barrier and must therefore be injected directly into the brain.

With first-generation drugs falling short, researchers are racing to identify new compounds. Prusiner and his UCSF colleagues plan to screen thousands of quinacrine analogs over the next several years for more potent derivatives. Others are trying to parlay the current explosion of knowledge about prion biology into new treatments. The approaches on display at the meeting included methods to prevent the conversion of the normal prion protein into its misshapen form, ways to nudge the immune system into fighting prions (an approach once thought impossible because of people's natural tolerance to the normal prion protein), and strategies to interrupt the life cycle of prions in cells.

In one such study, Corinne Lasmézas, a researcher with the French Atomic Energy Commission in Fontenay-aux-Roses, and her colleague Stefan Weiss of the Gene Center in Munich targeted a receptor that interacts with the normal prion protein while it's on the cell surface and that may be involved in its conversion to the misshapen form. When the researchers blocked the receptor's expression in infected cells, there was a striking reduction in the number of malformed prions.

Although most of the therapeutic strategies described at the meeting aim to rein in the infectious prion particles, some researchers are seeking ways to repair the structural damage to the brain that causes the disease's symptoms. In one presentation, Janet Fraser of the Institute for Animal Health in Edinburgh, U.K., reported that stem- or fetal-cell transplants can colonize damaged areas of the brain and restore some lost tissue in experimental animals.

Intercepting the disease well before it eats away at the brain, however, would open up the most treatment options. Many people at the meeting emphasized the dire need for diagnostic tools that would permit widespread screening for carriers of the infectious agent. Such tools would signal who should receive compounds—perhaps including quinacrine—that might prevent prions from spreading within the brain, or even from reaching the central nervous system in the first place.

–PETER FOLLETTE

Peter Follette is a writer in Ville d'Avray, France.

Meeting International Society for Intelligence Research

The Practical Benefits of General Intelligence

NASHVILLE, TENNESSEE—About 60 psychologists, cognitive scientists, and psychometricians gathered here last month for the society's third annual meeting.

Many applied psychologists still regard the intelligence quotient (IQ) test as their field's crowning achievement. But the test has been taking a public battering for the past few decades; it's often denigrated as measuring little more than test-taking ability. Various efforts have been made to supplant the test with better measures of creativity, practical abilities, or street smarts. But at the meeting, the assembled researchers defended IQ. No instrument has yet been devised, they argue, that can outdo classic IQ tests in predicting school and job performance.

The basis of the predictive power of IQ tests, psychometricians posit, is that they measure "g"—for "general intelligence factor"—an ability to manipulate information that underlies skills such as learning and problem solving. Although the tests come clothed in words and concepts that require cultural learning, psychometricians argue that they in fact measure something deeper. For example, researchers point to the fact that IQ scores correlate with performance on nonverbal (and thus, theoretically, less culturally loaded) tests such as Raven's Progressive Matrices, which involves discriminating among geometric figures.

But how important is g? That's long been a matter of debate among psychologists, some of whom argue that it's relevant only to academic skills and not to many real-world activities, whereas others say that it is directly relevant to life outside of work or school.

Sociologist Linda Gottfredson of the University of Delaware, Newark, presented two papers arguing that g is a useful predictor of how well an individual copes in most areas of life. "IQ scores predict a wider range of important social outcomes than perhaps any other psychological trait; … bright people have a tail wind in virtually all aspects of life," says Gottfredson. Because the g abilities—including learning, reasoning, and problem solving—are relevant in every sphere, she says, life can be viewed as "one long mental-test battery."

Image not available for online use.

Health care is a prime example, Gottfredson says. According to a test of health literacy, more than 40% of the population in one study could not, for example, understand directions about taking medicine on an empty stomach, and 60% could not understand a basic consent form. People at this level of comprehension "experience much higher health costs, poorer health, and more frequent hospitalization," Gottfredson reported. The reason, she claims, is low g, as measured by the health-literacy test. The test retains its predictive power even after controlling for education and social class, she says.

People who score poorly on IQ tests also have more accidents, Gottfredson points out (see table). Remarkably, she says, "the only accidental death not correlated with lower g is death in a private plane."

Health-care providers should give low scorers more support, says Gottfredson, adding that "patients are loath to let people know they don't understand or can't read." To deal more effectively with all patients, she says, "we might develop simple psychometric measures to help service providers unobtrusively assess people's capabilities for self-care." There are many areas, from drug labeling to health insurance, where unnecessary complexity could be reduced, according to Gottfredson. Such measures could help service providers adjust their help in accord with clients' "cognitive complexity," or g.

The message that g has direct bearing on quality of life was supported by reports from two other researchers. Jody Hendrix, a graduate student at the University of Texas, Austin, used data from the 1998 National Longitudinal Study of Youth to look at the well-being of 466 children from homes deemed high risk (that is, poor and fatherless). Some children, she found, were "resilient," which she defined as showing no signs of depression, delinquency, or school failure. In her study, the 160 most resilient chil-

MOTOR VEHICLE FATALITIES
(FROM STUDY OF AUSTRALIAN VETERANS UNDER 40)

IQ	Death rate per 10,000
>115	51.3
100–115	51.5
85–99	92.2
80–84	146.7

CREDIT: CORBIS; (TABLE SOURCE) BRIAN I. O'TOOLE, *ACCIDENT ANALYSIS AND PREVENTION* **22** (3), 211 (1990)

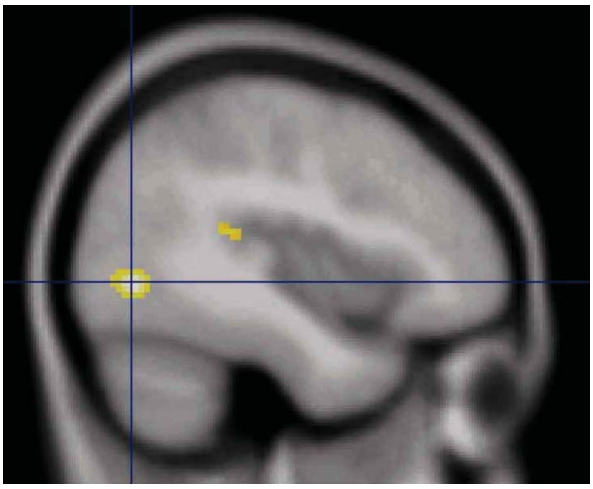
dren tended to have the highest IQs at age 8 or 9, and the low-IQ children were among the least resilient.

