Mom's blood reveals baby's hemorrhage risk

Clinicians have developed an improved means for evaluating a pregnant woman's risk of delivering a baby with a potentially fatal bleeding disorder. Reliably determining which pregnant women face a low risk of carrying such babies could also prevent thousands of unnecessary caesarean sections annually.

An estimated 7.6 percent of all pregnant women have reduced numbers of blood platelets, cell fragments that facilitate clotting. Most of these women have developed a benign pregnancy-related disorder of unknown origin. But some suffer from a serious autoimmune disease, immune thrombocytopenic purpura (ITP). The antibodies of its victims mistakenly destroy blood platelets. The antibodies can also wipe out many of these important clotting agents from a developing child.

Infants born with a severe deficiency of platelets can develop massive brain hemorrhages during the first few weeks after birth. This is especially true of infants delivered naturally, since the birth canal compresses a baby's head. To limit an infant's risk of potentially fatal bleeding, some obstetricians have advised all patients with low platelet counts to schedule caesarean deliveries.

But previous research hinted that infants of women with the benign low-platelet disorder run no such risk. Philip Samuels and his co-workers at the University of Pennsylvania School of Medicine in Philadelphia and colleagues now confirm that observation. They also report identifying a means for detecting those pregnant women who pose a hemorrhage threat to their newborns.

Between 1979 and 1989, the researchers studied 162 pregnant women with lower-than-average platelet counts – less than 150,000 platelets per cubic millimeter of blood. Though 88 women had been diagnosed with ITP prior to pregnancy, the rest had no history of abnormal bleeding or signs of ITP. Among the 88 women with obvious ITP, 18 delivered babies with dangerously low blood-platelet levels. By contrast, children born to the 74 women who appeared only to have the benign pregnancy-related platelet abnormality faced no risk of severe hemorrhage, the team reports in the July 26 NEW ENGLAND JOURNAL OF MEDICINE.

"Unless the mother has a known history of ITP, one doesn't need to worry about the fetus and one doesn't need to perform a caesarean section," Richard H. Aster, a hematologist at the Medical College of Wisconsin in Milwaukee told SCIENCE NEWS. Aster wrote an editorial accompanying the research report.

Furthermore, the researchers found that among pregnant women with a history of abnormal bleeding, testing for the ITP antibodies could help determine whether they also pose a hemorrhage risk to their child at birth. Women with ITP whose blood carried no detectable levels of the platelet-destroying antibodies delivered children with sufficient platelet levels to prevent massive bleeding, they report. However, the researchers say the test's predictive power needs confirmation before physicians can rely on it to assess the safety of natural deliveries among these women. – *K.A. Fackelmann*

Hubble's flaws: Looking for the source

Only "three or four" NASA inspectors oversaw the Hubble Space Telescope's optical system during construction, former NASA administrator James Beggs told Congress last week. "We would normally have had many more people in the plant," but management problems, budget cuts and a Department of Defense directive all conspired to limit NASA's inspection force, he said.

Testifying before the Senate appropriations subcommittee that oversees NASA spending, Beggs acknowledged that the limited number of inspectors could "have had some impact" on NASA's failure to prevent or detect a serious flaw in one of Hubble's two mirrors (SN: 7/7/90, p.4).

Efforts to reduce cost overruns, as well as the necessity of dividing NASA's inspection work force between two main contractors may have hampered the agency's efforts to properly inspect Hubble's mirrors, Beggs said. But seriously compounding these problems, Beggs said, was the military's request that NASA limit its personnel at the optics contractor in Danbury, Conn. – Perkin-Elmer Corp., now Hughes-Danbury Optical Systems, Inc. – because of classified U.S. defense projects the company handled.

A 1983 investigation by the House Appropriations Committee bolsters Begg's assertions. It found that because the military "wished to limit the number of NASA personnel 'penetrating' contractors who were working on classified projects," NASA established an initial "cap" of 90 people for the Space Telescope program – less than half the number the agency usually allocates for large projects. After that cap was lifted in 1979, NASA's Hubble staff grew to exceed 200. However, the congressional investigators concluded, "NASA was slow in reaching this level, and inadequate contractor monitoring resulted."

