

# Final Assessment

## Decision-Making Framework

Students will be able to:

- Integrate and apply understandings about stem cell science, ethics, and policy issues.
- Utilize a decision-making framework to help them clarify their own ethical position.

**Class Time**

1 class period.

### Introduction

The use of a Decision-Making Framework allows students to integrate their learning from throughout the unit into a coherent whole. It provides them with a methodology for structuring their reasoning in a logical way.

### Materials

Student Handout

6.1 –*Ethical Decision-Making Framework*

Scoring Guide

*Ethical Decision-Making Framework*

### Procedure

1. Give students Handout 6.1 *Ethical Decision-Making Framework*. Explain that when examining an ethical question, it is helpful to have a structured way to reason through the dilemma. One possible ethical question could be: *Under what circumstances, if any, is it ethically acceptable to conduct embryonic stem cell research?*
2. Explain that this framework will integrate material from throughout the unit. Just as the unit started with an understanding of stem cell science, an ethical decision should be grounded in the factual information available. The framework also integrates the idea of stakeholders and their concerns, examines various options, and asks students to relate their chosen solution to a bioethical principle.
3. Students can work through the decision-making framework in small groups or individually. Individuals should complete the last section ('Decision') from their own, personal perspective. The key to sheet 3.4, Biomedical Ethical Principles and Embryonic Stem Cells, may be useful to students in completing the decision portion of their framework.
4. The completed Decision-Making Framework can serve as the basis for the individual or group culminating assessments. Students can complete the Decision-making Framework for homework if not completed in class.



## **Ethical Decision-Making Framework**

### **I. Question**

What is the ETHICAL QUESTION?

### **II. Facts: Known and Unknown**

KNOWN: What are the different types of stem cells? Where do they come from? How do they differ in terms of what they can become?

What other facts are relevant to this question?

UNKNOWN: What additional facts, information, or evidence would be useful in helping to make a decision?

**III. Stakeholders**

WHO are the major stakeholders? Which individuals or groups have an important stake in the outcome? Identify the concerns and values associated with each stakeholder. What do they care about? What is important to them? Pick 6 of the most important stakeholders.

Stakeholder	Stakeholder	Stakeholder
Concerns/Values	Concerns/Values	Concerns/Values

Stakeholder	Stakeholder	Stakeholder
Concerns/Values	Concerns/Values	Concerns/Values

**IV. Options**

What different options are available?  
(Try to identify at least 3)

1.

2.

3.

4.

5.

What are the advantages/disadvantages of each?

**V. Decision**

What is your decision?

Describe the reasons for your decision. Refer to the ethical concepts and principles (autonomy, beneficence, nonmaleficence, justice) in one or more of your reasons.

1.

2.

3.

