Research Ministry has asked the DFG to postpone funding for a proposal Brüstle has submitted—the only research project proposed to date that would use imported ES cells—to allow more time for discussion. Social Democrats and opposition politicians, as well as church officials categorically opposed to research involving human embryos, quickly assailed the new guidelines.

Stymied. Oliver Brüstle's ES cell project is still on hold.

Currently, Germany's Embryo Protection Act allows researchers to harvest stem cells from aborted fetuses but not from blastocysts, embryos that are 4 to 7 days old. The new guidelines, unveiled by DFG president Ernst-Ludwig Winnacker and endorsed unanimously by the agency's 39-member senate, allow DFG-funded scientists to import ES cells derived legally in foreign labs from surplus IVF embryos. That's a big change from the DFG's initial guidance on ES cell research, issued in March 1999, which counseled scientists to avoid doing research on human ES cells. The DFG has also recommended that an independent commission examine the ethics of research projects involving human ES cells in both publicly and privately funded labs.

If the import of ES cells does not satisfy scientific demand, the DFG recommends that Parliament amend the 10-year-old Embryo Protection Act to allow German researchers to derive their own ES cells from surplus IVF embryos for 5 years. The creation of human embryos solely for use in research, as well as therapeutic cloning—in which a nucleus of a somatic cell is transferred into an enucleated egg cell—would remain off limits.

Last February, the DFG established a 6-year, $2.3 million program to explore the value of human stem cells of all kinds for cell and tissue transplantation. Nearly all researchers who have received grants under this program work on adult stem cells or on animal models. Only Brüstle's team has applied for funding for the use of imported human ES cells. His group wants to explore how neural precursors can be cultivated from human ES cells and purified from other cell types. This would follow up on work in which Brüstle transformed mouse ES cells into functional neural cells.

The DFG has not yet approved Brüstle's project, which was submitted for funding 10 months ago. He had hoped for a decision last week, but after the guidelines were unveiled, the Research Ministry announced that it would urge the DFG to postpone a decision on Brüstle's application. "The far-reaching changes suggested by [the DFG] need to be discussed broadly in science and society," said research minister Edelgard Bulmahn. She has suggested that the National Ethics Council, a new body appointed on 2 May by Chancellor Gerhard Schröder, examine the ethical and legal framework for research on human ES cells before any project proceeds.

Officially, the DFG is not bound by the Research Ministry's directives. But federal and state governments provide the bulk of the DFG's budget, and government representatives make up almost half the agency's grants committee. German researchers are watching with interest to see how the DFG responds.

–SABINE STEGHAUS-KOVAC

Sabine Steghaus-Kovac is a science writer in Frankfurt.

GERMANY

Scientists Rebel Against Research Overhaul

HEIDELBERG—A proposed overhaul of the way Germany's national research centers are funded has sparked a massive protest backed by a Nobelist and a former research minister. As the government's plan heads for a showdown later this month, more than 4300 scientists and other staffers at the centers have signed a petition to research minister Edelgard Bulmahn denouncing the overhaul as a threat to scientific freedom. "If you take away the freedom of the scientists at the institutes, it will downgrade the quality of the research," argues Peter H. Krammer, a molecular immunologist here at the German Cancer Research Center (DKFZ).

The DKFZ and 14 other research centers comprise the Helmholtz Association, whose 8000 scientists constitute Germany's biggest scientific workforce outside the university system. Federal and state research ministries spend about $1.5 billion a year on the centers, with grants bringing the total to about $2 billion. For 2 years, the Research Ministry has been negotiating with Helmholtz officials in an effort to wean the centers off block grants and instead fund program areas, from biomedical research to the structure of matter, spanning several centers. Germany's top scientific advisory body, the Science Council, outlined the concept of program-oriented research in a January report that drew on recommendations from a 14-member panel of German and international experts (*Science*, 26 January, p. 570). Bulmahn told *Science* that "the goal is, on one hand, to increase competition among the centers that work in similar research fields, and, on the other hand, to increase cooperation."

