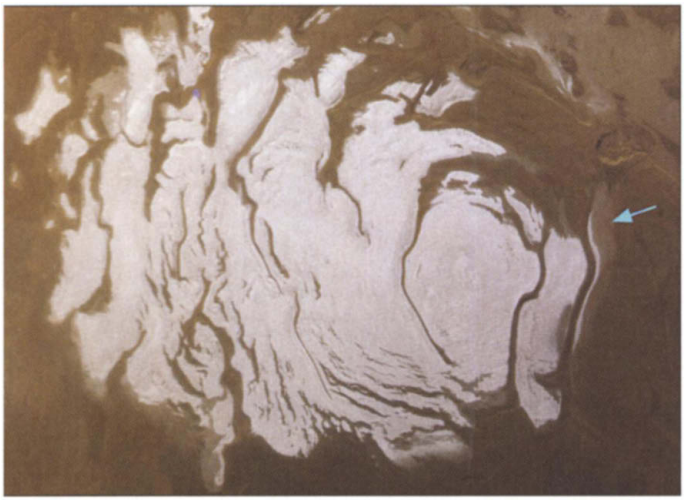


**Cold shoulder.** Region of water ice (arrow) flanking a vast sheet of frozen $CO_2$, photographed by the Mars Global Surveyor, may be typical of the fringes of Mars's southern ice cap.

detailed measurements made with the spacecraft's infrared camera revealed that the tundralike plain absorbed more heat than did the surrounding terrain during the day and radiated more heat at night. That high "thermal inertia" strongly suggested that the surface was pure water ice.

Christensen's team, which included Timothy Titus and Hugh Kieffer of the U.S. Geological Survey (USGS) in Flagstaff, Arizona, also examined old visible-light photographs of the area taken by NASA's Viking orbiter mission in the 1970s. Sure enough, the photos showed sharp delineations between bright dry ice, medium-bright water ice, and dark rock, in exactly the same places where their infrared camera had seen them. The icy plain, the researchers concluded, is a regular feature that has reappeared every martian summer for at least 25 years. Viking saw many similar medium-brightness patches around the edges of the southern ice cap, so seasonal plains of water ice might be fairly common. This suggests that the permanent layer of carbon dioxide ice might be relatively thin—perhaps only meters thick.

Other researchers say the find is like a Christmas present you have asked for: not a big surprise but good news nevertheless. "It's important to me because I predicted it," says David Paige, a planetary scientist at the University of California, Los Angeles. Several years ago, he and two other scientists studying data from the 1971 Mariner 9 mission found that the spectrum of light reflected from the south pole did not match that of dry ice alone. They speculated that the other ingredient was water ice, but their instruments could not pinpoint its location.

If the ice deposits are indeed accessible from the surface, they might someday provide a record of Mars's climatic history, just as glaciers do on Earth. "In many ways, Mars should be a simpler system than Earth for understanding climate change," says Ken Herkenhoff of USGS. "There are no oceans on Mars, and no biological community that we know of." Thus, Mars could serve as a laboratory for understanding the effects of orbital mechanics and of the sun's variations on climate.

But that understanding will come only if NASA sends a mission to the polar regions of Mars, to replace the Polar Lander that failed to reach its destination in 1999. The inaugural Mars Scout mission, to be launched in 2007, might provide an opportunity. Two of the 10 finalists for this mission, including Paige's "Artemis" proposal, involve polar landings. (The winning proposal was expected to be announced on 5 December.) "I see a groundswell of interest in going to the poles," Paige says. "The poles are where a lot of the action on Mars is." –DANA MACKENZIE

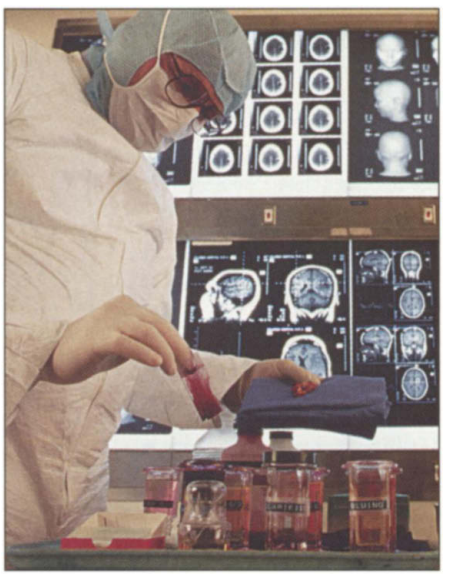
Dana Mackenzie is a writer in Santa Cruz, California.

