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Regenerative Medicine Is Heating Up

Associated Press

Sat Mar 13, 2:56 AM ET

By PAUL ELIAS, AP Biotechnology Writer

SAN FRANCISCO - In laboratories the world over, scientists bent on turning back our biological clocks are looking past harvesting human embryos and cloning in their quest for disease cures.

AP Photo

A small but growing group of researchers seeking the proverbial fountain of youth insists its work has no kinship to cryogenics — freezing Ted Williams' body — or other fantastic scientific forays in life extension.

What these scientists hope for is to be able to make old cells young again, imbuing them with all the potential healing power that youthful cells may possess.

Perhaps most significantly, they want to create stem cells without having to destroy embryos in the process.

Years of work remains, but the researchers are hard at work building biological time machines that reverse aging in some cells.

Some are trying to reset biological clocks by mimicking "magic factors" in human eggs — the only cells in a woman's body not programmed to die.

Others are identifying molecules that enable salamanders to re-grow limbs.

Chemists in San Diego have created a chemical compound they call "reversine," which resets muscle cells in mice much the same way newts restart limb cell growth after injury.

Ultimately, these discoveries could usher in regenerative medicine. The idea is to turn a patient's skin cells into embryo-like cells that could be coaxed into growing into replacement tissue for failing organs.

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The biggest game being stalked in this hunt is finding the still theoretical genes that launch creation of the human body from a single cell.

Scottish and Japanese researchers last year isolated an "immortality gene" in mice that allowed stem cells to grow indefinitely in the laboratory. They dubbed it Nanog, from the Celtic mythical land called Tir nan Og, where everyone stays young. The discovery hastened the race to find a similar human gene and prompted serious scientists to publicly discuss for the first time what they've been quietly pursuing for years.

"We are dreaming of finding that master gene in the egg," said Michigan State University researcher Jose Cibelli, a pioneer in cloning and stem cell science. "The fountain of youth is in the egg."

The goal of Cibelli and others is to reprogram cells to reverse the aging process — until stem cells appear.

Embryonic stem cells are the most sought after stem cells. Created in the first days after conception, they give rise to the human body.

Scientists hope to harness this powerful ability of so-called undifferentiated cells to grow into replacements for lost or damaged cells in treating a wide range of ailments, from Alzheimer's disease (news - web sites) to spinal cord injuries.

Much of the attention in the field of regenerative medicine has been focused recently on human embryonic stem cells and cloning.

Such work has run into fierce opposition from abortion foes and other biological conservatives who are appalled that researchers must destroy human embryos to harvest the stem cells. Most embryos are donated by fertility clinics, though some scientists are cloning embryos as a possible stem-cell source.

Cibelli remains an outspoken proponent of cloning for therapeutic purposes, having served as a co-author with the South Korean-led team that reported last month the first successful clone of a human embryo and the culling of stem cells from it.

Cibelli now believes, however, that better results may come through alternative approaches to regenerative medicine that are being worked on far away from the heated public debate over embryo research.

Politics aside, daunting logistical barriers remain for efforts to use embryos to turn stem cells into widely available drugs. For one, the supply of available eggs is limited. As well, few researchers have the highly honed skills needed to properly handle embryos and extract stem cells.

An increasing number of researchers thus argue that a more simple solution is needed to make regenerative medicine work.

Cibelli, for one, signed on to help researchers at the Scripps Research Institute in San Diego pursue a chemical answer.

Led by Sheng Ding, the Scripps team has created a chemical compound — a so-called small molecule_ that reverses the aging process of mouse muscle cells, turning them into "stem-like cells" and then re-growing them into different cells "just like a newt," Ding said.

· Alzheimer's disease

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Ding said more research has to be done to determine exactly what reversine does to the cells, but he's optimistic he's onto something.

The chemists' goal is to create a single compound that will turn ordinary cells into embryonic cells and then use another compound to direct the new cells to grow into desired tissues.

Clues may well come from research at University College London, where Jeremy Brockes has isolated an enzyme implicated in the salamander's ability to re-grow an eye lens after it has been surgically removed.

Brockes said he would be amazed if the mechanics of salamander and human cell growth differs much: "Because it would seem very strange that an animal with the same basic body plan such as ours did not have something very important to teach us about regeneration."

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On the Net:

Cibelli's lab: http://www.canr.msu.edu/dept/ans/community/people/cibelli_jose.html

Scripps Research: http://www.scripps.edu/

Shockes lab: http://www.biochem.ucl.ac.uk/research/brockes/brockes.htm

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