

Pitt stem-cell research slows aging

By Luis Fabregas, PITTSBURGH TRIBUNE-REVIEW

Wednesday, January 4, 2012

Stem cell project

Courtesy the University of Pittsburgh

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University of Pittsburgh scientists improved the lifespan of mice with an aging disease by injecting them with normal stem cells, a finding they say underscores the ability of stem cells to repair muscle, bones and injuries.

The mice, which had an aging disease called progeria, lived two to three times longer than expected once they received the stem cells, according to a study published Tuesday in the journal Nature Communications.

The stem cells -- derived from the muscle of young, healthy rodents -- did not migrate to other tissue in the body and appear to have secreted a growth factor, or protein, that delayed the aging process. Instead of losing muscle mass and moving slowly, the animals grew as large as normal ones.

Johnny Huard, the project's senior investigator and director of Pitt's Stem Cell Research Center, and Dr. Laura Niedernhofer, a senior investigator and an associate professor in Pitt's Department of Microbiology and Molecular Genetics and the University of Pittsburgh Cancer Institute, are hopeful the animal research can be translated into humans.

Huard told the Tribune-Review that human muscle-derived stem cells could be stored at an early age and used when people age.

"When you turn 30, 35, 40, instead of having all this cosmetic surgery, we can take your cells and then reinject them into you," he said. "We're going to rejuvenate your body, basically. You're going to age, but you're going to age slower than the normal person who doesn't have stem cell transplantation."

The findings were so provocative that the researchers initially thought they made a mistake, Huard said.

"When we do work in the animal facility, sometimes a mix-up can happen," said Huard, also a professor in Pitt's Department of Orthopedics. "Sometimes it's misplaced mice, or maybe they didn't label the cage. I said, 'Oh, my God, we're really doing something very interesting here.' "

Still, it is always prudent to be cautious in extending findings in mouse progeria models to humans, said Amy Wagers, associate professor of stem cell and regenerative biology at Harvard University.

"Mice are a very valuable research tool, and studies in mice have proved highly informative for many human diseases, but appropriate follow-up studies still must be done in a human system," Wagers said.

Dr. Curt Freed, a professor and head of the division of clinical pharmacology and toxicology at the University of Colorado School of Medicine, said the public has the impression that stem cells are a "cure-all" for diseases with no known treatment. He said he is concerned that unscrupulous clinics elsewhere in the world will misuse the Pitt discovery "to claim that stem cell transplants can slow the aging process."

Huard has worked in stem-cell research for several years and achieved success nearly a decade ago by identifying muscle stem cells in laboratory mice that can help regenerate weak muscle. He led research in trying to use those findings to create treatments for Duchenne muscular dystrophy and other orthopedic illnesses.

Other Pitt researchers are using muscle-derived stem cells to repair muscle damage in injured soldiers.

In the latest study, Huard and his team discovered that stem cells in the diseased mice were "tired," meaning they did not proliferate well and were worn out. The mice were dying at 21 to 28 days, instead of their typical two-year lifespan. Giving them stem cells stretched their lives to 45 to 60 days.

Stem cells have the ability to become various types of cells, but Huard said his team found a limited number of cells in later studies of the treated mice. That led them to the discovery that the stem cells released a protein substance or growth factor.

The team believes the stem cells promote blood vessel formation because the mice that received the injections showed blood vessel growth in the brain and muscle. Researchers are studying the substance to understand what it is.

"If we can purify that protein, we may have found an anti-aging protein and that will be huge," Huard said.

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