

## Laser seeks out and zaps cell proteins

A cell resembles a walled city, barricaded by a double layer of fatty molecules called lipids. Communication with the outside world is critical to the cell's development and survival, so information about what's happening on each side of the cell wall is mediated by specialized proteins. Scientists usually study the function of these proteins by introducing mutations into the gene for one protein and studying the effect on cell function. Now a researcher at Harvard Medical School in Boston has demonstrated he can do these studies without genetic manipulation by zapping specific proteins with a laser.

The method, called chromophore-assisted laser inactivation, involves attaching a laser-absorbing molecule (a chromophore) to an antibody that will selectively attach itself to one kind of protein on the cell surface. A series of short ( $10^{-8}$ second) pulses of laser light — of a wavelength absorbed by the chromophore but not by the cell — is focused on the tissue after it has been exposed to the antibody. In a trial with red blood cells, Daniel Jay found that the heat absorbed by the chromophore is enough to disrupt the cell surface protein bound to the chromophore-antibody combination, but not enough to affect other proteins or the cell itself, he reports in the August PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.85, No.15).

Jay calculates that the technique works because the heat radiated by the chromophore raises the temperature directly around it  $130^{\circ}\text{C}$ , but the rapid dissipation of heat means that the temperature a few hundred atomic widths away rises only about  $2^{\circ}\text{C}$ , he says.

The technique offers an advantage over genetic approaches because it allows scientists to inactivate one type of protein in a single cell within an organism by focusing the laser on that cell only, Jay says. Moreover, the depletion of proteins is short-lived, because the cell will produce replacement proteins, he adds.

These two properties make the method valuable for studying protein-mediated events that happen only at one place and time, such as some of the cell changes that occur in a developing organism, Jay says. One area of interest for Jay is the study of how neurons know where to go to "wire up" the developing brain. Cell surface proteins are important in this process, and the laser inactivation technique may reveal more about the specific proteins that guide neurons and how they do it, he says.

Researchers also can guide a chromophore to a cell surface protein by attaching it to an enzyme, Jay says.

— C. Vaughan

## Pollution study finds smoking gun

Where there's smoke, there's hydrocarbon. Scientists who took wintertime air samples in Albuquerque, N.M., say most airborne pollutants floated from burning wood, but emissions from motor vehicles were the more potent health hazard.

The study showed that 78 percent of the extractable organic matter, or hydrocarbon, was generated from wood stoves and fireplaces. However, the smoke accounted for only 58 percent of the air's mutagenicity. Pollution from motor vehicle exhaust was three times as mutagenic as wood smoke, the researchers report in the August ENVIRONMENTAL SCIENCE AND TECHNOLOGY.

Those two sources accounted for almost all of the samples' mutagenicity, which the scientists measured with the Ames test, a gauge of cancer-causing potential based on a compound's ability to induce genetic mutations in bacteria.

Scientists from the Atmospheric Sciences Research Laboratory and the Health Effects Research Laboratory, both in Research Triangle Park, N.C., conducted the study during January and February of 1985 in a residential area of the city. The Environmental Protection Agency sponsored the study.

Unlike previous research that analyzed pollutants as they were spewed directly from cars or chimneys, the Albuquerque study did not use samples

taken at the pollution source. "We took the air people actually breathe," says Charles Lewis, who led the study.

By supporting the findings of previous studies on the volume of wood stove pollution and the unhealthiness of both smoke and exhaust, the new study dampens speculation that pollution farther from its origin might be less harmful.

"Pollutants change their chemical composition when they're exposed to sunlight and other particles in the air," says Lewis. "What this [study] says is that we don't see any effects on the mutagenicity."

Also unique to the study was its use of carbon-14 to reveal the source of pollution, says Robert Stevens of the Atmospheric Sciences Research Laboratory. Normally, scientists trace pollution by looking for some distinguishing component, such as the high potassium content of wood smoke or the lead from burned fossil fuels. While the researchers did use those techniques in the recent study, they confirmed their findings by measuring carbon-14, a naturally occurring isotope of carbon. Carbon-14 is abundant in firewood but almost nonexistent in fossil fuels.

Later this year, the group plans to publish similar studies — with similar results, they say — done in Raleigh, N.C., and Boise, Idaho.

— L. Beil

## Success of bypass surgery questioned

Although coronary bypass surgery is beneficial in the short term, its advantage to heart patients gradually decreases, according to new statistics from the European Coronary Surgery Study Group. Seven years ago, the same group reported that during the first five years after surgery, bypass patients had a significantly higher survival rate than those who received only medical treatments determined by their physicians.

But after continuing to follow survivors among the 767 men (all of whom were under age 65 when the study began, and none of whom initially had severe symptoms), the researchers found the percentage of surgical patients who survived decreased in the seven years following their first report. During these seven years, the researchers report in the Aug. 11 NEW ENGLAND JOURNAL OF MEDICINE, "the patients originally assigned to surgical treatment who survived to five years fared worse than those [who survived to five years] in the medically treated group, and the benefit of early surgical treatment gradually decreased."

Overall, the scientists say, there is still a slightly higher rate of survival among

patients treated with surgery.

The European study is one of three large, randomized studies comparing the usefulness of two treatments for chest pain, or angina, when the need for surgery is unclear. In 1984, the Veterans Administration Coronary Artery Bypass Surgery Cooperative Study Group reached similar conclusions from an 11-year study. And in 1983, researchers conducting the Coronary Artery Surgery Study found little difference between medical and surgical treatment after following some patients for as long as seven years (SN: 11/5/83, p. 294).

Although the European researchers do not offer an explanation for the findings, some physicians suggest that using a vein in the leg, once the most common procedure for coronary bypass, does not provide long-term benefit. "There's quite a bit of evidence that disease develops in the grafts and they don't stay open," says Katherine Detre of the Veterans Administration Medical Center in West Haven, Conn., who coordinated the 1984 study. Detre says researchers are now finding the internal mammary artery a more successful bypass.

— L. Beil