That's not how Krammer and other critics see it. They argue that the reorganization would cede too much control over research specifics to the ministry. A separate protest letter signed by Krammer and 40 other leading DKFZ scientists foresees mounting bureaucratic hurdles to doing science. Although he signed neither letter, DKFZ chair Harald zur Hausen says he fears that "the increasing bureaucracy linked with the present plans will have a negative impact on the quality of scientific research at the national research centers." Bulmahn's predecessor, Jürgen Rüttgers, told the *Süddeutsche Zeitung* newspaper last week that the Research Ministry "should not take the position that bureaucrats know better than the scientists." And Nobelist Günter Blobel, a German-born cell biologist at Rockefeller University in New York City, also blasted the plan in an interview in *Der Spiegel* magazine, saying that the concept reminds him of inflexible Soviet-style planning.

Bulmahn and a deputy minister, Uwe Thomas, counter that the proposed shift to program-oriented funding would breathe new life into the research centers by making the scientists compete for baseline funding. "I'm convinced that it would give centers more freedom and increase the quality of the research," says Thomas.

Caught in the middle is the Helmholtz leadership. "Science-driven, theme-oriented financing can be a positive development"—as long as the ministry agrees to longer term budgeting and gives centers the flexibility and freedom to develop projects within the main research categories, says Helmholtz chair Detlev Ganten, who heads the Max Delbrück Center for Molecular Medicine in Berlin. But Albrecht Wagner, scientific director of the DESY particle physics center in Hamburg, says: "I'm worried that the way the program-oriented funding is implemented might lead to a real loss in the

Freedom fighter. Peter Krammer fears a bureaucratic morass.

CREDITS: (TOP TO BOTTOM) R. KOENIG; GERMAN CANCER RESEARCH CENTER

flexibility needed to build and advance large international projects in Germany," such as the planned TESLA accelerator.

The dispute is likely to come to a boil next week, when the center directors are expected to take a position on the restructuring plan. Their stance will set the tone for a meeting on 25 May of the Helmholtz Senate, which includes representatives of the Research Ministry, the Science Council, and outside experts. Ganten predicts that both groups will ratify the overhaul, which would begin by changing the Helmholtz's legal status. In principle, individual centers could refuse to join the new entity, but the government could then assert its power to overrule any rebellious centers. Even so, some scientists are hoping to stop the juggernaut. Says DKFZ cell biologist Werner W. Franke: "We are fighting for the most precious thing we possess: the individual scientist's freedom of decision." –ROBERT KOENIG

With reporting by Richard Stone.

DRUG ADDICTION

Zapping Memory Center Triggers Drug Craving

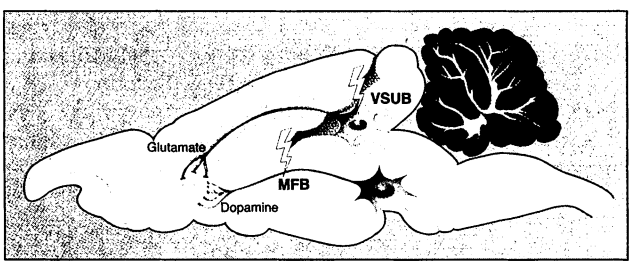
Stimulate a memory area of the brain in a rat that has kicked a cocaine habit, and the animal will desperately try to get another fix. In contrast, stimulation of the area that produces the high itself has little effect. Those findings, reported on page 1175 of this issue, show for the first time that the brain registers the high from cocaine in a separate place from where it retains the memory of, and craving for, the drug. The research opens up the possibility of new targets for anti-craving medications.

Attempts to develop new drugs to treat addiction usually focus on the brain's all-purpose "reward" area—a dopamine-rich pathway called the medial forebrain bundle in the rat. But in recent years, scientists have found indications that the reward function operates independently of craving for a drug. That's now been confirmed by the new study. "We have anatomically located the relapse circuits in the brain," says neuroscientist Stanislav Vorel of the Albert Einstein College of Medicine in New York City. And the main chemical implicated is not dopamine but glutamate, an excitatory neurotransmitter found throughout the brain.

