Thinking too much might not be smart

Figures of speech describing the process of problem-solving often use energy-intensive imagery in which our brains are kept busy "cranking out answers," "grinding away at problems" and "crunching numbers." But new research suggests that mental performance need not be so trying.

Richard Haier of the University of California at Irvine has preliminary data showing a relationship between higher scores on intelligence tests and lower rates of metabolism in the brain's cortical areas. One interpretation of the research, he says, is that people who perform better on intelligence tests may have more energy-efficient neural circuitry.

Haier had his subjects perform the Raven's Advanced Progressive Matrices test, a difficult, standardized, nonverbal test of abstract reasoning, while he performed positron emission tomography (PET) scans on their brains. The test requires that subjects recognize a pattern within a matrix of abstract designs and then select another design that completes the pattern. PET scans allow direct measurement of brain function by graphically depicting areas with higher glucose metabolism.

"Although one might assume that a good performer's brain would 'work harder' than that of a subject who did poorly," says Haier, "our data suggest that the opposite is true."

Babies or barbells: Make your choice

Strenuous exercise, especially when accompanied by unusual diets or substantial weight loss, has been known to upset hormonal control of reproduction in humans. Recent research is helping to explain the nature of these troublesome imbalances, which can delay the onset of menstruation, and is suggesting a few possible benefits as well.

David C. Cumming of the University of Alberta in Edmonton reports that exercise can change the pattern of hormonal pulses that normally initiates a menstrual cycle. Normally, gonadotropin-releasing hormone is released from the brain in pulses every 90 to 120 minutes, causing a similarly pulsed release of luteinizing hormone (LH) from the pituitary. The frequency and amplitude of these pulses are decreased in some women athletes, especially after exercise, causing amenorrhea or lack of menstrual periods. Moreover, many women athletes who do menstruate nevertheless fail to ovulate and so cannot become pregnant.

Although exercise-induced amenorrhea is usually reversible, other medical consequences of these changes may be more significant, Cumming says. For example, amenorrheic women tend to gradually lose bone mass. Cumming says amenorrheics in their 20s and 30s, who should be building up to their peak bone mass, may be at greater risk for osteoporosis, a degenerative bone disease, later in life.

But according to Rose E. Frisch of the Harvard School of Public Health in Boston, exercise-induced suppression of the reproductive system may have benefits, too. Studies by Frisch and her colleagues show that women who were athletes in college have half the rate of breast cancer and less than half the rate of reproductive system cancers compared with women who were not athletes. Lower hormone levels have in the past been associated with lower rates of cancer, and Frisch hypothesizes that the latest observations can be explained by the lower estrogen levels found in women who exercise more.

In the distant past, she says, such a mechanism might have had survival advantages by preventing pregnancy during strenuous times, such as when a tribe was moving to a new area. She suggests that the relative lack of exercise in modern life may be contributing to a gradual trend toward earlier onset of menstruation. Girls today begin menstruating three years younger than their counterparts did 100 years ago.

Bridge-to-transplant given good marks

With thousands of heart transplants now being performed worldwide, medical personnel in a hospital's cardiac unit frequently find themselves buying time while searching for an appropriate donor heart for transplant. Because the hours and days often needed to locate a well-matched heart can literally mean the difference between life and death, researchers have been studying artificial hearts as potential bridge-to-transplant devices—keeping patients alive until donor hearts arrive. The bridge-to-transplant concept has had its controversies and problems, as the target of criticism that the mechanical devices lead hospitals to waste scarce donor hearts on patients too sick to benefit from transplantation (SN: 1/4/86, p.4). Those concerns may be misplaced, according to a new study.

After using mechanical devices to pump blood in 21 patients who later received a donor heart, researchers at several medical centers in the United States conclude in the Feb. 11 New England Journal of Medicine that such "bridges" are both safe and effective. Led by David J. Farrar and J. Donald Hill of Pacific Presbyterian Medical Center in San Francisco, the researchers say that, at the time of the report, 19 of the 21 heart recipients were still alive seven to 39 months after their transplant. Eleven of the original 12 had survived at least one year. Thus far, say the authors, these survival rates are comparable to or better than those seen in transplant patients not receiving the so-called ventricular assist device. One risk anticipated by the scientists—that of serious infection due to inserted tubing—was not a life-threatening problem with the device used, although patients were on support from eight hours to 31 days before transplant, Hill told Science News. He says more recent data continue to support observations that more than 80 percent of bridge-to-transplant patients should survive a year and longer. Since the current report was compiled, a total of 57 patients have been put on the pump, with 46 eventually receiving hearts.

The authors caution that the decision to use assist devices be made carefully, however. At an average age of 36, the patients were relatively young and considered healthy enough to withstand necessary surgery. In addition to the 21 patients in the study given hearts, eight others placed on the pump had not been stable enough to receive a heart and later died.

Two for AIDS: New drug and new patent

• Federal officials announced last week that the anti-cancer drug trimetrexate has been approved for limited use in treating *Pneumocystis carinii* pneumonia, a serious infection often associated with AIDS. It is the first AIDS-related drug to be approved under the Food and Drug Administration's drug evaluation process called treatment IND (investigational new drug), an accelerated procedure adopted last year to provide experimental drugs to patients with life-threatening diseases (SN: 3/21/87, p. 189). Because of its toxicity, trimetrexate must be given with the drug leucovorin, which protects cells from trimetrexate exposure. Although drugs against the infection are already available, researchers have considered trimetrexate a less toxic or more effective alternative if used in conjunction with leucovorin.

• In a decision that could mean big bucks and have wide-reaching effects in AIDS research, Harvard University was granted a patent last week for commercial use of the protein gp120, found in the wall of the AIDS virus. Although gp120 is a naturally occurring substance, its isolation in 1984 by Harvard scientists made it patentable under current laws. Many of the tests and vaccines for AIDS now being developed by researchers depend on gp120 as part of the development process. The patent, however, does not extend to the use of gp120 for research-only purposes.