

Holiday Lectures Take On Stem Cells

BEFORE A THOUGHTFUL AND FORTHRIGHT AUDIENCE, SCIENTISTS AND ETHICISTS DISCUSS THE PRESENT AND FUTURE OF A SCIENCE REPLETE WITH PROMISE AND PITFALLS.



(left) Douglas A. Melton; (center) Washington, D.C.-area high school students; (far right) Nadia Rosenthal

BIOMEDICAL RESEARCH CAN GENERATE controversy, and HHMI believes that the next generation needs to understand the issues raised by controversial research and evaluate them scientifically. So in its annual Holiday Lectures on Science—two days of lectures and discussion—the Institute tackles topics that may inspire fervent debate. Previous lectures have focused on issues such as evolution, sex and gender determination, and obesity. In the most recent Holiday Lectures, in December 2006, stem cell research was the focus.

Douglas A. Melton, an HHMI investigator at Harvard University, and Nadia Rosenthal, director of the European Molecular Biology Laboratory in Monterotondo, Italy, were the featured speakers. They discussed their work and the potential of stem cell research in a series of talks, titled *Potent Biology: Stem Cells, Cloning, and Regeneration*, delivered to an audience of Washington, D.C.-area high school students.

Melton explained, among other things, how stem cells function and how they can be used to understand and potentially treat disease. “Stem cells are essential to normal development,” he noted. “Differentiation occurs when different genes are turned on or turned off by internal or external signals.”

A student in the audience asked what kinds of signals tell a stem cell to change its destiny. “You’re talking about reprogramming signals, and that’s a hot area of research,” Melton replied. “That’s what we want you to find out when you become scientists.”

Rosenthal described how adult stem cells help repair and replace lost or damaged cells and how they might be stimulated to do a better job in human beings. She explained the concept of regeneration, her main area of research. Planaria, a simple flatworm, can regenerate a whole worm from any part of itself. If a salamander’s limb is cut off, it can generate a new one. But such abilities seem to have weakened as vertebrates evolved, thus mammals cannot regenerate most body parts—yet.

Harnessing the potential of stem cells could one day mean nothing less than the end of aging, Rosenthal suggested, and “the fountain of youth appears to be in factors, or proteins, floating around in the blood serum.” Young serum activates a factor that stimulates regeneration in injured, old muscle cells, she said.

After their lectures, Melton and Rosenthal joined Jonathan D. Moreno, a bioethicist at the University of Pennsylvania and a member of HHMI’s Bioethics Advisory Board, and Debra Mathews, a geneticist and bioethicist at the Berman Institute of Bioethics at Johns Hopkins University, for a spirited discussion in which they also invited questions from the audience.

The students had a lot on their minds. “Aristotle says that there is no substantial change between an acorn and an oak,” one student observed. “Wouldn’t that apply to an embryo and a human being too?”

“If we can save more lives by doing embryonic stem cell research, doesn’t that justify it?” another student asked. “We should support stem cell research before our economic rivals in the world get ahead of us,” suggested a third.

The panel responded to these and other questions with due scientific rigor, examining the difficult moral and ethical issues involved.

The audience expressed concern about possible deception and exploitation. One student wanted to know whether scientific frauds, such as the report that South Korean researchers had derived stem cells from a cloned human embryo, would impede legitimate stem cell research and applications. It could, agreed the panel. Fortunately, in this case, the paper was quickly retracted, and the peer-review process was strengthened as a result.

Fraudulent treatment claims are already becoming a problem. “Desperate people are spending thousands of dollars on stem cell treatments advertised to cure themselves or a loved one,” Mathews warned. “There are no embryonic stem cell treatments now. We call them scam cell treatments.”

“It’s up to people like you,” Moreno told the aspiring scientists, “to explain what is feasible and what is not, to help the public have confidence in replacing a child’s heart valve with one from a pig or the possibility of regenerating an arm.”

The 2006 Holiday Lectures on Science can be viewed at www.hhmi.org/biointeractive/lectures. Free DVDs of the lectures, with resources for teachers added, will be available through the HHMI catalog in spring 2007. ■ —JENNIFER BOETH DONOVAN