CREDITS: (TOP TO BOTTOM) NASA/JPL/MALIN SPACE SCIENCE SYSTEMS; ROGER RESSMEYER/CORBIS

MEDICAL RESEARCH

## U.K. Researchers Hope For Clarity in Tissue Use

**CAMBRIDGE, U.K.**—British medical researchers are facing major changes in the rules governing the scientific use of human tissues, the result of a series of scandals in the 1990s. Earlier this year, the U.K. government said it was considering drafting a law to prevent misuse of tissues and asked for



**Consent required.** Slices of tumors are stored in wax before disposal.

## ScienceScope

**Diverse Views** Attempts to create a more diverse scientific work force will be undermined if the Supreme Court prohibits U.S. universities from using race as a criterion for admission, according to the head of the country's leading consortium of research universities. The thorny issue is back in the news this week after the high court agreed to hear two cases involving admissions practices at the University of Michigan.

Nils Hasselmo, president of the 62-member Association of American Universities (AAU), says that affirmative action "has been an effective means of achieving academic diversity," and that it is especially important "at the most selective end of the spectrum." He expects AAU to join other scientific and educational organizations in urging the court to uphold race-based admissions efforts.

But opponents say that several states have come up with alternative ways to increase diversity on campus without discriminating against Caucasian students, two of whom filed lawsuits seeking to overturn Michigan's policies.

**Stressed Out** The average corporate executive is more relaxed than an academic at the Massachusetts Institute of Technology (MIT), according to a university-sponsored survey released this week. More than 60% of MIT's nearly 1000 professors say that they are emotionally and physically drained at the end of the workday—and 78% say they can't get everything done no matter how hard they try, according to the study, which took the pulse of faculty stress. By comparison, just half of corporate executives feel the same way, according to the independent company that analyzed the data.

The study also found that two-thirds of MIT faculty are not happy with their job's pace and pressure. Less than half worked 60 hours a week or more in 1989; now two-thirds do. And more than half say the pressure has a negative effect on family life and professional relationships. Women and untenured professors report feeling more stressed and overworked than their tenured male counterparts do.

The alarming statistics have prompted MIT administrators to order a new committee to look at ways to monitor and ameliorate stress. "We have to learn how to monitor this," says Provost Robert Brown. "But the question is: Will the faculty have time to read the report?"

**Contributors: Pallava Bagla, Jocelyn Kaiser, Jeffrey Mervis, Andrew Lawler**

public input; the deadline for submissions was 14 October. Researchers say that bioethics committees are not waiting for new legislation, however: They have already tightened access to human tissues drastically, causing some projects to grind to a halt.

The use of human tissues for research has been a charged issue in the United Kingdom since 1999, when it was revealed that Alder Hey Children's Hospital in Liverpool, as well as hospitals in Bristol and Birmingham, had been removing organs from dead babies for decades without parents' consent. In some cases, the hospitals had allegedly given organs to pharmaceutical research companies in return for financial donations. "What happened at Alder Hey was inexcusable," says Carlos Caldas, a genetic epidemiologist at the University of Cambridge, but he argues that overly cautious regulatory committees have overreacted in a way that is severely hampering legitimate medical research.

The projects hardest hit, according to Caldas, are those that rely on archives of human tissue samples. Such collections consist of tumors and other tissue removed during surgery that are either frozen or embedded in wax. Caldas coordinates an international consortium that hunts for genetic factors in gastric cancer by comparing archived tissue samples from patients going back 20 years. Access to such samples before 1999 was straightforward, but it has now become "very difficult," he says.

Regional bioethics committees now require that consent be obtained from the original owner, or the next of kin if the owner has died, for any new use of an archived tissue. Such requirements are long overdue, says immunologist Herbert Sewell of the University of Nottingham, a member of the Nuffield Council on Bioethics. Although he acknowledges that contacting donors or next of kin for decades-old samples can be difficult, informed consent for all intended uses of donated tissue is a fundamental requirement of ethical research.

But many researchers are not happy. Because of the new requirements, "cancer research has been paralyzed," says Kathy Pritchard-Jones, an oncologist at the Institute of Cancer Research in Sutton. Pritchard-Jones says several of her research projects are on hold because of difficulties in accessing archived tissues. "Legal clarity is needed," she says, because tissue archives are now being treated as equivalent to whole organs from the recently dead.

