Case Teaching Notes for "The Case of Eric, Lou Gehrig's Disease, and Stem Cell Research"

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Introduction / Background

This case was first written and used in the fall of 2001, just three months after President Bush's televised speech outlining his guidelines for federally funded embryonic stem cell research. At the same time President Bush created the President's Council on Bioethics, which he envisioned would monitor stem cell research and advise him on bioethical issues. The ensuing debate that continues to rage over stem cell research reflects the confluence of (and the struggle between) science, politics, religion, and disease.

When I originally designed this case study, I considered adding adult stem cell research to the story. After careful consideration, however, I decided that including adult stem cells would make the case study too dense, and as a consequence detract from the ethical issues posed by embryonic stem cell research. I wanted the case to focus the students' understanding on embryonic stem cells, which is surrounded by so much controversy, unlike adult stem cells.

The case study introduces students to 31-year-old Eric, who coaches soccer in his spare time. Eric has begun to show signs of the debilitating and fatal neuromuscular disease, amyotrophic lateral sclerosis (ALS), also known in the United States as Lou Gehrig's disease. Students follow Eric as he is examined first by his physician and then a specialist, undergoes a series of tests, and eventually is given the devastating prognosis. He is also given a ray of hope, a possible cure for his condition. A group of prominent scientists has begun human trials with embryonic stem cell therapy, and Eric is told that he can participate in the experiment if he wishes. But Eric is uncertain about the ethics of the treatment since it requires using stem cells isolated from embryonic or fetal tissue. The story ends with Eric setting out to talk to as many experts as possible about the science, religious implications, and practicality of this cutting-edge technique before he decides whether to be a subject in the study.

Each student or pair of students is assigned one of the experts to whom Eric will speak. The student(s) must investigate, using library and web-based resources, the expert to establish the position held by that person on embryonic stem cell therapy. The students give an oral presentation to the class, taking on the role of the expert, explaining his/her position, and then recommending whether or not Eric should participate in the experiment. After the presentations, the entire class discusses the case.

As written, the case is appropriate for biological science students who have some understanding of vertebrate embryology. I teach it as part of my undergraduate developmental biology course, about six weeks into the semester. It could, however, be modified for non-science students. To do that, the instructor should prepare students by teaching them about basic human development and the difference between embryonic germ (EG) and embryonic stem (ES) cells. In addition, for a non-majors course, the focus could be shifted more towards the political and ethical aspects of stem cell research; one of the scientists could be removed and a representative of another religion, such as Judaism, could be added. To accommodate these changes, the text of the case study would have to be rewritten slightly.

Before beginning the case study, students need to know how to use databases (such as MEDLINE) to gather primary as well as secondary sources of information. They will also need to know how to use the Internet, specifically to go to the National Institutes of Health and various ALS websites. In addition, students must have an understanding of early human development from fertilization and cleavage through the blastocyst and, finally, the formation of a young fetus with primordial germ cells in the gonads as well as the definition of pluripotent stem cells.

Objectives

- To understand the two methods (developed independently by Drs. Thomson and Gearhart) for isolating human embryonic/fetal stem cells: embryonic germ (EG) and embryonic stem (ES) cells.
- To understand the basic theory behind how ES or EG cells could be used to treat a disease like ALS.
- To gain knowledge of ALS, its pathology and prognosis.
- To gather data from scientific sources (primary literature) and public information (reputable websites, government agencies, and newspapers) so each student is fully aware of the position of his/her expert on embryonic stem cell therapy and research.
- To understand the past and present politics (including research regulation and funding) of embryonic stem cell therapy.
- To understand what religious leaders, present Republican politicians, ALS experts, and stem cell scientists think about the ethics of embryonic stem cell research.
- To realize that some recent advances with rats (by the Gearhart lab) have made stem cell therapy for ALS patients more of a reality.
- To be able to clearly express a position on a scientific ethical topic in a short oral presentation using PowerPoint and a short paper.

Classroom Management

Introducing the Case and Assigning Roles/Experts

Three weeks before the students make their oral presentations, I spend 15 minutes of class time discussing the basic premise and objectives of the case study and randomly assign a role/expert to each student or pair of students (we do this in my class by drawing names out of a hat). I give students the case and tell them to read it as homework and come to the next class period with questions. All of the assigned articles are available either via the library's electronic journal subscriptions, the Internet, or on reserve.