# Scoring Guide

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Ethical Decision-Making Model Scoring Guide	POINTS POSSIBLE	POINTS RECEIVED
<p><b>Ethical question clearly identified</b></p> <p>5 pts: Question that relates to an ethical dilemma clearly identified.            4 pts: Question suggests an ethical dilemma but is ambiguous, vague, or not clearly identified.            3 pts: Question does not clearly relate to an ethical dilemma or is inappropriate for topic.            0 pts: Question not identified.</p>	5	
<p><b>Sufficient factual information provided</b></p> <p>25 pts: Different types of stem cells, their origin, and their potency are thoroughly discussed. Additional information relevant to the question is provided.            24-20 pts: Different types of stem cells, their origin, and their potency are discussed. Additional information relevant to the question is included. Most relevant information is presented, but some main ideas are missing.            20-10 pts: Different types of stem cells, their origin, and their potency are mentioned but the information is inaccurate or incomplete.            0 pts: Factual information is missing.</p>	25	
<p><b>Additional (unknown) information necessary for decision-making identified</b></p> <p>5 pts: Additional information necessary for decision-making is thoroughly considered, clear explanation of what is lacking is provided.            4 pts: Additional information briefly considered, and explanation conveys what is lacking overall.            3 pts: An attempt to identify additional information is made, but explanation is unclear or not present.            0 pts: Additional information not considered.</p>	5	
<p><b>Stakeholders clearly identified</b></p> <p>10 pts: Major stakeholders clearly identified, and their concerns and values are thoroughly explored.            8 pts: Major stakeholders clearly identified, but without corresponding clarification of their position.            6 pts: Major stakeholders not clearly identified, or irrelevant stakeholders mentioned.            0 pts: Description of stakeholders is missing.</p>	10	
<p><b>Minimum of 3 alternative options generated</b></p> <p>10 pts: 3-5 alternative options described            8 pts: 2-3 alternative options described            6 pts: 1 option described            0 pts: Description of options is missing.</p>	10	
<p><b>Options</b></p> <p>15 pts: Options thoroughly evaluated based on advantages and disadvantages.            14-13 pts: Evaluation of options is adequate, but certain aspects lack depth. The discussion of advantages/ disadvantages would benefit from further exploration and development.            12-5: Evaluation of options is attempted, but important aspects may have been missed or are incorrectly interpreted.            0 pts: Options are not described.</p>	15	
<p><b>Decision clearly identified</b></p> <p>10 pts: Final decision is readily identified.            8 pts: Final decision is identified, but may be unclear or vague            6 pts: Final decision is alluded to, but may be incomplete or fragmentary.            0 pts: Final decision is not identified.</p>	10	

# Scoring Guide

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Ethical Decision-Making Model Scoring Guide	POINTS POSSIBLE	POINTS RECEIVED
<p><b>Justification</b></p> <p>20 pts: Justification includes accurate reference to one or more ethical principles and is thoroughly and thoughtfully developed. The rationale behind the decision is clearly articulated. The explanation is logical and presents clear supporting examples.</p> <p>18 pts: Justification includes accurate reference to at least one ethical principle and is well-developed. The rationale behind the decision is mostly complete. Explanation is logical and presents clear supporting examples.</p> <p>16 pts: Justification may reference to ethical principles, but key concepts/ideas are inaccurately presented or incomplete.</p> <p>Partial reference is made to the consideration of perspectives, facts, and principles involved, but key points may be missing. The rationale behind the decision may be incomplete. The explanation may not follow logically, or less than 3 supporting examples are present.</p> <p>14 pts: The consideration of perspectives, facts, and principles involved is incomplete. The rationale behind the decision is not clearly explained. Evidence of a logical justification for the decision reached is scant or absent, or less than 2 supporting examples are present.</p> <p>12 pts or less: The consideration of perspectives, facts, and principles involved is attempted. Evidence of a logical justification for the decision reached is scant or absent. Supporting examples, if provided, are insufficiently developed or do not relate to the decision made.</p> <p>0: Justification is missing.</p>	20	
<b>TOTAL</b>	<b>100</b>	

ADDITIONAL COMMENTS:



# Individual Culminating Project

## A Letter to the President / President's Council on Bioethics

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Students will be able to:

- Integrate and apply their understandings about stem cell science, ethics, and policy issues in developing a letter to the President or the President's Council on Bioethics.

**Class Time**

1-2 class periods.

### Introduction

This culminating assessment allows students to write a letter to the President or President's Council on Bioethics.

### Materials

Student Handout

*6.2 –A Stem Cell Letter*

Scoring Guide

*A Stem Cell Letter*

### Procedure

1. Students reference their completed Decision-Making Framework as a basis for writing the letter.
2. Provide students with the Student Handout 6.2, Stem Cell Letter, and review the rubric. Students should work individually on completing their letters.
3. Some teachers choose to actually mail the students' letters to the intended recipients.

A policy recommendation letter-writing guide and scoring rubric can be found in *An Ethics Primer*, available to download from the Northwest Association for Biomedical Research ([nwabr.org](http://nwabr.org)).

