spread flat and stay put.

"Up to now, you've never had that property before [in rubber]," says Carl C. Gryte, a chemical engineer at Columbia University in New York City.

The secret lies in a hybrid molecule known as a block copolymer, which Noda mixes with latex particles when making his elastomer. This hybrid consists of two molecular chains attached at their tail ends. One, called the polar chain, sticks out of the finished elastomer film and contains lots of oxygen, which attracts water molecules. The other chain branches as the elastomer forms, entwining itself with the latex particles like an overgrown root.

Usually, such arrangements don't last because the molecules in rubber move around all the time and "the polar groups get swallowed up like quicksand," Noda explains. As a result, the water-loving property eventually disappears. Noda suspects his block copolymer molecule may be so large that the rubber can't swallow it. "It takes a tremendous amount of work to push this huge molecule inside the rubber matrix," he says.

The new material's water-loving property seems permanent. Noda reports washing the elastomer continuously for a week without rinsing off the polar surface, heating the material to 140°F and keeping it in dry air, all with no ill effects.

If placed in a diaper's absorbent layer, he says, the wettable film will suck in urine "almost like a pump."

Its potential applications reach well beyond the nursery, observes Mohamed El-Aasser, director of Lehigh University's Center for Polymer Science and Engineering in Bethlehem, Pa. Noda's invention may enable scientists to gain more precise control over the strength and placement of water-loving properties, El-Aasser suggests. And with the ability to control which parts of a material get wet and which stay dry, all sorts of product improvements become possible. Looking to the future, he and others envision rubber surfaces that hold paints or inks more tightly, fabrics that "breathe" better and medical devices more compatible with body fluids. — *E. Pennisi*