The case outlines the specific issues each student must address depending on which expert role they will assume as well as what they will be graded on during the presentation and in the two-page paper. I also describe the minimum number of references they must have and the proper format of those references.

The case also has a subsection that requires students to prepare for their presentations as well as for the final case discussion by researching the following issues.

1. ALS, the conditions of and the prognosis for the disease.
2. The definition of pluripotent stem cells.
3. The difference between embryonic stem (ES) cells and embryonic germ (EG) cells and the techniques used to produce them.
4. The basic theory and challenges related to how ES or EG cells could be used to cure a disease like ALS.

These issues are examined in the detailed case analysis (see Blocks of Analysis, below).

I do not dictate to the students the format of their oral presentations, i.e., I have never specified whether they are actually to portray their experts or rather just to present information about them. Given that ambiguity, students have done it both ways. However, some of the best presentations have been when a student assumes the role of the assigned expert.

Presentations

I have had the students present during a lab period (three hours, which was more than enough time) and in a 75-minute class period. The latter time frame is a little tight for the presentations, questions, and discussions. A more comfortable amount of time would be 90 minutes. Each student/pair of students is allotted approximately 12 minutes to make his/her case. Students are encouraged to ask questions after the presentation, and these often lead to our group discussion of the case. We end with a 20- to 30-minute group discussion, which I generally do not need to lead. Students are energized by the presentations and want to continue talking to their peers about what they have learned. Frequently, a student who had to play an expert with whom he/she disagreed wanted time to explain how difficult it was to do this and why he/she was so strongly opposed to the opinions of that particular expert. If the students are paired up, they must fairly divide the workload. This should be evident in the presentation, as they take turns presenting.

Paper and References

The paper is an abbreviated version of the students' oral presentaion but with references throughout. Only one paper is turned in for each pair of students.

Grading

The presentation is worth about 57% (20/35 points) of the total grade for this assignment. Each student or pair of students is given a grading sheet/rubric for their presentation. The paper is worth about 29% (10/35 points) of the total grade and the references are worth the remaining 14% (5/35 points). The paper is graded on accuracy of information and coverage of the outlined points/questions.

Assessment

At the end of our discussion, each student fills out a self-evaluation or assessment. Students have unanimously agreed that they thought they learned more about the topic by participating in the case study than from a lecture environment. They also all said they learned more than they knew before and very rarely did they feel that a partner did not contribute equally to the project.

Blocks of Analysis

In working through this case, students learn about amyotrophic lateral sclerosis (ALS) as well as explore the science, politics, and ethics of embryonic stem cell therapy and research.

Detailed case analysis is provided in a separate file that is password-protected. To access this information, go to the **detailed case analysis.** You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our **password policy and then apply online** or write to **answerkey@sciencecases.org.**

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Grading the Presentation on the Stem Cell Research Case Study

Student Presenters:
Character: ALS specialist
Grading scheme: √+, √, +, 0

How were each of these points addressed:

1. A complete understanding of the disease. (4)

2. The currently used treatment possibilities and their effectiveness. (4)

3. This person may or may not support embryonic stem cell research – you need to decide what you think seems more likely and then take that stance. (2)

4. Expresses an understanding of the science behind embryonic stem cell research. (2)

5. Understands and clearly states the opinion of person represented. (2)

6. States what this person would advise Eric; this must reflect the person's viewpoint and beliefs about stem cell research. (2)

7. Clarity and organization of talk. (2)

8. Visual aids. (2)

GRADING: _____ /20 = ____ /3

Grading the Presentation on the Stem Cell Research Case Study

Student Presenters:
Character: Dr. John D. Gearhart, Department of Gynecology and Obstetrics, The Johns Hopkins School of Medicine
Grading scheme: √+, √, +, 0

How were each of these points addressed:

1. The theory behind and results of his breakthrough research published in 1998. Include a description of EG cells and how they are derived. (4)

2. His 2003 report on partially curing rats previously paralyzed in a manner similar to ALS by injecting them with human embryonic stem cells. (4)

3. Understands and clearly states the opinion of person represented. (2)

4. States what this person would advise Eric; this must reflect the person's viewpoint and beliefs about stem cell research. (2)

