Such a map, which will speed the search for disease genes, represents a tenfold improvement over the current genetic map—"an achievable but fairly horrendous increase," says Olson. The benefits, however, are clear. "If your child has cystic fibrosis, then there is some urgency," notes Watson. "If we can get the mapping done in 4 years instead of 6, it seems to me that this is progress."

For the physical maps, which involve actually lining up fragments of DNA in the order they appear along the chromosomes, the goal has been scaled back from mapping the entire human genome within a few years to mapping one or two small human chromosomes within 5 years.

For areas other than genetic mapping, the primary emphasis will be on technology development, says Wyngaarden: new technologies for physical mapping, sequencing, and information-handling. Massive sequencing will not start for at least 5 years.

A key question the ad hoc committee grappled with, and that seems likely to plague the soon-to-be-established program advisory committee as well, is how to distinguish this work from other projects in molecular genetics. Borrowing from the recent National Academy of Sciences (NAS) report, the committee recommended that NIH support work that, as a rule of thumb, offers a five- to tenfold improvement over existing capabilities, whether it be the sequencing rate, the size of a clone, or the resolution of a map.

By establishing this special office and lobbying for a boost in funds, NIH has wrestled the lead away from DOE, which has a focused, but smaller, program, now funded at $18 million. "I don't see this as an important turf battle," says Wyngaarden. "What really determines how much we all do is funding."

Whether Congress will feel the need to legislatively designate a lead agency remains to be seen. In its report the NAS pushed for a single agency to direct the project; the Office of Technology Assessment argued against it, recommending instead an interagency task force.

"I don't think there need be a lead agency," says Wyngaarden, "but if there is one, NIH is the only logical place for it. This isn't primarily a hardware and information project. The reason for doing this is to extract the biological information in the genome."

Watson, however, thinks a lead agency is essential. "Who are you accountable to without a lead agency?" he asks. At a recent congressional hearing Watson recommended that "NIH should be the primary dispenser of the vast majority of funds—80% of the funds." His arguments have proved persuasive in the past. ■ **LESLIE ROBERTS**

Brain Graft Puzzles

During the recent rush to implant adrenal gland tissue into the brains of Parkinson's disease patients, the focus of attention, quite naturally, has been on the hoped-for improvement in symptoms (Research News, 22 April, p. 390). Amid all this attention on the therapeutic effects of the procedure, there has frequently been observed an epiphenomenon that, until now, has been unreported, except in a very anecdotal manner. Specifically, many patients appear to experience a series of unusual and unexpected behavioral changes that begin immediately after surgery and may persist for several months.

"Everyone has seen these behavioral changes in at least one of their patients," says Caroline Tanner of Rush Medical Center, Chicago. "Some of the changes are quite subtle, and you have to look carefully for them." In collaboration with Harold Klawans and his colleagues at Rush Medical Center, Tanner has made a systematic study of this phenomenon, which she described at the recent meetings of the American Academy of Neurology.

The behavioral effects observed in the Chicago patients fall in five categories. First, patients have a significantly reduced need for analgesics immediately following surgery. "This is not just because they are drowsy," says Tanner. "It is a real change in pain threshold." Second, about 3 days after surgery patients' sleep patterns change for about 3 or 4 days. "They tend to fall asleep often during the day, not through an increased lethargy, but simply spending more time asleep."

Third, and most intriguing says Tanner, are delusions of various sorts, ranging from simple to flamboyant. For instance, one man, a farmer, was convinced that a farm store was attached to the hospital. In another case, a woman described herself as floating on a lake, whereas, of course, she was sitting on a hospital bed. Another man was convinced that appliance salesmen were visiting patients in their rooms, persuading them to buy things, from which the hospital was getting a cut. He was very angry about the whole thing. "In each case the patients' behavior was quite appropriate, and unless you touched on the topic of the delusion, you wouldn't be aware that anything was amiss," says Tanner. Later, when the delusions had passed, patients often remembered "knowing" that they had been true, but also "knowing" at the same time that they were not.

Fourth, some patients experienced personality change, including disinhibition and mania, sometimes shifting from a reserved, conservative personality to being exuberantly outgoing. And fifth, several patients experienced visual and auditory hallucinations. Now, it is true that Parkinson's disease patients sometimes have hallucinations, mood changes, and other behavioral phenomena when they are treated with the standard drug, levodopa. But, as Tanner points out, the patients in her study had been under observation for a very long time, and the symptoms that emerged after surgery were novel for each of them. In addition, some of the behavioral effects are qualitatively different from those associated with levodopa.

Anecdotal reports from other medical centers match the Chicago experience to varying degrees. For instance, Abraham Lieberman at New York University Medical Center told *Science* that out of 12 patients, he had noticed some effects in a few patients, and strikingly so in one. And George Allen's group at Vanderbilt University has seen "confusional" effects in some of the older patients, but not in younger patients. Tanner notes that the criteria used by the different transplant groups for selecting patients—severity of symptoms, age, and so on—may influence the degree of postoperative behavioral changes that develop.

Although patients who undergo brain surgery as extensive as that in adrenal implantation sometimes experience some of the phenomena that Tanner describes, it is rare and much less developed. The changes may therefore be related in some way to injury specifically to the caudate, which is where the implant is inserted, or to the adrenal implant itself, which is packed with various neurotransmitters, including catecholamines, opioid peptides (enkephalins and endorphins), and probably some steroids too. However, the Chicago group was unable to find any correlation between changes in cerebrospinal fluid levels of these chemicals and the changed behaviors. Nor was there a correlation between the behavioral effects and any modification of parkinsonian symptoms. A direct pharmacological effect of the neurotransmitters therefore looks unlikely. ■ **ROGER LEWIN**