Roger Angel, a telescope-mirror designer at the University of Arizona in Tucson, and member of a panel appointed by NASA to investigate Hubble's troubles, is concerned the flawed mirror may have escaped detection "not so much because of a lack of people, but because of a lack of information flow." On his panel's visit to Hubble's mirror maker, Angel plans to compare data from several tests made with either of two "null" lenses, used to help detect mirror imperfections (SN: 7/21/90, p.39). Because the two null lenses have different optical properties, Angel told SCIENCE NEWS it was "unlikely" that each could have been mistakenly constructed so they both missed the mirror defect. But he adds that the company may not have compared final measurements taken with one of the null lenses to those obtained using the other.

Efforts to pinpoint technical and procedural errors "is not a witch hunt," according to William G. Fastie, an astronomer with Johns Hopkins University in Baltimore. Says Fastie, involved with a NASA working group formed in 1977 to oversee Hubble's construction, "If we can detect the problem, we can design the most accurate method to correct the flaw." – *R. Cowen*

Clues emerge to how brain reads, spells

After suffering extensive stroke-induced damage to the central portion of her brain's left side, a 77-year-old woman had trouble identifying the latter half of words. Her problem, investigated by a pair of researchers in Baltimore, has yielded some intriguing clues to the way the brain ordinarily recognizes a string of letters as a word.

The woman, referred to as N.G., could easily read the left sides of written words, regardless of their lengths. Though her vision and muscle control remained unaffected by the stroke, this woman consistently misidentified the right halves of the same words, even though she could name all their letters. N.G. also misread the right halves of almost all words presented vertically, rather than left-to-right. The same pattern held for forward and backward spelling, whether written or spoken.

Other researchers have observed that patients with damage on the left side of their brain may have difficulty recognizing objects that appear on the right side of the visual field, and vice versa. Neurologists call this disorder "unilateral neglect." But N.G. is the first to show deficits focused on the same end of a word, no matter which side of the visual field that half of the word is presented in, note Alfonso Caramazza of Johns Hopkins University and Argye E. Hillis of Health-

South Rehabilitation Corp., both in Baltimore. For example, when shown the word "common" spelled backwards as "nommoc," N.G. read out "com." However, she made errors on "mon," even though the latter part of the word had been presented to her left side, where normally spelled words were always recognized.

N.G.'s performance suggests reading and spelling rely on representations of words in the brain positioned according to the central point of a string of letters, the researchers assert in the July 19 NATURE. To further illustrate this notion, they observe that when they added letters to the right end of a word, N.G. had an easier time reading it. For instance, she was much better at recognizing "contrast" in the word "contrastiveness" than at simply reading "contrast."

N.G.'s impairment is "unexpected and potentially informative," writes psychologist Stuart Sutherland of the University of Sussex, England, in an accompanying comment. But its true meaning remains baffling, he concludes.

If words are mentally positioned by their center point, Sutherland asks, why are those same words more easily lifted from memory by their first letters? While this tendency may help explain why a person more easily recognizes the left side of a word, he says, it offers no aid in deciphering why a string of letters is easier to recognize as a word if extra letters are added on. *– B. Bower*

Open mind may help close rad-waste lid

The United States should revamp its "rigid" approach to assessing, designing and building a high-level radioactive-waste repository, according to a "position statement" by the National Research Council's Board on Radioactive Waste Management. Otherwise, this independent advisory board warns, permanent-storage efforts may stall, raising the prospect that spent nuclear power-plant fuel could continue to accumulate indefinitely in surface storage depots.

Without giving specific examples, the 34-page report released July 18 characterizes storage rules set by the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) as excessively prescriptive and detailed. Such rules include NRC's requirement that planners assume all storage canisters will last no more than 1,000 years, says Charles Fairhurst of the University of Minnesota at Minneapolis, the board's vice-chairman.

The lifetime of copper canisters apparently far exceeds that NRC cap. If the Energy Department (DOE) could use such actual lifetimes, Fairhurst says, it might cut the cost and effort now spent designing and testing superfluous barriers. Regulations like this and others governing groundwater movement and radioactivity leakage could sink the program, warns the report.

