

Health risks from vaporizing blood

Federal law requires that employers protect health care workers from the AIDS virus and other potentially infectious agents by employing "universal precautions" to limit exposure to blood and other bodily fluids. This generally means wearing gloves or masks where blood may be present. But surgery in which tissue is burned off doesn't automatically trigger these mandatory precautions, according to Douglas E. Ott, a physician at the Mercer University school of engineering in Macon, Ga. That oversight may put surgical crews at risk, he argued last month in Atlanta at the annual meeting of the American Association for the Advancement of Science.

The smoke emitted during laser cauterization can travel 40 yards or more, he notes, prompting complaints from surgical crews several rooms away. And while such workers may complain about tearing eyes or respiratory irritation, Ott worries even more about infectious agents that may have hitched a ride into nasal passages along with that smoke.

As lasers and other cauterizing devices vaporize targeted tissue, some of the surrounding, at least partially unburned cells will be freed to waft away with the smoke, Ott notes. Though hospitals provide minivacuums to suck up the irritating combustion products, he says, surgical staffs don't use these devices as religiously or carefully as they should — primarily because they consider smoke no more than a nuisance. In fact, he notes, one 1991 study by researchers at the State University of New York in Syracuse cultured HIV, the AIDS-causing virus, from smoke emitted during laser cauterization of infected tissue.

Ott argues that the Occupational Safety and Health Administration should explicitly target for mandatory engineering controls any aerosols produced by the combustion of blood. OSHA should require smoke evacuation when open-air tissue cauterization is under way and consider recommending respirators for surgical crews — because masks offer ineffective protection against aerosols. He also recommends that hospitals install ultraviolet lighting, air ionizers, and other antimicrobial technologies.

As it is performed today, Ott told *SCIENCE NEWS*, cauterizing surgery contributes substantially to making "the operating room the most polluted part of the hospital."

Pesticides' noxious companions

Though consumers often complain of nausea, headaches, irritation, and other ills after their homes have been treated with pesticides, these symptoms probably trace to volatile organic chemical (VOC) additives, not the pesticides themselves, a new study suggests.

Emulsifiers, propellants, and other compounds typically constitute 95 percent or more of the pesticide solutions sprayed indoors. And while labeled inactive, these additives — which include xylene, kerosene, and other solvents — may be anything but inert when it comes to human health, note John A. Bukowski and Leroy W. Meyer of the New Jersey Department of Environmental Protection in Trenton.

In the March *ENVIRONMENTAL SCIENCE & TECHNOLOGY*, they describe simulations of how chemicals in several types of pesticide formulations would disperse throughout a home under various ventilation schemes. Solvents typically entered the air more quickly and stayed there longer than the heavier pesticides that they accompanied, Bukowski and Meyer found.

Without ventilation, the 24-hour average airborne concentrations of these VOCs often exceeded the 25 milligrams per cubic meter of air that can cause irritation, headaches, and other symptoms in healthy adults. Ironically, the pair note, few indoor insecticide labels recommend ventilation or even suggest how long to stay out of treated premises.

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EMFs may threaten pooch

Several studies have linked residential electromagnetic fields (EMFs) with human cancers, especially those of the blood. A new study now suggests that these fields may pose a similar risk to pets.

John S. Reif and his coworkers at Colorado State University in Ft. Collins focused their study on 230 dogs hospitalized with cancer. These included 93 animals with canine lymphoma — a common blood cancer whose origins remain unknown.

After characterizing the wiring in each pet's home, Reif's team measured, whenever possible, actual magnetic fields where the dog spent most of its time.

Overhead power lines running along streets and up to homes constitute the biggest overall contributor to residential EMFs (SN: 8/21/93, p.124). And in this study, factors associated with those lines also showed the strongest link to lymphoma. They included high front-yard fields (more than 2 milligauss) or "open secondary" wires (that have been associated with very high fields). Compared to animals whose homes were fed by buried power lines, dogs exposed to these factors faced double the cancer risk — and it tripled if the animal spent 25 percent or more of its time outside.

But the most powerful statistical association to the cancer occurred in those 10 dogs whose homes were located very near a large, "primary" power distribution line. After adjusting for potentially confounding variables, researchers found that the dogs had 13.4 times the lymphoma risk of animals from homes with buried power lines.

Overall, Reif's team concludes in the Feb. 15 *AMERICAN JOURNAL OF EPIDEMIOLOGY*, this investigation suggests that "dogs may act as a 'sentinel' species" for studying environmental threats to the families with whom they share a home.

Are micromagnets polluting EMF studies?

Crystals of magnetite, the magnetic form of iron oxide, contaminate our world — from the air we breathe to the water we drink. At ambient concentrations, these microscopic pollutants pose no risk to human health. But in the laboratory, they could lethally poison studies of the cellular effects of electromagnetic fields (EMFs), according to a cautionary note published in the March 9 *NATURE*. Indeed, it charges, such contamination may have invalidated the findings of most or all such studies conducted to date.

Michael H. Nesson of Oregon State University in Corvallis and his coauthors report finding the crystals — typically around 100 nanometers in diameter — tainting disposable sterile plastic labware (such as flasks and pipettes) and the commercially prepared medium used to grow tissue cultures. To gauge magnetite accumulation during an experiment, Nesson's group simulated an EMF tissue-culture trial — minus the cells. They successively passed a 50-milliliter sterile sample of liquid growth medium through 30 pieces of "clean" plastic labware. By the end of the experiment, the liquid had picked up 160 nanograms of magnetite. This corresponds to an estimated 32 million individual crystals, or about 30 micromagnets for each of the cells that would ordinarily grow up during such a test.

In the presence of the type of magnetic field associated with residential wiring, each polluting crystal will attempt to flip 180° 60 times each second. For any crystal attached to a membrane on the surface of a cell, this rotation may open stretch-activated ion channels, "thereby changing the cell's physiology," Nesson says — and prompting the type of cell changes that have been recorded in EMF studies.

Indeed, Nesson told *SCIENCE NEWS*, his team suspects EMFs may be capable of inducing harm in humans and other creatures by interacting with magnetite crystals recently discovered to occur naturally in the brain and other tissues.

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