

How hypertension affects memory

People suffering from mild hypertension often lag behind those with normal blood pressure on several general tests of memory and learning. But scientists have yet to pin down the specific components of memory that prove most sensitive to elevated blood pressure.

A new study suggests that the memory deficits displayed by hypertensives revolve around tasks requiring speedy mental manipulations and retrieval of just-learned information. The scores of hypertensives on such tests do not necessarily reflect any problems in performing routine daily activities, but the statistically strong disparity between hypertensives and controls with normal blood pressure cannot be attributed to differences in age, education, or psychological health, according to James A. Blumenthal, a psychologist at Duke University Medical Center in Durham, N.C., and his colleagues.

Blumenthal's group recruited 100 white adults ranging in age from 29 to 59 years old. Of that number, 68 met the criterion for hypertension, defined as blood pressure between 140/90 millimeters of mercury (mm Hg) and 180/105 mm Hg. The remaining volunteers displayed normal blood pressure readings, averaging 111/72 mm Hg.

Participants completed eight tests that, the researchers assert, encompass three dimensions of memory: rapid information processing and recall of just-learned material, verbal memory, and memory for shapes. Hypertensives performed more poorly than controls only on measures tapping into the first dimension. Blumenthal and his associates contend in the January-February *PSYCHOSOMATIC MEDICINE*.

For instance, immediately after studying either two, four, or six digits shown on a video screen, hypertensives took longer to indicate whether a single digit presented later on the screen had been part of the original set. They also required more time to draw a line connecting a series of letters and numbers in sequence (1-A, 2-B, and so on).

The ways in which sustained hypertension may alter brain function and thus subtly interfere with mental activity remain unknown, the researchers note.

Pregnancy troubles, before and after

Greater numbers of women are bearing healthy infants following premature labor and other severe physical complications of pregnancy. Many pediatricians believe that whatever worries a new mother develops during such an ordeal will evaporate in the warmth of her new baby's smile.

However, a study described in the March *PEDIATRICS* suggests that women who endure troubled pregnancies face an increased likelihood of getting depressed shortly after giving birth and of becoming overprotective of their children in response to nagging fears that the youngsters remain prone to all sorts of health problems.

JoAnne Burger, a pediatrician at Yale University School of Medicine, and her co-workers interviewed 1,095 mothers of children age 4 to 8. Each participant reported any pregnancy complications and periods of two or more continuous weeks of sadness and other symptoms of depression that occurred within three months after delivery. Mothers also offered perceptions of their currently healthy children's physical vulnerability, such as how often they kept their child indoors because of health reasons or thought of calling a physician for their child.

About 17 percent of mothers with serious pregnancy complications viewed their children as highly vulnerable, compared with 9 percent of women without problem pregnancies. And 27 percent of the former group reported depression following delivery, compared with 11 percent of those who had not experienced pregnancy complications, Burger's group reports.

Nuclear leftovers: Waste not, want not

Legal and safety disputes have logjammed federal programs to create repositories for the permanent internment of long-lived radioactive wastes. What's a nuclear power plant owner or bomb maker to do while debate over the placement of these "hot" discards drags on?

Consider squashing or "burning" wastes, suggest researchers at two Department of Energy (DOE) facilities.

On Feb. 22, technicians began flattening wastes at DOE's Rocky Flats plant, a former nuclear-weapons facility outside Golden, Colo. Conceptually similar to a kitchen compactor, Rocky Flats' 44-ton trash smasher drives a piston with 2,200 tons of compaction force down upon 35-gallon drums containing plastic, glass, and metal wastes. Resulting "pucks" may take up as little as one-fifth of the waste's initial volume. That's a dramatic reduction for a plant like Rocky Flats, which has enough plutonium-laced wastes to fill 3,000 55-gallon drums.

"[This] supercompactor could save the taxpayers millions of dollars in future disposal costs by reducing the total volume of waste," notes Bob Nelson, who manages DOE's Rocky Flats Office.

Argonne (Ill.) National Laboratory is exploring a higher tech solution: recycling long-lived wastes as fuel for a new breed of "inherently safe" reactors (SN: 1/26/85, p.60). In a reactor, some neutrons liberated by fissioning uranium are absorbed by other uranium atoms, transmuting them into heavier elements known as actinides. Because today's commercial reactors cannot "burn" actinides efficiently, these heavy elements accumulate as long-lived wastes — isotopes with half-lives measured in thousands to millions of years. But in Argonne's experimental Integral Fast Reactor (IFR), "we can effectively destroy them," notes IFR project manager Yoon I. Chang.

Having demonstrated a technology for extracting actinides from IFR wastes, Chang says, his team must now prove that recycled actinides will fission efficiently. Late last month, they launched a two-year experiment to test just that by placing a small quantity of the actinides americium and neptunium into a fuel bundle that they inserted in an IFR-type reactor core.

If successful, says Charles E. Till, also at Argonne, this experiment "will be the equivalent of burning nuclear garbage." Though his team has thus far demonstrated the ability to recycle actinides from IFR fuels only, Chang says a spin-off program is under way to adapt this technology to the efficient extraction of actinides from commercial reactor wastes.

The cost of idle computers

While most computers don't draw much power, these electronic marvels collectively account for an estimated 5 percent of commercial U.S. electricity consumption and represent the fastest growing sector of commercial electrical demand. Moreover, "the vast majority of time the nation's 30 million to 35 million personal computers are turned on, they are not actively in use — and 30 to 40 percent are left running at night and on weekends," notes Brian J. Johnson in Washington, D.C. Johnson manages a new Environmental Protection Agency program aimed at promoting more efficient computing.

To date, 28 manufacturers of computers and monitors, seven makers of printers, and 16 companies producing software and hardware components have voluntarily signed onto this program. Its goal: new systems that reduce the power drawn by an idling computer or monitor to 30 watts or less — typically up to half its normal consumption. Together with other strategies for increasing computational efficiency, this program aims by the year 2000 to cut computer energy consumption by nearly 40 percent. That in itself would reduce emissions of carbon dioxide, the leading greenhouse gas, by 20 million tons — or the equivalent of 5 million automobiles, says Johnson.