Resilience also seems to be linked to IQ at the other end of life, reported Ian Deary of the University of Edinburgh, U.K. He has been studying a group of 80-year-olds for whom he has childhood IQ records. The high scorers, he found, are the most successful in terms of health, longevity, and daily functioning. High g, sums up Gottfredson, is the ability to "simply live a less error-plagued existence."

Physiology of IQ

High-IQ people use less brain energy than do low-scoring peers when performing a mental task, according to a report 12 years ago by positron emission tomography (PET)–scan imager Richard Haier of the University of California, Irvine. He later found that people expend less brain energy on a computer game after they've learned it—a phenomenon that was more pronounced in those who score well on IQ tests. Now, he's found that high- and low-IQ people also differ when they're doing something that requires little mental effort: watching videos.

Twenty-two volunteers were divided into two groups based on how well they performed on the Raven's geometric shape test. Each was scanned by PET twice—while watching an emotional video and a boring video. Each person's test score was matched with patterns of brain activation during the videos. In the high-IQ group, Haier found a correlation between an area in the back of the brain involved in processing vision and language and an attention area in the frontal lobe, but he did not see the correlation in the low-IQ group.



Busy brains. Unlike low scorers on a spatial test, high scorers show a correlation between activity in a visual area (cross-hairs) and activity in the frontal lobe.

Haier says the findings, in press in *Intelligence*, suggest that the higher scorers are involved in more "active processing" of the material. "We believe this is evidence that smart brains work differently, even when there is no reasoning task," he concludes.

John Gabrieli of Stanford University, who does imaging studies of cognitive processes, says Haier's result is "entirely reasonable," in view of what's known from human and animal brain studies. Gabrieli explains that there's good evidence that the frontal cortex, the seat of the brain's more complex functions, has a big role in choosing what brain regions are activated in the posterior cortex. Therefore, he suggests, it's possible that "people who are better at quick, flexible thinking" show more "tight orchestration" between the two parts of the brain.

–CONSTANCE HOLDEN

Biomedical Policy

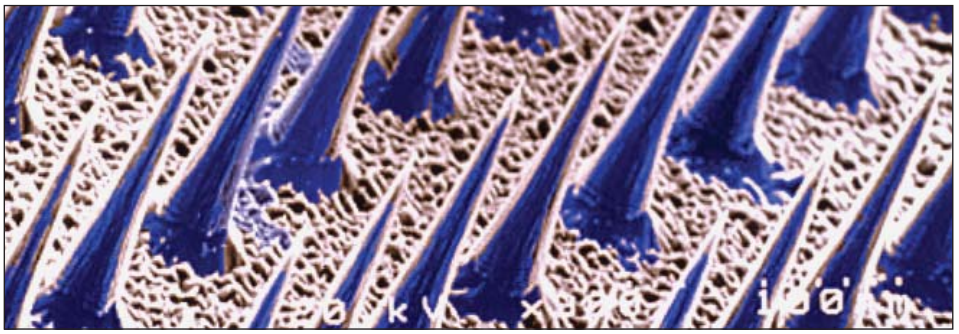
Shrugging Off Doubters, NIH Launches a New Institute

As the imaging and bioengineering institute builds its portfolio, some researchers worry that their projects could get lost in the shuffle

It's never easy being the new kid on the block, as the new National Institute for Biomedical Imaging and Bioengineering (NIBIB) is discovering. Congress created this latest addition to the National Institutes of Health (NIH) 2 years ago, despite arguments that it would balkanize research on NIH's campus in Bethesda, Maryland. Now it is ready to join the club: It got a permanent director last fall, and its first advisory board is meeting next week. But NIBIB is still struggling to win over critics, define its priorities, and reassure jittery scientists that their grants won't fall in the cracks between institutes.

NIBIB's mission is to do technology-based research not specific to an organ or disease. To launch it with a respectable budget, lawmakers last year instructed NIH to transfer extramural grants from other institutes. However, some don't fit NIBIB's mission, according to officials at some NIH institutes, who worry that the resulting problems might take years to correct.

NIBIB's leaders brush aside such concerns. Deputy director Donna Dean says it's painful for program managers at other institutes to release grants, but no worthy projects will go unfunded. She notes that NIBIB has already expanded the field, supporting new research in areas from biosensors to small-animal imaging that wouldn't fit comfortably in NIH's other institutes. Its budget could more than double this year, to $283 million, if Congress approves a proposal that passed the Senate. NIBIB's new director, Roderic Pettigrew, a radiologist from Emory University in Atlanta, says NIBIB's goal is straightforward: "optimizing the positive impact that technology can have on the nation's health-care agenda." But doing that without stepping on the toes of other insti-



Sharper image. Bioengineering projects such as this one, using a patch of needles thinner than a human hair to deliver drugs, will be in NIBIB's portfolio.

CREDITS: (TOP TO BOTTOM) R. HAIER; M. PRAUSNITZ GROUP/GEORGIA TECH