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Korean Cloning Fraud Case Advances Stem Cell Research

By AMANDA GARDNER, HealthDay Reporter

WEDNESDAY, Aug. 1 (HealthDay News) -- Experts sifting through data from the discredited 2004 South Korean human cloning study say it may have had one positive outcome: the creation of human embryonic stem cells in a whole new way.

The scientists who defrauded the world into thinking they had created the world's first human embryonic stem cells via cloning actually did achieve something, new research shows, just not what they had claimed.

The Seoul team created the first-ever human embryonic stem cells from a process known as parthenogenesis, a process that creates an embryo by "tricking" the egg into thinking it has been fertilized.

"For years, scientists have been seeking a method for making patient-specific embryonic stem cells. We've been trying to do that with nuclear transfer [cloning] and that hadn't worked," said study senior author Dr. George Q. Daley, associate director of the Stem Cell Program at Children's Hospital Boston.

"Now we've found that if you're a young woman, you can make embryonic stem cells from your eggs. This gets us to making a customized, patient-specific stem cell without having to go through nuclear transfer," he said. "It represents a very important advance."

"These cells are important potentially for making stem cells that aren't going to have a problem with the immune system of the host. It's another route," added Paul R. Sanberg, distinguished professor of neurosurgery and director of the University of South Florida Center for Aging and Brain Repair, in Tampa. "The stem cell field continues to move forward in spite of controversy. As we go forward, we will get more answers and theories as far as stem cells work and the best ways to make them."

In 2004, Dr. Hwang Woo-Suk of Seoul National University published a paper in Science purporting to have created embryonic stem cells using somatic cell nuclear transfer, or cloning. Amid a worldwide flurry of accusations and finger-pointing, the journal retracted the paper in early 2006, following evidence that the Korean group had falsified their data.

But Hwang may inadvertently pushed stem cell science forward, after all.

Human embryonic stem cells are usually made from embryos donated from couples who have undergone in vitro fertilization.

The process of somatic cell nuclear transfer involves replacing the nucleus of an egg with the nucleus of another cell from the body. No fertilization is involved.

Parthenogenesis involves artificially activating the egg in the absence of sperm.

"You take a human egg and trick it into thinking it's fertilized," Daley explained. "The egg will actually duplicate its own DNA and start to divide and become a little embryo. The embryo would never develop into a baby because you need contributions from male DNA, but you can get embryonic stem cells."

Both somatic cell nuclear transfer and parthenogenesis are of interest because they may be able to produce stem cells that are genetically identical to the donor and would therefore be ideal for research into specific diseases.

To determine if the cell lines created by Hwang came through somatic cell nuclear transfer or parthenogenesis, Daley and his colleagues did a genome-wide analysis, the results of which appear in the Aug. 2 issue of Cell Stem Cell.

They discovered that cells did indeed come from parthenogenesis and that cells derived form this method have a different genetic signature than those derived by somatic cell nuclear transfer. Genetic screening could therefore be used to help determine origins.

Both somatic cell nuclear transfer and parthenogenesis are now potential ways to provide human embryonic stem cells, the experts say.

"These findings demonstrate convincingly that mammalian embryonic stem cells can be derived by parthenogenesis. The results partially explain what went wrong in the Korean embryonic stem cell paper and also describe a new, less invasive technique to generate embryonic stem cells," said Radhika Pochampally, assistant professor at Tulane University's Center for Gene Therapy in New Orleans.

"The embryonic stem cells generated in the study are not well-characterized, we do not know their differentiation potential and other properties yet, so it is too early to comment on the use of these cells in practical purposes," she said. "However, the cells obtained by parthenogenesis could be a good source of embryonic stem cells for research."

SOURCES: George Q. Daley, M.D., Ph.D., associate director, Stem Cell Program, Children's Hospital Boston; Paul Sanberg, Ph.D., D.Sc., distinguished professor, neurosurgery, and director, University of South Florida Center for Aging and Brain Repair, Tampa; Radhika Pochampally, Ph.D., assistant professor, Center for Gene Therapy, Tulane University, New Orleans; Aug. 2, 2007, Cell Stem Cell