Treatment Reduces Deaths from Hypertension

New study shows dramatic effects of treating even those with mild hypertension

For the past 10 years, doctors have based their treatment of patients with high blood pressure on the results of a clinical trial sponsored by the Veterans Administration (VA) and directed by Edward Freis. The trial showed dramatically that antihypertension drugs can prevent deaths from strokes, congestive heart failure, and kidney disease.

But the VA trial involved only middle-aged and elderly men, so it was not clear whether its results could be extended to the general population. And it did not answer the question of whether the drugs are worthwhile for patients with mild, or borderline, hypertension.

In 1972, the National Heart, Lung and Blood Institute (NHLBI) began a $60-million to $70-million clinical trial to take up where the VA one left off. The trial, known as the Hypertension Detection and Follow-up Program (HDFP), is now complete and the results surpass its director's best aspirations. The results of the HDFP provide the first evidence that it pays to treat people with borderline hypertension, defined as blood pressure between 140/90 and 160/95. They also show that lowering blood pressure can prevent heart attacks in both borderline hypertensives and those with definite hypertension, defined as blood pressure greater than 160/95. And they are the first direct evidence that treatment is worthwhile for blacks, women, and younger people.

"Even we were surprised at how good the results were," says Robert Levy, director of the NHLBI. At a recent press conference, the trial's administrators exuberantly produced bar graph after bar graph illustrating their findings. Afterwards, Jeremiah Stamler of Northwestern University Medical School, a vice-chairman of the study's steering committee, told *Science*, "It's a pleasure to be associated with a winning study."

The study's conclusions can have a major effect on health care in this country. High blood pressure is the most prevalent of the major diseases. Thirty-five million Americans, or one in every six people have definite hypertension. Twenty-five million more have borderline hypertension. The disease is a major contributing factor to strokes and heart attacks as well as being disabling in its own right. It is estimated to cost the nation more than $8 billion a year in medical costs, lost productivity, and lost wages.

The HDFP was designed so as not to deny anyone the proved benefits of antihypertension drugs. For that reason, no one was given a placebo. The study's 11,000 participants, who consisted of nearly equal numbers of blacks and whites and of women and men, were randomly divided into two groups. One group was sent to special clinics, where they were given free drugs, encouragement to comply with their treatment, and frequent checkups. Those in the other group were referred to their personal doctors for medical care.

The HDFP led to the following conclusions:

- Patients with borderline hypertension who were assigned to the special clinics had a 20 percent lower mortality rate from all causes than those referred to their doctors for care.
- The mortality rate for the special clinic group as a whole was 17 percent lower than that for the group referred to their own doctors.
- Blacks referred to the special clinics showed a 22.4 percent reduction in mortality compared to the other blacks in the study. Whites referred to the clinics had 10 percent fewer deaths than the other whites. Blacks are far more likely than whites to get high blood pressure and far less likely to be treated for it.

Those who may benefit most from the study are patients with borderline hypertension. Even when they knew they had it, they often were not treated. Many doctors, Freis included, have taken a conservative view of treatment for these people, reasoning that the benefits of the drugs were unproved but that the risks were well known. Others have treated only those who, for other reasons, were at considerable risk for heart attacks or strokes. These were patients, for example, who had a family history of early death from cardivascular diseases, who smoked, or who had high concentrations of cholesterol in their blood. Thus the HDFP result, indicating that all patients with borderline hypertension benefit from treatment, is of considerable importance. Freis, for example, says he will now be more aggressive in treating patients with borderline hypertension. Levy recommends, however, that patients with borderline hypertension try other treatments to lower their blood pressure before resorting to drugs. He suggests that they try reducing their sodium consumption, and losing weight if they are overweight. James Hunt of the University of Tennessee Medical School finds that at least 85 percent of these patients can get their blood pressure to normal by these nondrug measures alone.

Unfortunately, it may not be enough for doctors to simply tell patients to cut down on table salt, which is the most common form of sodium. Hunt found several years ago that a group of men who thought they were following low-sodium diets and who had ceased salting their food at the table actually were consuming daily at least as much sodium as is in 2 teaspoons of salt. This is more than twice as much as they should have been consuming if they wanted to lower their blood pressure.

According to Hunt, the men were fooled because they had no idea how much sodium is added to processed foods. Their largest single sources of sodium were soups and condiments, such as ketchup. Much of the sodium added to processed foods is in the form of flavor enhancers, such as monosodium glutamate, leavening agents, such as sodium bicarbonate, and preservatives, such as sodium nitrite. Many foods that are extremely high in sodium do not even taste salty.

To illustrate how much sodium is in prepared foods, the Center for Science in the Public Interest, which is a watchdog organization based in Washington, D.C., cites the sodium in foods sold to MacDonald's Restaurants. With the exception of the sodas and orange juice, the food with the least amount of sodium is the french fries. There is more

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sodium in the shakes, the hamburgers, the cheeseburgers, and the apple pie.

