Houston Philosophical Society
Dinner Meeting
Minutes of 617th Meeting, April 19, 2007

CALL TO ORDER: 8:00 p.m.

President James L. Kinsey called the meeting to order. The first item of business was the election of the new slate of officers, new members, and new section heads. President Kinsey announced that the section heads elected would continue to serve in the fall even if the proposed reorganization of the Society is approved by the membership. Ballots were distributed to the membership.

All of the nominees were elected to membership in the Society. The newly elected members are:

Section B: Robert F. Curl; David Queller; Gustavo Scuseria; Joan Strassman
Section C: Robert Couch; Thomas Leffler
Section D: Bryan T. Emerson
Section F: Melissa Kean
Section G: Fares El-Dahdah; Adrian (Sandy) Havens
Section H: David R. Dow; David Furlow

The new slate of officers for the 2007-2008 Society year was elected by the membership. The new officers are:

President: Newell Boyd
Vice President: Robert Patton
Recording Secretary: Evelyn Keyes
Corresponding Secretary: Pamela Covington
Treasurer: Laney Littlejohn
Bursar: Don Byrnes
Custodian of Records: John Boles

The section heads elected by their sections are:

Section A: Dick Wilson
Section B: Graham Glass

Section C: Joe Schoolar
Section D: Charles Lusk
Section E: Don Looser
Section F: Robin McCorquodale
Section G: Gwen Goffe
Section H: Fields Alexander

President Kinsey introduced the speaker, Dr. Thomas Swaka. Dr. Swaka holds an M.D. and a Ph.D. from the University of Ulm and is an assistant professor in the Department of Molecular and Cell Biology at Rice and in The Center for Cell and Gene Therapy at Baylor College of Medicine. He spoke on "Embryonic Stem Cell Research."

Dr. Swaka stated that many people associate stem cells with the fountain of youth, but we are far from using them that way. Certain basic principles underlie stem cell research: (1) cells are the fundamental unit of the human body; (2) they have different jobs (specialized/differentiated); and (3) when dopamine-producing neurons, found in the substantia nigra, die or are damaged, those parts of the brain die and cause disease, unlike skin cells, which are constantly repaired, leading to the question why these can be repaired and other cells cannot.

Embryonic stem cells are unspecialized and self-renew. When a sperm and egg join, they form a zygote, which becomes a morula and then a blastocyst before implantation, *i.e.*, while the cell mass is free-floating in the first three days of life. These embryonic stem cells are pluripotent, *i.e.*, they can turn into any cell type.

The first researcher who isolated stem cells was Jamie Thompson, from the University of Wisconsin, who published his work in *Science* in the break-through year of 1998. Johnson obtained consent to use the cells of pre-implantation embryos, from in vitro fertilization clinics, that were no longer wanted by couples for implantation.

In embryonic stem cell research, we remove part of the pre-implantation embryo and put it in a Petri dish. Under the right conditions, the isolated cells remain undifferentiated unless we change their environment. Cells grow in wells in the Petri dish in a tissue-culture medium. Colonies of thousands of undifferentiated cells provide nutrients that allow them to remain in undifferentiated states while moving, dividing, and proliferating.

These cells can be maintained in the culture as long as we like. They continue to grow and do not differentiate or show genetic abnormality because, unlike chromosomes, which have an end that signals the cell not to divide, stem cells keep the end long and, therefore, escape senescence, unlike all other cells except cancer cells. In vivo differentiation of embryonic stem cells, however, forms tumors. Therefore, when we want differentiation, we expose the cells to growth factors in the Petri dish, generating neurons, red blood cells, platelets, white blood cells, and muscle cells.

Human embryonic stem cell research has the potential to change the face of human disease by repairing damage. The problems for the research, however, are four-fold: (1) will the cells grow into healthy tissue in the body, as well as in a Petri dish; (2) are they pure enough; (3) will they be rejected by the human body's immune system; and (4) will there be funding?

The problem of purity is important because undifferentiated cells behave like cancer cells and cause tumors. Stem cells are differentiated into dopamine producing neurons that attach to the bottom of the Petri dish. If they attach, they form neurostemcells and behave as we want. Cell-sorting machines can sort cells to make a pure population of neurons. The next step is to purify them under extremely clean conditions in GMP facilities, such as Texas Children's Hospital, where they are trying to do this experiment so that the cells will be useful for clinical application.

The next problem is how to prevent rejection. This requires long-term immuno-suppression. In this regard, scientists are working on somatic nuclear transfer, which allows us to make embryonic stem cells that are genetically identical to any of us. When we remove the nucleus, which contains the genetic information, and inject it into the oocyte, we can initiate cell division in the egg, which generates blastyocsts that are genetically identical and will not be rejected. This process has been widely used in animals but not, so far, successfully in humans. It is difficult to obtain the eggs, and the procedure is painful. An alternative idea is egg reprogramming of *any* cell, like a skin cell, to make a pluripotent cell that is patient specific.

A principal obstacle to embryonic stem cell research is that the federal funding allowed by President Bush for stem cell lines established before August 9, 2001 turned out only 5-10 useful lines, which now must be used

by all researchers using federal funds. These lines are now almost 10 years old and were not obtained under optimal conditions, but later lines cannot be used. There are now, however, multiple state funding initiatives and university stem cell programs (including the University of Texas and M.D. Anderson) that are philanthropically funded. However, this research must be kept entirely separate from research done with federal money. Baylor has a federal fund grant called the Quantum Grant from the National Institute of Health to be used for research for stroke repair by coupling blood vessel regrowth with the regeneration of nerve cells. This is the only Quantum Grant funded. The future goal is to replace entire organs.

The ultimate goal of stem cell research is to use the cells for therapy, *i.e.*, to inject cells to repair tissue damaged, for example, by a heart attack or Parkinson's disease. The literature suggests this therapy may dramatically improve the damage. Everything is basically in place. We have the facilities, the stem cells, and the methods. We have only to bring everything together. We may have a way to cure disease, and we should do everything possible to make this happen. It is about real life.

The meeting was adjourned at 9:00 p.m.

Submitted,

Evelyn Keyes
Recording Secretary