

The high costs of rough riding

New measurements of both the direct and indirect costs of caring for injured motorcyclists reveal the expense to the public is much greater than previously believed. For 105 motorcyclists hospitalized at a major trauma center in one year, the cost of initial care, rehabilitation and readmission for injury-related problems amounted to \$2.7 million, and indirect costs, representing loss of income during 20 months of follow-up — a factor not previously measured — came to \$4.4 million. Payment came largely from public funds, note Frederick P. Rivara and his colleagues at the Harborview Injury Prevention and Research Center in Seattle, who report their findings in the July 8 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*.

Following repeal of motorcycle helmet legislation by many states, motorcycle injuries and fatalities have increased, the researchers note. A 44 percent increase nationally in fatalities between 1976 and 1979 reflects a much larger number of injuries requiring medical attention, they add.

Congress enacted legislation in 1966 to withhold federal highway construction funds from states without compulsory helmet laws, prompted by the well-established link between helmet use and a reduction in death and disability. Past studies have shown that states with an enforced helmet law maintain a compliance rate of 90 percent, while states without such a law maintain a rate of 50 percent. "Decreasing head injuries through a mandatory helmet law would therefore be expected to significantly reduce the cost of care," the investigators conclude, noting that Congress altered its original policy in 1976 due to pressure from motorcycle rider groups.

Bloody dilemma

After weighing the risks of blood transfusions, now charged with occasionally transmitting hepatitis and AIDS and causing immunosuppression, a panel of experts convened at the National Institutes of Health recently recommended eliminating the old "10/30" rule. The rule dictates a transfusion when a surgical patient's hemoglobin value falls below 10 grams per deciliter and the hematocrit — the percentage of red blood cells in a blood sample — becomes less than 30 percent. Improved surgical and anesthetic techniques figured in the reevaluation, as well as clinical experience showing that patients could survive surgery with lower blood-test values. Recognizing that "with every unit you get, the risk incrementally increases, therefore, the fewer the better," conference chairman Tibor J. Greenwalt of the University of Cincinnati says the decision to transfuse should be left to physicians. "We didn't want to set another irrational number," he says.

In reviewing alternatives to standard transfusion, Margot S. Kruskal of Harvard Medical School in Boston reports that the use of a patient's own blood, donated earlier — overall the safest alternative — is limited. Although such autologous transfusion has increased dramatically, she says, it accounts for only 2 percent of transfusions. She attributes this to indifference by some physicians and a lack of patient education and public knowledge of the process, as well as the lack of a well-organized system for dealing with this blood. Moreover, misconceptions remain about hazards of donation. "What are you going to do when much of the population still thinks you can get AIDS by giving blood?" Greenwalt asks.

The panel says other safe alternatives, such as intra-operative blood salvage (collecting blood from a patient during an operation for subsequent use) and hemodilution (removing blood and substituting other fluids to keep blood volume up) are useful in selected cases, while some of the more innovative approaches, including artificial blood, remain experimental. Standard, homologous transfusions will be the mainstay in the foreseeable future, it concludes.

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The hot side of chiles

Capsaicinoids are the chemicals that impart the flaming bite to chiles and other hot peppers. Having almost no odor or flavor, they act directly on pain receptors in the mouth and throat. Anna Krajewska and John Powers at the University of Georgia in Athens asked 16 trained tasters to characterize very dilute solutions of the four most prevalent naturally occurring members of this family of stinging chemicals and one synthetic cousin, used as a reference gauge of the others' hotness.

Reporting in the May-June *JOURNAL OF FOOD SCIENCE*, the researchers find nordihydrocapsaicin (NDHC) and the synthetic vanillylamide of n-nonanoic acid (VNA) the mildest and "least irritating." They were also only about half as hot as capsaicin (C) and dihydrocapsaicin (DHC), the most pungent and prevalent two. NDHC's "mellow warming" develops immediately after swallowing, recedes rapidly and centers in the front of the mouth and palate. Overall, its character is "fruity, sweet and spicy." In contrast, the inflammatory response induced by homodihydrocapsaicin (HDHC) — which is about two-thirds as hot as C and DHC — does not develop immediately. Once it does, HDHC stings with a "very irritating" and "numbing burn" in the throat and back of the tongue and palate. Its pungency is also the most prolonged and difficult to rinse out.

The two hottest capsaicinoids deliver their bite everywhere from the mid-tongue and palate back down into the throat. How hot is that? A single drop of capsaicin diluted in 100,000 drops of water will produce a persistent burning of the tongue. Diluted in 1 million drops of water, it still produces a perceptible warmth. Like DHC's, its sharp sting develops rapidly and lasts longer than NDHC's.

When hot may be anticarcinogenic

Four years ago, researchers at the Eppley Institute for Research in Cancer at the University of Nebraska in Omaha showed that capsaicin, the predominant capsaicinoid, can cause genetic mutation in the Ames test — a quick bacterial assay used to screen for possible carcinogens. More recently, these and other researchers have found additional evidence suggesting capsaicin might cause colon cancer in animals. But the newest studies by the Eppley team now indicate the pungent chemical may also be an antioxidant, and therefore capable of neutralizing harmful oxygen species in the body.

In their work, Peter Gannett and Patrick Iversen found that capsaicin strongly binds to at least one form of the cytochrome P-450 enzyme — the "j" form, which is believed to activate certain mutagens including nitrosamines. In the first stage of a two-step process, capsaicin is oxidized — donating an electron to another molecule. Gannett says it appears the P-450j enzyme actually fosters the oxidation by accepting the electron. Then the oxidized capsaicin appears to covalently bind to the P-450j, effectively inactivating it.

Dimethylnitrosamine (DMN) — a known animal carcinogen — is usually a potent mutagen in the Ames assay. But when the Eppley researchers conducted an Ames assay on paired exposure to both DMN and capsaicin, "we found the mutagenicity of the DMN was effectively destroyed," Gannett says. Work by others, he notes, has found evidence that capsaicin can also bind to a P-450c enzyme — one believed to activate potentially cancer-causing polycyclic aromatic hydrocarbons (PAHs). The implication, Gannett believes, is that capsaicin may "interfere with nitrosamine- or PAH metabolism" — preventing their harmful transformation into potent mutagens. So this popular and peppery food constituent may have the dubious distinction of presenting a low-level cancer risk to the gut while at the same time neutralizing enzymes that might otherwise turn on classes of other carcinogens.

41