5. Clarity and organization of talk. (2)

6. Visual aids. (2)

GRADE:_____/16 = /3

Grading the Presentation on the Stem Cell Research Case Study

Student Presenters:
Character: Dr. James Thomson, Department of Anatomy, University of Wisconsin School of Medicine and the Wisconsin Regional Primate Research Center
Grading scheme: √+, √, +, 0

How were each of these points addressed:

1. The theory behind and the results of his breakthrough research published in 1998. Include a description of ES cells and how they are derived and cultured. (4)

2. His work on hematopoietic stem cells; although it does not directly relate to curing a neurodegenerative disease, it illustrates the success he has had in stem cell research. (4)

3. Understands and clearly states the opinion of person represented. (2)

4. States what this person would advise Eric; this must reflect the person's viewpoint and beliefs about stem cell research. (2)

5. Clarity and organization of talk. (2)

6. Visual aids. (2)

GRADING: /16 = /3

Grading the Presentation on the Stem Cell Research Case Study

Student Presenters:
Character: Religious scholar
Grading scheme: √+, √, +, 0

How were each of these points addressed:

1. How do various religious faiths address the question of does stem cell research further or hinder the improved health and well being of humans. (6)

2. Pope John Paul II's opinion of stem cell research. How abortion influences the issue. (4)

3. Expresses an understanding of the science behind stem cell research. (2)

4. Understands and clearly states the opinion of person represented. (2)

5. States what this person would advise Eric; this must reflect the person's viewpoint and beliefs about stem cell research. (2)

6. Clarity and organization of talk. (2)

7. Visual aids. (2)

GRADE:_____/20 = /3

Grading the Presentation on the Stem Cell Research Case Study

Student Presenters:
Character: Republican politician/Bush supporter
Grading scheme: √+, √, +, 0

How were each of these points addressed:

1. President Bush's August 2001 decision and televised public announcement concerning stem cell research. What are his regulations? (2)

2. The rationale for Bush's decision. (1)

3. What impact has Bush's regulations had on the Gearhart lab getting any government funding for doing research with their EG cells and on the Thomson lab getting funding to create more ES cell lines. (1)

4. Make clear what the federal regulations are on embryonic stem cell research that is privately (not federal government) funded. (4)

5. Expresses an understanding of the science behind stem cell research. (2)

6. Understands and clearly states the opinion of person represented. (2)

7. States what this person would advise Eric; this must reflect the person's viewpoint and beliefs about stem cell research. (2)

8. Clarity and organization of talk. (2)

9. Visual aids. (2)

GRADING: /18 = /3

Grading the Presentation on the Stem Cell Research Case Study

Student Presenters:
Character: Dr. Kass
Grading scheme: √+, √, +, 0

How were each of these points addressed:

1. His background and education and how he came to become concerned with the "ethical implications of biomedical advance" (report to Committee on Energy and Commerce, Subcommittee on Health, June 20, 2001). (4)

2. His argument against the "Brave New World." His fear that this type of research on stem cells will lead to designer embryos. (4)

3. Expresses an understanding of the science behind stem cell research. (2)

4. Understands and clearly states the opinion of person represented. (2)

5. Address his critics, specifically referring to Drs. Elizabeth Blackburn and Janet Rowley. (2)

6. States what this person would advise Eric; this must reflect the person's viewpoint and beliefs about stem cell research. (2)

7. Clarity and organization of talk. (2)

8. Visual aids. (2)

GRADE:_____/20 = /3

I learned a tremendous amount about the techniques of and research behind embryonic stem cell therapy.

1	2	3	4	5
Strongly agree		Indifferent		Strongly disagree

Through reading this case study and preparing for this project, my ability to analyze the ethical issues surrounding this topic improved.

1	2	3	4	5
Strongly agree		Indifferent		Strongly disagree

I have a much better understanding of the ethical and scientific issues surrounding this topic since working on all aspects of this case study.

1	2	3	4	5
Strongly agree		Indifferent		Strongly disagree

I improved my oral presentation skills by working on this presentation.

1	2	3	4	5
Strongly agree		Indifferent		Strongly disagree

I felt well-prepared for my role in the presentation. I adequately researched the topic, organized my thoughts, and practiced my presentation.

1	2	3	4	5
Strongly agree		Indifferent		Strongly disagree

I believe I learned more about this topic by participating in this a case study than if I had learned it via a single lecture or reading assignment.

1	2	3	4	5
Strongly agree		Indifferent		Strongly disagree