Oxygen damage: Role in preeclampsia?

Roughly 7 percent of pregnant women develop preeclampsia, a potentially fatal disorder of unknown origin that appears during the last trimester. It can involve a number of symptoms, including sudden weight gain, swelling of the face and fingers, headaches, abdominal pain and high blood pressure. Delivery of the baby remains the only cure. But one small study offers new insights into this mysterious ailment – and hints at a possible vitamin treatment.

Margaret K. McLaughlin and her colleagues at the University of Cincinnati College of Medicine noted two provocative preeclampsia findings emerging from a growing but diffuse body of research. First, blood from affected women possesses evidence of greater lipid damage than the blood of healthy women, including pregnant women. Second, some unidentified factor in the blood of preeclamptic women – perhaps a product of that lipid oxidation – makes their blood serum more toxic to endothelial cells, such as those lining blood vessels.

In a new study reported in the June OBSTETRICS AND GYNECOLOGY, McLaughlin, Sandra T. Davidge and their team found that blood from preeclamptic women possesses a strikingly lower ability to inhibit biologically damaging oxidation than does blood from other pregnant women. The researchers assayed spontaneous oxidation of tissue from sheep brains, alone or in the presence of human blood serum. Serum from nonpregnant individuals inhibits oxidation by about 45 percent. But as pregnancy progresses, McLaughlin and her co-workers found, the blood's capacity to inhibit oxidation typically doubles, reaching 90 percent.

The big surprise, McLaughlin says, is that in terms of inhibiting oxidation, serum from preeclamptic women "looks nonpregnant" – that is, it appears not to inhibit oxidation by more than about 45 percent.

This striking difference in oxidation inhibition between women with normal and preeclamptic pregnancies suggests either that the disease occurs when women have insufficient antioxidants "or, more likely, that they used them up because there's a lot of [oxidative] injury going on," says James M. Roberts, an obstetrics researcher at the University of Pittsburgh's medical school. If it turns out that excess oxidation products cause the vascular effects of preeclampsia, treatment might be as simple as administration of antioxidant vitamins, Roberts suggests.

And that's exciting, he says, because while some preventive therapies can reduce a woman's risk of preeclampsia, "nobody's ever shown any treatment that works once a woman is sick." – *J. Raloff*

Teasing out dietary cholesterol's impact

To defend their predilection for meat and dairy products, many people cite nutrition studies indicating that cholesterol consumption has little, if any, effect on cholesterol levels in the blood. Cardiologists counter by citing other studies linking dietary cholesterol to significant elevations in serum cholesterol and an increased risk of heart disease.

Who's right? Both, according to a preventive cardiologist from the University of Utah in Salt Lake City.

Paul N. Hopkins pooled data from 27 studies comparing dietary and serum cholesterol levels. Such meta-analyses hunt for trends statistically masked within the smaller, component studies. His findings, detailed in the June AMERICAN JOURNAL OF CLINICAL NUTRITION, appear to reconcile the seemingly divergent data on cholesterol. As a rule, the new analysis shows, the higher an individual's initial serum and dietary cholesterol levels, the less likely that raising or lowering dietary cholesterol will alter serum cholesterol.

So for most people, another egg or two per day should produce little change in blood cholesterol, Hopkins says. Why? Since the 400 milligrams of cholesterol contained in the typical U.S. daily diet have already saturated the body's need for the fat-like substance, any additional cholesterol accumulates in the liver rather than the blood. On the other hand, for people who typically eat less than 160 mg of cholesterol daily, such as Mexico's Tarahumara Indians, an extra egg or two might seriously spike their naturally low serum cholesterol.

Hopkins notes that genetics plays a far larger role than baseline cholesterol-consumption patterns in determining a person's responsiveness to dietary cholesterol – accounting for about 50 percent of the variability seen in the populations he studied.

Within the diet, saturated fat remains the most important single influence on serum cholesterol levels. Hopkins says dietary cholesterol probably accounts for most of the remaining variability seen – perhaps some 20 percent.

One of the biggest surprises, Hopkins observed, "is how easily the liver is saturated [with cholesterol]," a finding whose significance has not yet been studied. That saturation takes only 400 to 500 mg per day – the equivalent of two eggs. – *J. Raloff*

Galactic black hole: X marks the spot?

It looks more like a pirate's treasure map than a picture taken by the Hubble Space Telescope. Researchers this week released a Hubble photo depicting a dark X that may mark the exact location of a black hole believed to be hiding at the heart of a spiral galaxy called M51.

When Hubble radioed the image to Earth late last year, technicians at NASA's Goddard Space Flight Center in Greenbelt, Md., were so captivated with the bizarre graphic that they immediately brought it to the attention of Admiral Richard Truly, then administrator of NASA. But the image – along with other recent Hubble findings – is proving far more than a pictorial curiosity, says Holland C. Ford, an astronomer with Johns Hopkins University and the Space Telescope Science Institute in Baltimore. The observations suggest that M51 and some of its relatives, all of which sport moderately luminous centers, share a common lineage with a group of galaxies known as Seyferts, which possess cores 100 times as bright.

"This tells us there's a real continuity in physical phenomena from the most luminous to the least luminous; we don't have a half-dozen different galaxy types that we're dealing with," says Ford. He presented the findings June 8 at a meeting of the American Astronomical Society in Columbus, Ohio.

For years, astronomers have suspected that relatively small black holes fuel the energetic activity found at the core of M51 and several other galaxies, called LINERs (for low-ionization narrow emission-line region), just as larger black holes may power the more luminous cores of Seyfert galaxies. But the theory faced a major obstacle: As observed from Earth, not all LINERs and Seyferts radiate in the same pattern.

To address that problem, researchers speculated that the differences might stem from the orientation of doughnut-shaped clouds of gas and dust thought to surround the proposed black holes in these galaxies. Viewed edge-on, such a doughnut would hide the black hole, and the galaxy's center would seem to emit only narrow bands of light. However, an observer looking at the ring face-on – straight through the hole of the doughnut – would probably detect a wide band of frequencies. Thus, a diverse group of galaxies with active nuclei might possess similar powerhouses.

But another problem remained: No one had ever found direct evidence of a dusty doughnut.

Ford and his colleagues weren't looking for the elusive structure when they used Hubble's wide-field/planetary camera to study M51's nucleus last December. They