## **A Stem Cell Letter**

Your assignment is to write a letter, addressed to the President or the President's Council on Bioethics, with your recommendations for future federal policies concerning embryonic stem cell research. In your letter, there should be a clear statement as to whether you, 1) support the current policy or, 2) you believe there need to be changes to the policy, and state those changes. For either position, you need to support your reasoning and cite any sources used.

**TASK:** Write a policy recommendation letter containing the following:

**PRE-WRITE:** Use the decision-making model to organize your ideas.

1. Describe the ethical dilemma surrounding stem cell research.
2. Clearly explain your recommendation(s) concerning funding and regulations to address the ethical dilemma.
3. Provide two supporting ethical arguments. Include reference to the ethical principles.
4. Provide two supporting scientific arguments. Demonstrate your understanding of the science behind stem cell research by using terms and concepts from this unit accurately.
5. Cite your sources.
6. Conclude your letter by thanking the recipient for their time.

**LENGTH:** The paper should not be longer than 3 pages, 12pt font, 1.5 line spacing.

Use the evaluation rubric for additional guidelines for meeting criteria.

## A Stem Cell Letter for Policy Recommendation

	Exemplary	Proficient	Partially Proficient	Developing	Comments
<b>Recognizes and Understands Multiple Perspectives</b>	Student's own thinking becomes more complex and thorough with added perspectives.	Student demonstrates recognition and understanding of multiple perspectives.	Student recognizes and understands some alternate perspectives.	Student struggles to reflect and paraphrase alternate perspectives accurately.	
<b>Communicates Ideas Using Supporting Evidence</b>	2 Ethical arguments are provided. Student states ideas with <b>relevant</b> supporting evidence from several of the following: content presented in class, experience, legitimate sources that are cited in the body of the letter and works cited (at least 2 sources).	2 Ethical arguments are provided. Student states ideas with supporting evidence from content presented in class, experience, or legitimate sources cited in the body of the letter and works cited (at least 2 sources).	Fewer than 2 ethical arguments. Student sometimes states ideas using relevant supporting evidence from content presented in class, experience, or legitimate sources.	Fewer than 2 ethical arguments. Student rarely or never states ideas using relevant supporting evidence from content presented in class, experience, or legitimate sources.	
<b>Demonstrates Understanding and Application of Science Content</b>	2 Scientific arguments provided. Student consistently uses ample content vocabulary appropriately. Scientific statements are factual and thorough. Student is able to apply scientific concepts through examples and integration, even to areas outside the original content.	2 Scientific arguments provided. Student uses content vocabulary appropriately. Scientific statements are factual. Student applies scientific concepts accurately through examples and integration of different concepts.	Fewer than 2 scientific arguments provided. Student is at times able to use vocabulary appropriately. Some facts are incorrect. Student shows limited ability to apply scientific concepts through examples and integration.	Fewer than 2 scientific arguments provided. Student rarely uses vocabulary appropriately. Facts are often incorrect. Student struggles to apply scientific concepts through examples and integration.	

**A Stem Cell Letter for Policy Recommendation**

	Exemplary	Proficient	Partially Proficient	Developing	Comments
<b>Identifies and Addresses Ethical Dilemma</b>	Student correctly identifies dilemma and clearly explains major viewpoints surrounding debate. Recommendations for policy show thoughtful reasoning incorporating both scientific and ethical ideas.	Student correctly identifies dilemma and can express some understanding of viewpoints. Recommendations for policy show thoughtful reasoning, incorporating both scientific and ethical theories.	Student shows limited understanding of dilemma and viewpoints surrounding debate. Recommendations for policy are poorly connected to scientific and ethical ideas.	Student incorrectly identifies dilemma and has not shown understanding of viewpoints surrounding debate. Recommendations are not clearly connected to scientific and ethical arguments.	
<b>Timeliness and Thoroughness / Grammar and Spelling</b>	Student met all deadlines. Work meets all guidelines. In-class time given is always used efficiently and thoughtfully. Evidence also demonstrates much time spent outside of class in writing and improving. No mistakes are made with sentence structure, grammar and spelling.	Student met all deadlines. Work meets all guidelines. In-class time given is often used efficiently and thoughtfully. It is clear that additional time outside of class was spent. Few grammar and spelling errors.	Student met some deadlines. Work meets some guidelines. In-class time given is sometimes used efficiently and thoughtfully. Work reflects some time spent outside of class. Few to many grammar and spelling mistakes.	Student did not meet either deadlines. Work meets only a few of the guidelines. In-class time given is rarely used efficiently and thoughtfully. Work done reflects little time spent outside of class. Many spelling and grammar mistakes	

