Caution Continues Over Transplants

Last week the American Academy of Neurology (AAN) issued a position statement on the use of surgical transplantation in the treatment of Parkinson's disease, saying: "We urge great caution in expanding the current human experience except as research conducted in highly specialized centers." The statement went on to say, "The AAN regards this scientific effort with interest and restraint," and notes that "It would be wise to encourage further transplantation studies in animal models before large-scale trials are undertaken."

The academy was responding to what many observers consider was an unseemly haste with which some clinical centers in the United States and elsewhere had embarked upon transplantation therapy, first using adrenal autografts and then fetal brain tissue implants. The initial enthusiasm was engendered by apparently remarkable therapeutic effects following adrenal-to-brain transplants, carried out in 1986 and 1987 by Ignacio Madrazo and his colleagues in Mexico City. During 1987 Madrazo's team also implanted human fetal brain tissue into two parkinsonian patients, again with dramatic improvement reported.

By March of this year more than 100 adrenal-to-brain transplants had been performed at various centers in the United States, but with somewhat disappointing results, at least as measured against the reported Mexican experience. As a result, participants at a workshop of the United Parkinson Foundation held in Chicago in late March concluded that further clinical work should proceed cautiously and with more attention to systematic assessment.

Meanwhile, Olle Lindvall and his colleagues at the University of Lund Medical Center had performed human fetal tissue implants in two Parkinson's disease patients under highly controlled conditions, and were awaiting an assessment of the outcome. Lindvall told *Science* in June, 6 months after the surgery, that "no therapeutically useful improvement could be detected." At another gathering of the United Parkinson Foundation workshop last month in Chicago, Lindvall reported that the clinical condition of the patients remained substantially unchanged.

More difficult than adrenal-to-brain transplants, about 40 human fetal tissue implants have been performed in half a dozen countries, the only one so far in the United States being done a month ago by Curt Freed and his colleagues at the University of Colorado Health Science Center. Positive responses have been reported in many of these cases, although none to the degree of the original adrenal-to-brain transplants.

The sense of caution—not to say outright skepticism—that has settled in, both informally and in public statements such as that by the AAN, contrasts greatly with the mood a year ago. And both the academy and the United Parkinson Foundation are placing more and more stress on a systematic approach to the problem, so that good data can be collected and compared between clinical centers. As Anders Björklund, a colleague of Lindvall's at the University of Lund, put it at the recent annual meeting of the Society for Neuroscience, held in Toronto: "Any attempt to shortcut the scientific method is a mere scientific gamble."

Although work with experimental animals continues to favor the use of fetal brain tissue rather than adrenal tissue, there is still a great deal of basic experimental information to be gathered, stresses John Sladek of the University of Rochester. One key issue to be addressed is that fetal tissue implants have generally been done in people with long-established disease, whereas experimental implants have typically been carried out with animals in which the disease condition has only recently been induced. This might be one reason for the different outcomes in human and experimental fetal tissue implants. Animals with long-established disease are now being studied. ■ ROGER LEWIN

MIT to Get Superconductor Patent

Although the major winners in the race for superconductor patents remain undecided, the U.S. Patent Office last week indicated it will grant a patent to the Massachusetts Institute of Technology for a process to manufacture more flexible high-temperature superconductors. "We believe that this represents the first substantive patent in the area of high-temperature superconductivity," said John T. Preston, director of MIT's technology licensing office. The biggest prizes will be the patents on the superconducting materials themselves, which could be worth many millions of dollars and for which several groups have submitted patent applications, but neither the U.S. patent office nor its counterparts in foreign countries have sorted out the various claims.

MIT said it has licensed exclusive rights to its patent to American Superconductor Corporation, a company whose founders include the two MIT professors who developed the process, Gregory Yurek and John Vander Sande. Details of the licensing agreement were not released.

The MIT patent is for a process in which the metallic constituents of a ceramic superconductor are mixed with a noble metal, such as silver or gold, and then reacted with oxygen to produce a metal/superconductor composite. For example, the standard process to fabricate the superconductor $YBa_2Cu_3O_7$ is to grind together oxides of yttrium, barium, and copper and then bake them in the presence of oxygen. The result is a ceramic material that becomes superconducting—loses resistance to electricity—at about 93 K, but that is very brittle and inflexible and thus is difficult to form into wires and other useful shapes. In the MIT process, an alloy of yttrium, barium, copper, and silver (or other noble metal) is formed, and this alloy is reacted with oxygen at high temperature.

This produces a "microcomposite" of $YBa_2Cu_3O_7$ and the silver, in which the silver is intertwined with the superconductor on a microscopic level. The composites are 5 to 10 times less brittle than the superconductor by itself because the silver in the composite helps prevent cracks from propagating through the material. The silver also allows easier electrical connections, which are rather tricky to make with pure superconductors.

The presence of the silver in the composite does not change its superconducting properties appreciably, said William Doyle, director of marketing for American Superconductor. The critical temperatures of the composites—the temperature at which they become superconducting—are virtually identical with those of the ceramic superconductors alone, he said, and the critical currents—the maximum amount of current the materials can carry—are also typical of the pure superconductors.

The process has a number of advantages, Doyle said. It can be used with any of the families of ceramic superconductors discovered so far and will probably be applicable to any not yet discovered. In the alloy stage of the process, the materials are very malleable and can be formed into a desired shape before they are reacted with oxygen and become less flexible. And the amount of noble metal in the material can be varied easily to produce different mechanical, electrical and thermal properties. "We believe it will be the preferred form of superconductors for most applications in the future," Doyle said. ■ ROBERT POOL