

"How can [NRC] justify \$186,300—which is what my bill would be for three years—for just one week of inspector time on my site?" Poston asks.

NRC spokesman Frank Ingram responds that the fee is not meant to represent actual inspection costs. Commercial power reactors pay additional inspection fees on top of an annual fee, he notes. Why do all university reactors pay the same fee? "That seems to be the most equitable way to do it, because there isn't that much difference in size among [university reactors]," Ingram says.

With a budget of less than \$15,000 a year, Poston's reactor will not survive NRC's new fee schedule. But shutting it down will not come cheap. While Poston can avoid NRC's bills by shutting down the reactor and taking a possession-only license on it, he notes that "you can only stay in this mode for two years before NRC forces you to [dismantle] it." And that, he estimates, will probably cost between \$500,000 and \$1 million.

Finally, NRC's new fees aren't restricted to university reactors. Last week, many

universities got bills for licenses on "special nuclear material"—neutron sources and uranium—and for "by-product materials," the radioisotopes used in biology, medicine, and other fields.

MIT's bill for special nuclear materials totaled \$187,000—almost entirely for material in dead storage. "The irony," Bernard says, "is that we have been trying to return most of this material to its owner—the U.S. Department of Energy—for over a decade, but have been unable to do so because of various regulations." Even MIT's bill for by-product materials is high: \$28,500.

These additional fees will hit a host of universities without reactors, Bernard notes. For instance, any using uranium foils or neutron sources in physics laboratories will be subject to a fee.

Hoping to eliminate the new fees altogether, TRTR members are seeking support from a number of scientific groups. But "the real source of relief here must come from congressional action," Mayer says, "because NRC is after all responding to a congressional mandate." —*J. Raloff*

## Weighing the causes of severe depression

Scientists have taken an initial step toward identifying the ways in which genes and specific personal experiences jointly act to produce severe depression in women.

Although genes assume a high profile in much recent research on mental illness, the new study finds they exert "a substantial but not overwhelming" influence on episodes of severe depression, assert Kenneth S. Kendler, a psychiatrist at the Medical College of Virginia in Richmond, and his co-workers. Stressful personal events, such as getting divorced, losing a job, or developing a serious illness act as the strongest instigators of depression, the researchers contend.

Their results appear in the August AMERICAN JOURNAL OF PSYCHIATRY.

"Kendler and his colleagues have moved the field ahead by taking the time and care to study a large sample with prospective measurement of several putative risk factors [for depression]," writes C. Robert Cloninger, a psychiatrist at Washington University School of Medicine in St. Louis, in an accompanying editorial.

Kendler's team studied 416 identical and 264 fraternal female twin pairs located through a state twin registry in Virginia. Both members of each pair had lived in the same household through age 16. Participants averaged about 30 years of age.

At an initial assessment, each twin filled out questionnaires on the warmth and support offered by her parents, traumas she had endured during her life (such as sexual assault and life-threatening injury), neuroticism (a measure of anxiety and the quality of life), social support (from family, friends, and

others), and prior bouts of severe depression lasting two weeks or more.

At follow-up interviews conducted about 14 months later, each woman reported any instances of depression in the previous year, childhood separations from parents of more than one year, recent interpersonal, financial, and health difficulties, and stressful events in the past three months. Around 17 months later, the women again were asked to cite new episodes of depression and recent stressful events.

Nearly one-third of the sample reported an instance of severe depression at some time in their lives. In the more than two years of follow-up, about 16 percent of the women cited one or more new episodes of severe depression.

New instances of depression occurred more often among both identical twins, who share the same genes, than among both fraternal twins, who share about half the same genes. A woman's genetic risk for depression, signaled by a history of depression in a twin sibling, more strongly predicted future instances of depression than did the genetic risk combined with other factors studied.

This finding indicates that genes boosting the likelihood of getting depressed may largely do so through a direct effect on the brain that remains active during adulthood, rather than by fostering personality traits or behavioral tendencies that lead to depression, the researchers argue.

Recent stressful events showed the strongest direct association with new cases of severe depression. Genes may, to a small degree, influence personality

## Mars: Prelude to an orbit



NASA

*Coasting through space, the Mars Observer snapped this image of the Red Planet on July 28 to test its high-resolution, narrow-angle camera.*

*Despite dim light and an intervening distance of some 3.6 million miles, the photograph reveals glimmers of bright and dark markings etched by dust and sand. In the dark center, above the sunrise line, lie the volcanic plains and vast sand dunes of Syrtis Major. The bright area of the northern polar cap halos the top of the planet.*

*The Mars Observer will enter orbit, 248 miles above the Martian surface, on Aug. 24 (see p. 104). Once in orbit, the spacecraft will send back detailed pictures of geologic features such as the polar ice cap, where layers of dust surround icy deposits. These deposits "may reflect a much more arid period of Mars' past," says Bevan M. French, program scientist for the Mars Observer mission at NASA headquarters in Washington, D.C.*

*The new images will help scientists attain one of the mission's major objectives: an understanding of the climate of Mars, French says. The high-resolution camera will be able to discern objects as small as 1.4 meters across—about 20,000 times greater detail than that captured in the image shown here.*

characteristics that cause some people to encounter more traumatic events, according to Kendler and his co-workers.

Taken together, the various risk factors in the study accounted for half of each twin's susceptibility to severe depression, they conclude.

Further research must consider other possible influences, such as marital status and history of other mental disorders, the researchers maintain.

Untested assumptions by the researchers about cause and effect still muddy the meaning of the new data, Cloninger adds. For example, some recent stressful life events may result from, rather than contribute to, depression. —*B. Bower*