# Group Culminating Project

## A Grant Application

Students will be able to:

- Integrate and apply understandings about stem cells, disease, and policy issues.
- Develop a research proposal for funding.

### Class Time

- 1-2 class periods to allow students to work together in small groups.
- Providing time with internet access would be helpful.
- 1 class period to evaluate the research proposals.

### Common Misconceptions

The NIH funds a majority of the grant applications it receives.

### Introduction

The culminating assessment allows students to simulate the real life process of writing and presenting proposals for obtaining NIH funding to research treatment for a chosen disease using stem cells. In addition, the students participate on a review panel to evaluate proposal presentations in order to determine which proposals should be funded.

### Materials

Student Handout

*6.3 –A Grant Application*

Scoring Guide

*Grant Proposal Presentation*

### Procedure

1. Students work in small groups to develop a research proposal which uses stem cells to treat a disease of the group's choosing.
2. Teams write a Letter of Intent, and fill out a grant application (Student Handout 6.3).
3. Teams present their proposals to a funding panel made up of their peers.
4. Students participate in the funding panel to evaluate other proposals from their class. A scoring guide is also provided for them.
5. As a class, students decide which proposal(s) get funded, while recognizing only 15% of grant proposals received are funded by the National Institutes of Health.

### Homework

Students can work on portions of the proposal individually at home.

Those with Internet access can do background research and carry out a literature search.

As an individual assessment each student can express personal views on the stem cell debate by writing a letter to a policy maker recommending future regulations and funding criteria.

## A Grant Application

### REQUEST FOR APPLICATIONS

**TITLE:**

Research to Identify Possible Treatment for Disease Using Stem Cell Therapy

**EXECUTIVE SUMMARY:**

**Purpose:** This Request for Applications seeks to provide financial support to researchers interested in the treatment of disease by stem cell therapy. Stem cells have the remarkable potential to develop into many different cell types in the body. Serving as a sort of repair system for the body, they can theoretically divide without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential to either remain a stem cell or become another type of cell with a more specialized function, such as a muscle cell, a red blood cell, or a brain cell. This potential may lead to the treatment and cure of several diseases requiring the replacement of ailing or destroyed tissue.

**Assignment Objectives:** Your research team is responsible for developing a research proposal to develop a treatment for a disease of your choosing. Your team must complete the following tasks:

1. **LETTER OF INTENT:** Submit the names of group members, disease of interest, and preliminary sources for research.
2. **APPLICATION:** Complete Grant Application including specific aim of project and research plan.
3. **PRESENTATION:** Present your proposal to the Funding Panel.
4. **PANEL PARTICIPATION:** You will be a member of the Funding Panel during the presentation of proposals by other groups. During this time you will evaluate the proposals using a rubric as a guide.

**Funds Available:** Due to a limited budget, approximately 15% of NIH grant applicants are approved for funding. There will only be 15% of proposals funded for this project. You will be evaluated by a panel of experts to decide which proposals are worthy of funding.

