

Male-female brain anatomy may differ

An age-old debate about both the existence and source of a possible difference in intellectual ability between men and women may be ignited again by the first reported discovery of an anatomical difference between the human male and female brain.

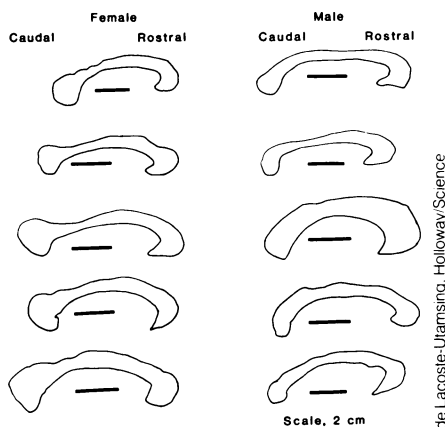
Christine de Lacoste-Utamsing of the University of Texas Health Science Center and Ralph Holloway of Columbia University report in the June 25 *SCIENCE* that they found "a sex difference in the shape and surface area of the human corpus callosum." The corpus callosum is a large bundle of nerve fibers connecting the two cerebral hemispheres. It is not the only connection, but it is the most important one — making possible communication and coordination between the two hemispheres, each of which receives information from and controls activity in opposite sides of the body.

Fourteen "normal" brains (five female, nine male) were examined by the researchers, who then took Kodachrome slides of their center sections, projecting and magnifying them onto a glass table so that the corpus callosa could be drawn. In addition to this "gross morphological examination," they measured the total length of the callosa and the width and surface areas of their various parts.

Where they found a difference was in the splenium, the caudal or posterior portion of the corpus callosum. "The female splenium is bulbous and widens markedly with respect to the body of the callosum," de Lacoste-Utamsing and Holloway report. "In contrast, the male counterpart is approximately cylindrical and is relatively continuous in width with the body of the corpus callosum."

This is "a significant study that should stimulate more research," says Richard Restak, a neurologist at Georgetown University Medical School and author of *The Brain: The Last Frontier* (Doubleday, 1979). "I'm not aware of any morphological sex differences [in the human brain that have been] found before this." He adds, however, that the sample size is very small and that the work should be repeated with many more subjects. De Lacoste-Utamsing and Holloway, currently out of the country and unavailable for comment, write in *SCIENCE* that they, too, believe the results "need to be replicated with a larger sample size." The problem with that, says Restak, is that this kind of work is controversial and difficult to get funded.

The controversy springs from the possible significance of the finding about which de Lacoste-Utamsing and Holloway say they can now only "speculate." They suggest, however, that a larger splenium in women may mean there are more nerve fibers connecting the two brain hemi-



Sexual dimorphism in the corpus callosum. Female splenium (left) is larger and more bulbous than its male counterpart.

spheres than in men. In that case, they suggest, their finding could support the hypothesis that the female brain is less "lateralized" — divided into separate right and left brain functions — than the male's. An assumption accompanying this hypothesis is that because the female brain hemispheres are more closely connected, they are less specialized — particularly for abstract spatial tasks, such as mathematics.

"A number of behavioral and other studies have indicated less lateralization in the female brain," Restak told *SCIENCE NEWS*. In addition, "studies show that men are better [than women] at tasks involving the ability to visualize in space." But the relationship between these observations remains unclear, he says.

If future research confirms the lateralization hypothesis, what does that mean for male-female intellectual ability? "It doesn't necessarily indicate any difference in intellectual function," says Florence Denmark, professor of psychology at Hunter College and the City University of New York. Evenness of function does not have to be accompanied by decreased ability of either hemisphere, she adds — in fact, less lateralization could be better. "Specialization is great," says Restak, "but it carries a great price. If the system is damaged in some way, it's finished." He cites examples of many men who never recover the ability to speak after stroke-caused damage to the speech center of the brain, while many women do recover that ability within a year. In women, the other side of the brain can often take over the job.

"Very few abilities are wired in from birth," says Anne Petersen, a psychologist who has studied sex differences in cognition at the Michael Reese Medical Center and University of Chicago. "Even if we discover that [anatomical] differences like this indicate a biological predisposition [for some abstract spatial tasks], that predisposition is overemphasized by sexual stereotyping in our culture." —*L. Tangley*

Cancer and nutrition: A stronger link

Americans with a penchant for vegetables and citrus fruits and who eat less-fatty foods may have a reduced risk of developing cancer, according to a report issued last week by a committee of the National Academy of Sciences' National Research Council in Washington, D.C.

The committee, composed of 13 scientists and nutrition experts, said research indicates most common cancers can be prevented by following certain dietary guidelines:

- Reduce both saturated and unsaturated fat consumption. For the average American this means selecting leaner cuts of meat, trimming visible fat from meat, choosing low-fat milk products and using smaller amounts of cooking oils and fats. Fats should be reduced to about 30 percent of daily calories.
- Eat less salt-cured and smoked food, including bacon, sausage, smoked fish and ham. According to the report, these foods may be contaminated with a chemical used in processing that causes cancer in animals.
- Eat fruits and vegetables and whole-grain foods each day. The committee found that fruits and vegetables high in vitamins A and C helped protect the body against cancer (*SN*: 3/13/76, p. 165). Such foods include oranges, grapefruit, carrots, tomatoes, broccoli, cauliflower, cabbage, winter squash and dark-green vegetables.
- Drink, at the most, moderate amounts of alcohol. While the committee did not define moderate, the results they reviewed show that smokers who drink are at a particular risk of developing cancers of the mouth, larynx and esophagus.

The committee's admonition concerning fat is drawn from studies that show that people with high-fat diets have an increased rate of gastrointestinal, prostate and breast cancer. Scientists don't know why fat increases cancer risk, but they do know that when a person eats particularly greasy french fries, for example, the gall bladder releases bile acids and steroids that have been associated with cancerous tumors in laboratory animals.

High vitamin C foods associated with low stomach cancer rates may protect the body from cancer, scientists believe, because vitamin C blocks a reaction in which nitrosamine, a known carcinogen, is formed.

According to committee member Joan D. Gussow, chairperson of the department of nutrition at Columbia University in New York, vitamin C research focused on populations that consumed lots of fresh citrus fruits; scientists still don't know if processed citrus foods such as frozen, concentrated orange juice will give the same cancer-protecting results.

—*K.A. Fackelmann*