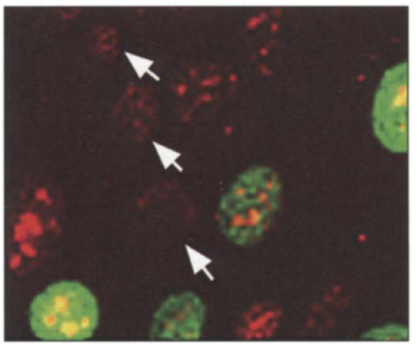
Caldas is leery of new legislation, however. "Legislating this kind of research could put it in a straitjacket," he says. Caldas would prefer a more flexible set of guidelines that bioethics committees can use to approve research on tissue archives without fear of scandal. In spite of the hardships that have befallen researchers, Caldas at least hopes that the public debate will help dispel some public misperceptions. "At the end of this," he notes, "[we hope] people will see that researchers are not Frankensteins. We're trying to improve health." –JOHN BOHANNON

John Bohannon is a writer in Lyon, France.

CELL PROLIFERATION

## Common Control for Cancer, Stem Cells

**KOBE, JAPAN**—At the very beginning of life, stem cells can develop into all the different tissues of the body; in contrast, cancer cells often end life. Despite these obvious differences, researchers have suspected that similar mechanisms might be at work in both cancer and stem cells. For example, both can multiply indefinitely. Embryonic stem (ES) cells transplanted into mice sometimes develop into tumors. And stem cell lines have been derived from a cancer known as teratocarcinoma.



**Missing multiplier.** Cells with a minimum of nucleostemin protein (arrows) show no sign of proliferating (green).

Now, two researchers have found a new gene that is apparently involved in regulating the proliferation of both stem cells and at least some types of cancer cells. "This could show that stem cell biology and oncology interact," says Ronald McKay, a molecular biologist involved in the experiments at the National Institute of Neurological Disorders and Stroke, part of the U.S. National Institutes of Health (NIH) in Bethesda, Maryland.

Other researchers find the link to cancer cells intriguing, but, as Shin-Ichi Nishikawa, a molecular geneticist at Kyoto University in Japan, says, "we really need more data before saying anything conclusive about the role of this protein in cancer." McKay described the finding briefly on 20 November during a symposium here on Stem Cells and Organogenesis. The full report, by McKay and NIH colleague Robert Tsai, appeared in the 1 December issue of *Genes & Development*.

Stem cells are the focus of intense research interest because of their ability both to self-renew, or proliferate, and to differentiate into a variety of tissues, offering tantalizing possibilities of growing replacement organs in vitro, among other possible therapeutic applications.

McKay and Tsai set out looking for genes with critical roles in the self-renewal mechanism. Working with various rat stem cell lines in culture, they found a new gene expressed in ES cells, in central nervous system stem cells, and in primitive bone marrow cells. In all cases, the protein encoded by the new gene was abundantly expressed while the cells were proliferating in an early, multipotential state, but it abruptly and almost entirely disappeared at the start of differentiation. The protein was not found in the differentiated cells of adult tissue, suggesting a role in maintaining stem cell self-renewal. The researchers dubbed the new gene *nucleostemin* because its protein product appears to be active almost exclusively within the nucleus of the stem cells.

That locus of activity led to "an inspired guess," says McKay. The cell nucleus is also the site of activity of several genes whose proteins are known to regulate the activity of *p53*, a gene with a well-studied role in suppressing tumors. Mutations in *p53* have been implicated in numerous types of cancer. Following the hunch that *nucleostemin* might be involved, McKay and Tsai looked for and found a human homolog active in several human cancer cell lines. They further determined that its protein product binds to the p53 protein, although just how the two proteins interact is unclear.

To further define the new gene's role, McKay and Tsai interfered with its activity in both rat stem cells and human cancer cells. They shut it off, through a technique known as gene silencing, and overexpressed it, by adding protein to the cells. Both too little and too much of the nucleostemin protein hindered cell proliferation. "There seems to be a critical level involved," McKay says. At that level, they suggest, nucleostemin helps regulate the proliferation of both stem cells and some types of cancer cells, although the precise mechanism is not yet known.

"The method appears to be very sound, and the study suggests the [gene has] some relation to promoting self-renewal," says Nishikawa. But he warns against attributing too big of a role to a single gene. He explains that among different types of stem cells, the evidence indicates that "there may be very diverse ways [of regulating] self-renewal and differentiation." And, he adds, regulation of proliferation in cancer cells is likely to be just as complex.

McKay readily agrees, but he predicts that further studies will find more links between these cells at the opposite ends of life.

–DENNIS NORMILE

CREDIT: R. TSAI AND R. MCKAY, *GENES & DEVELOPMENT* 16, 2991 (2002)