**KEY DATES:** Letter of Intent due:

Application due:

Presentation:

## **Grant Application**

Department of Health and Human Services Public Health Services

<b>TITLE OF PROJECT:</b>
<b>RESEARCH PLAN</b>
<i>Specific aim of project</i>
<i>Background research significant to project</i>
<i>Laboratory Experience (Planaria Inquiry Lab)</i> Include an explanation of how it relates to the project.

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**RESEARCH DESIGN**

a) **Source** and **potency** of stem cells to be used in research:

b) **Methods:** Describe the research techniques (IVF, SCNT, umbilical cord blood, bone marrow) you will be using to meet the specific aim of your project.

c) **Scientific justification** of stem cell type and research technique to be used. You must include arguments to support your choice.

d) **Ethical justification** of stem cell type and research technique to be used. You must include arguments to support your choice.

**LITERATURE CITED (list all resources used in your research).**



## Scoring Guide – A Grant Application

CATEGORY	5 EXCEEDS CRITERIA	3 MEETS CRITERIA	1 DOES NOT MEET CRITERIA	0 ABSENT	SCORE
<b>AIM OF PROJECT</b>	Disease is identified. Impact of disease on society is addressed. Result desired for cure and/or treatment of disease is clearly explained.	Disease is identified. Results desired for cure is clearly explained.	Disease is not clearly identified. Results desired for cure and/or treatment of disease is unclear.	No aim is presented.	
<b>BACKGROUND RESEARCH</b>	Explains three or more important studies previously conducted on disease. Shows clear understanding of how previous research connects to future studies including team's proposed research.	Explains at least three important studies previously conducted on disease. Explains how proposed project will advance scientific knowledge.	Explains less than three important studies previously conducted on disease.	Does not include summaries of previously conducted research.	
<b>LABORATORY EXPERIENCE</b>	Connects Planaria Inquiry Lab to understanding of stem cells and their potential to treat disease. Clear understanding of how neoblasts and stem cells compare and contrast and why stem cells are more complex.	Connects Planaria Inquiry Lab to understanding of stem cells and their potential to treat disease. Clearly understands differences between neoblasts and stem cells.	Connection to Planaria Inquiry Lab is unclear. Lacks understanding of how neoblasts and stem cells compare and contrast.	Does not include information concerning Planaria Inquiry Lab	
<b>SOURCE AND POTENCY OF STEM CELLS</b>	Source and potency of stem cells to be used in proposal is clearly identified. Shows clear understanding of related vocabulary by giving detailed examples.	Source and potency of stem cells to be used is clearly identified. Understands and uses stem cell vocabulary.	Source or potency of stem cells to be used in proposal is missing or unclear. Does not use stem cell vocabulary correctly.	Does not include source and potency of stem cells to be used in proposal.	
<b>METHODS</b>	Chosen methods are well developed and detailed. Techniques necessary from proposal are correctly identified and appropriate to the aims of the project. Alternatives techniques are considered and evaluated.	Methods are clearly explained. Techniques necessary for proposal are correctly identified and appropriate to the aims of the project.	Methods are not outlined clearly. Techniques are not defined and inappropriate to aims of the project.	Methods absent	
<b>SCIENTIFIC JUSTIFICATION</b>	Scientific justification for source of stem cells contains evidence from more than two pieces of research that they studied. More than three supporting facts are used.	Scientific justification for source of stem cells contains evidence from two pieces of research that they studied. Three supporting facts are used.	Scientific justification based on vague references to their research. Facts are not clearly connected to choice of stem cell source.	Scientific justification absent.	
<b>ETHICAL JUSTIFICATION</b>	Ethical justification uses correct vocabulary and clear expression of ethical ideas. Addresses status of the embryo. Lists more than one objection and responds with appropriate ethical argument.	Ethical justification for source of stem cells contains correct vocab. and clear expression of ethical ideas. Addresses status of embryo. Lists one objection and respond with appropriate ethical argument.	Ethical justification uses some vocabulary. Ethical arguments are unclear. Doesn't address status of embryo.	Ethical justification absent.	