The report also suggests current regulations encourage the "unsound" use of geophysical models to predict the performance of proposed sites. Trying to exact an "impossible" level of certainty from these models, the report charges, oversteps the limits of the models, current geological knowledge and site data.

Permanently burying high-level wastes deep underground remains untried as yet, notes Fairhurst. Yet, by law, DOE must do this, and it is focusing on a site within Nevada's Yucca Mountain for its first repository (SN: 1/6/90, p.11). Under present rules, Fairhurst says, DOE's task is like designing an airplane "without ever flying a prototype."

The position paper urges that DOE be allowed to "design (and improve the design)" as it proceeds with waste containment. By that approach, DOE would publicly accept some degree of uncertainty as normal for a new and complex technical undertaking. This shift should enable the project to weather likely surprises without causing the public to lose faith in the work, says Frank L. Parker of Vanderbilt University in Nashville, chairman of the board issuing the report. He cites such surprises as the pressurized brine discovered unexpectedly in New Mexico at an intended repository for wastes from nuclear weapons plants (SN: 3/19/88, p.188).

The report also recommends that EPA narrow its requirements imposed on DOE's waste facility to only a maximum public radiation dose, and let DOE choose how to meet that dose limit.

Robert R. Loux, executive director of Nevada's Nuclear Waste Project Office in Carson City, finds in the proposals a disturbing, "amoeba-type standard." A repository has to meet public health and safety requirements, Loux says. "We don't just mold and blend the criteria along the way. It's just not the way things are done." *– P. L. Weiss*

Self-made molecules do the double twist

Since the 1950s, when scientists uncovered the molecular structure of DNA, the double helix has symbolized biological phenomena as minute as a fruit-fly's eye and as grandiose as evolution. No wonder some chemists focus on making molecules to interact with such celebrity biochemicals or mimic their structures.

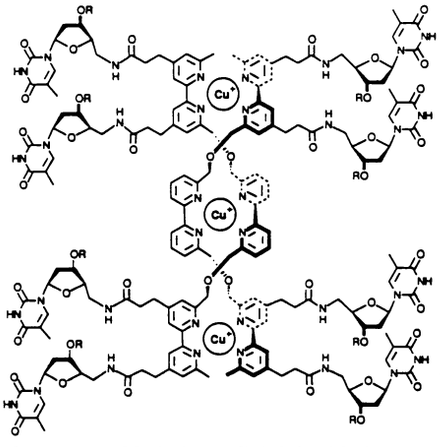
In the July 26 NATURE, Jean-Marie Lehn of the Université Louis Pasteur in Strasbourg, France, and co-workers describe how they coaxed molecular segments to self-assemble into double-helical molecules with DNA-like appendages.

Several years ago, Lehn and other coworkers first reported making the frameworks that underlie these new, more complex molecules. Their twisty frameworks begin as pairs of pyridine molecules (benzene-like hexagonal rings containing a nitrogen atom) joined like Siamese twins and linked to other pairs via short organic 'spacer' units. Chains of these linked pyridine twins spontaneously braid into double helices around copper ions.

In their latest work, Lehn and his coworkers integrate biologically important molecules such as the nucleoside thymidine – part of one of DNA's four nucleotide building blocks – into the helical backbone.

Though nucleosides reside within DNA's double-helix backbone, they point out from the double-helical spine of Lehn's new synthetic structures. In a commentary that accompanies the report, chemist and artificial-helix maker Edwin C. Constable, of the University of Dundee in Scotland, describes the synthetic molecules' structure as a "curious 'inside-out' analogue to that of DNA." Unlike DNA, which overall carries a negative charge, Lehn's compounds are positively charged.

The new synthetic structures offer a means for studying how natural and lab-made double helices form and bind to other molecules, such as DNA. Constable speculates that double helices built around heavier metals, such as ruthenium or platinum, might bond to specific portions of nucleic acids, permitting researchers to "eavesdrop" on, say, drug-DNA interactions. These structures might even serve as light-activated "molecular-mines" that could destroy malfunctioning regions of DNA, he told SCIENCE NEWS. *– I. Amato*



Structure of Lehn's artificial double helices with thymidine molecules springing from some of the pyridine rings.