Because so many Americans eat large quantities of processed foods and because many people are reluctant or unable to drastically change their diets, it is likely that quite a number of borderline hypertensives will soon be offered drugs to lower their blood pressure. Levy concedes that the cost of treating all these patients is of concern to the study's investigators. But he does not think the drug costs are insurmountable. According to Freis, 80 percent of all patients with hypertension can be controlled with diuretics, the simplest and least toxic of drugs. Michael Gorman, director of Citizens for High Blood Pressure, says that the generic diuretic that he takes costs him only 18 cents a day. But this still means that the drugs will cost the nation billions of dollars a year, since there are 60 million Americans with at least borderline high blood pressure.

Of course, the obvious question arising from the study is, can the results be extended to the general population? Levy says, "there is no reason why they cannot." He explains that many doctors did not have sufficient reason until now to vigorously treat all patients with hypertension, particularly borderline cases. In January, a group of medical experts will convene to decide how best to implement the findings of this study.

The HDFP is the first of several large-scale clinical trials on cardiovascular diseases to be completed. In the next few years, the NHLBI will be announcing results of the others. All of these trials have been criticized for excessive costs (Levy once said they were like a noose around his neck) and for the likelihood that their results would not be definitive or convincing. This might still be the case. But the HDFP results are certainly an auspicious beginning.

—GINA BARI KOLATA

Academics Victims in Fusion Politics Tangle

Reductions in alternative fusion concepts budget would have ended research at some schools, but a restoration of funds is imminent

A reactor to produce power by means of controlled thermonuclear fusion—the process that energizes the stars—will not come until well into the next century, according to Department of Energy timetables. But some fusion researchers believe that a demonstration reactor could come as early as the 1990's, barely more than a decade from now. More important, the House subcommittee on energy research and production, which oversees civilian energy research, shares this optimistic assessment. Academic researchers, who for the most part conduct basic fusion studies apart from the large reactor projects, got caught in the middle of this disagreement last spring and summer during congressional consideration of the fiscal 1980 budget, and thereby found many of their programs eliminated or drastically reduced. After the predictable lobbying by aggrieved fusion scientists, the Energy Department and the energy subcommittee agreed that the effects of the cuts were greater than intended, and a way to restore much of the funding has been found.

The actual size of the reductions, $5.5 million, is not large when compared to the total magnetic confinement fusion budget, which is more than $350 million this year. What had the academics riled up was that the cuts seemed to fall disproportionately harshly on small university projects. One observer, in a moment of passion, called it the "slaughter of the innocents." Equally upsetting to some was Congress' inclination to meddle in a detailed way with the fusion budget, including calling out by name some of the projects to be terminated or reduced. With the imminent restoration of funds by means of a stratagem known as reprogramming, in which money appropriated by Congress for a construction project would be shifted over to operating expenses for research, the uproar has subsided. Once bitten, however, university researchers are twice shy; they have formed an organization to look after their interests in Washington.

Probably no one who has successfully competed for federal research support should be called an innocent; but, in this case, the university researchers seem to have been the unintentional victims of fusion politics. In magnetic confinement fusion, there are several reactor concepts in various stages of development, and it is by no means clear which one will, in the end, be the most suitable for a commercial power-producing reactor for a utility bent on making a profit. There are two schools of thought on how to proceed.

One view, that developed by John Deutch, Undersecretary of Energy, and Edwin Kintner, Director of the Office of Fusion Energy, holds that the goal is to get the best design for a power-producing reactor. Doing this requires a balanced program in which several fusion reactor concepts are explored in parallel before a commitment to building an operating reactor of any one type is made. (All this assumes that a scientific proof of the feasibility of controlled nuclear fusion is forthcoming, although nothing of the kind has been achieved.)

At present, the mainline fusion reactor program, the one that has progressed the farthest toward the goal of breakeven (energy produced by the reactor no less than that required to power it), is the tokamak. Currently under construction at the Princeton Plasma Physics Laboratory is a $250 million machine called the Tokamak Fusion Test Reactor (TFTR). Facilities of a comparable capability are being built or planned in Great Britain, the U.S.S.R., and Japan. Next in line, about a technological generation behind the tokamak, is the magnetic mirror. Earlier this year, the Lawrence Livermore Laboratory, the center of U.S. mirror activity, began building a $94 million Mirror Fusion Test Facility.

One difference between tokamaks and mirrors is geometrical. A tokamak is shaped like a doughnut or torus, and particles in the plasma, most likely electrons and deuterium and tritium ions in power-producing reactors, follow trajectories determined by the magnetic field lines that wrap around the torus somewhat like the stripes on a candy cane. Mirror machines, on the other hand, are open-ended, and plasma can be lost at the

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