The Einstein team, with Eliot Gardner of the National Institute on Drug Abuse (NIDA) in Baltimore, Maryland, first got rats hooked on cocaine by hitching them to intravenous catheters that delivered a dose of the drug every time they hit one of two levers in the cage. After establishing the rats' drug habit, the researchers made them go cold turkey by substituting a saline solution for the cocaine. Within a week, the rats stopped pressing the levers.

Human cocaine users who are trying to stay clean are often tempted to relapse by what psychologists call triggers, such as an emotion, a social situation, or a visual cue that brings back memories of being high. The researchers found that they could trigger an apparently analogous craving in the rats by juicing up part of their memory circuitry. When the researchers stimulated a glutamate-rich part of the hippocampus called the ventral subiculum, the rats furiously pressed the former cocaine lever for 5 minutes or so, apparently until it became clear that they weren't going to get a fix. Electrical stimulation of the reward center, in contrast, had no such effect, even though rats happily self-administer those jolts when given the opportunity.

Peter Kalivas of the Medical University of South Carolina in Charleston, who does research on how glutamate mediates drugs' effects on neural plasticity, says, "What makes this a wonderful model of craving is that it can trigger craving even with no drug present." He notes that although electrical stimulation of either brain area leads to dopamine release, it's "only when the signal originates in the hippocampus that it triggers the memory that is integral to craving."



Relapse circuit. Stimulation of the ventral subiculum (VSUB), but not the medial forebrain bundle (MFB), spurs drug hunger.

NIDA director Alan Leshner says this experiment adds to a picture that has become clearer over the past decade: that addiction entails two separate processes. One is "passive neuroadaptation"—that is, changes in circuitry that are the direct result of drug-taking; the other is "the laying down of memory traces," which occurs at a higher level of the limbic system, namely the hippocampus.

"A lot of people say the whole thing is dopamine," says Leshner. But in the search for medications to stem drug craving, he points out, substances targeted at glutamate may be more likely to get to the root of the matter.

–CONSTANCE HOLDEN

ILLUSTRATION: MODIFIED FROM S. R. VOREL AND WILLIAM PAREDES

ScienceScope

New Face France's science ministry has chosen a new research director. The government last week named Ketty Schwartz, a geneticist who specializes in the molecular biology of heart diseases, to replace geophysicist Vincent Courtillot, who is returning to his Paris laboratory (*Science*, 5 January, p. 27).

Schwartz told *Science* that it is "too early" to outline her agenda. But the appointment of a biomedical scientist, she says, is in line with the "accent and priority" that research minister Roger-Gérard Schwartzenberg has put on beefing up life sciences research. Courtillot says that Schwartz's biggest challenges will include boosting research at universities—which lag behind France's public research agencies—and increasing the number of scholarships for doctoral students.

Big Gift Malaria research is getting a charitable boost. Johns Hopkins University in Baltimore, Maryland, this week announced that an anonymous donor has given it $100 million to fund a new research center aimed at developing malaria drugs and vaccines. The school will use the money over the next decade to recruit a dozen top scientists from fields including bioinformatics and immunology and to build facilities. The cash infusion is "wonderful," says Myron Levine of the University of Maryland's Center for Vaccine Development in Baltimore. "Malaria research has been starving for serious funds."

On the Dole A coalition of animal-rights groups aiming to expand government regulation of laboratory mice, rats, and birds has recruited a high-profile ally: former Republican politician Bob Dole, who as a senator helped write portions of the federal Animal Welfare Act (AWA), which sets animal care rules.

Biomedical groups fighting the new rules—which are currently blocked by Congress (*Science*, 4 May, p. 830)—have argued that the law doesn't cover rodents. But in his letter, printed as an advertisement from the Working Group to Preserve the AWA in the Washington newspaper *Roll Call*, Dole calls the claim "preposterous.... We certainly did not intend to exclude [from regulation] 95 percent of the animals used in biomedical research." The letter is sure to be discussed at a 2-day National Academy of Sciences workshop on the issue set to start 21 May in Washington.

Contributors: David Malakoff, Eliot Marshall, Andrew Lawler, Michael Balter, R. John Davenport