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Health & Science

## Stem cell researchers see hope in autologous transplant

A steady flow of positive studies promises possible cures for the incurable, but there is still a long way to go before these procedures enter mainstream medicine.

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PARKINSON'S PATIENTS MAY SOME day benefit from stem cells harvested from their own brains. Blood stem

cells could create a new immune system stopping multiple sclerosis in its tracks. And cartilage could be grown from stem cells found in fat, forestalling or ending completely the need for knee replacement surgery.

These are just a few of the current avenues of research involving adult stem cells sourced from a person's own body.

"It's terribly exciting," said Edwin Hewitt, MD, PhD, associate member of the hematology and oncology staff at

St. Jude's Children's Research Hospital in Memphis, Tenn., who is actively conducting research in this area. "The potential is absolutely enormous."

Researchers hope to cure diseases that could previously only be managed — poorly, if at all — as chronic conditions. And, at least at the surface, the advantages over embryonic and animal-source stem cells are significant. Adult stem cells lack the ethical baggage. The possibility of rejection is slim. Transplant drugs are not needed. And the chance of disease transmission is nonexistent.

"There's no chance of immune rejection," said Michael Levesque, MD, who presented a paper related to the treatment of Parkinson's at the Amer-

ican Assn. of Neurological Surgeons meeting in Chicago last month. "It minimizes the risk of infection or contamination."

### Finding early promise

BUT EXPERTS WARN THAT THE REVOLUTION is still far off. Cartilage studies are being done only in mice. Other studies involving humans are being done on a very small scale.

Dr. Levesque's Parkinson's study, for instance, involved only one person — although the results were remarkable. Before the stem cell transplant, his patient was nearly completely disabled. Afterwards, the patient is nearly fully functional.

Dr. Levesque, who is the director of the neurofunctional surgery center at Cedars-Sinai Medical Center in Los Angeles, now intends to recruit more patients for the procedure this year.

Meanwhile, a multiple sclerosis study presented at the American Academy of Neurology meeting in Denver in April had 26 subjects. This research was conducted by George Kraft, MD, director of the Multiple Sclerosis Center at the University of Washington in Seattle.

In this study, 20 people stabilized, but five got worse. The surgery to extract the adult stem cells is also risky, and one person died due to complications related to this procedure.

"Science has to catch up. There's been a lot of promise," said Farshid Gulak, PhD, director of orthopedic research at Duke University, Durham, N.C. He has published papers on his research into converting fat stem cells into cartilage. "We're still years away from real proven applications, but many of us feel we'll get there."

### Still work ahead

THERE ARE STILL MANY UNANSWERED questions.

How long will a stem cell transplant benefit a patient, and how long can a person's stem cells be stored and later used for treatment?

The patient in the Parkinson's study, for example, had a transplant only on the side of his brain causing the most severe symptoms. The symptoms on the other side are mild, but he would like to have the transplant done there as well. Dr. Levesque wants to wait until medication ceases to be effective. But it is unknown how long the patient's cell line will be viable.

Also, the human trials now under way involve people for whom standard therapies are no longer effective. How will stem cell transplantation stack up compared head-to-head with

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### WEBLINKS

<http://www.nih.gov/news/stemcell/>

National Institutes of Health, stem cell information resources

<http://www.abstracts-on-line.com/abstracts/aaa/>  
American Academy of Neurology, abstracts from annual meeting

<http://www.naacsurgery.org/naas/meetings/2002/>  
American Assn. of Neurological Surgeons annual meeting

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conventional therapies? Will it be effective at earlier stages of the disease?

Most patients in the MS study experienced a cessation of disease progression rather than symptom reversal. Researchers suggest that this may be more appropriate for patients at an earlier stage in the disease before extensive damage, but this remains to be seen.

"If this is as good as it looks, then you'd want to do this as soon as possi-

ble, because it doesn't put nerves back that have been damaged," Dr. Kraft said. "But it's expensive, and we really don't know if it's going to work. For all those reasons, it's being done in patients in the final stages."

And autologous transplants also may not always be practical, particularly for diseases that are primarily genetic in nature.

Dr. Horwitz is using adult stem cells sourced from matched donors to replace the bone marrow of those with

osteogenesis imperfecta. The patient's own cells are likely to have the same genetic defect that causes this problem in the first place.

And even for those working with adult stem cells where the genetic component is less clear-cut, there is still significant concern that the cells will exhibit disease.

"We know there's some sort of genetic factor to MS," Dr. Kraft said. "Maybe a patient who has a genetic predisposition will develop it again. We definitely will be trying cells from some other sources."

Adult stem cells are also not believed to be as versatile as those from other sources, and although stem cells have been found for most organs,

none have yet been located for the heart. Researchers in Australia are currently attempting to use bone marrow stem cells to repair damaged heart tissue.

"It's not clear whether stem cells from fat or blood would be functional in the brain or elsewhere," Dr. Gullak said. "Going from one system to the other isn't clear."

An individual's stem cells, except for blood and bone marrow stem cells, are also in short supply and not quite so easy to get to. Test animals are frequently killed in the process of extracting them. "You can't do that with a human being," said Richard Bart, MD, chief of immunotherapy at Northwestern Memorial Hospital in Chicago. He is currently performing adult stem cell transplants to treat lupus, rheumatoid arthritis and multiple sclerosis. "It can be very difficult to get access."

In addition, there are no studies comparing the efficacy of adult, embryonic or animal-source stem cells. Scientists say they are vital to determine the best approach for each disease, but that those may be impossible to do in the current political climate.

"All sources need to be fully investigated," Dr. Levesque said. "Embryonic stem cells may be a potential source for certain diseases where autologous adult stem cells cannot be generated." \*