

Unit Plan

Stage One: Desired Results

Established Goals: Students will be able to explain and model the processes of cell division from growth through anaphase of Mitosis and Meiosis. Students will be able to describe how cells specialize to form tissues which become organs. Students will be able to evaluate various ethical issues surrounding the use/growth/reproduction of human cells and debate the merits of these ethical issues in biology in a student led debate regarding The Immortal Life of Henrietta Lacks.

Standards:

Science 2010

SCI.B.6.1 2010 Describe the process of mitosis and explain that this process ordinarily results in daughter cells with a genetic make-up identical to the parent cells.

SCI.B.6.3 2010 Explain that in multicellular organisms the zygote produced during fertilization undergoes a series of cell divisions that lead to clusters of cells that go on to specialize and become the organism's tissues and organs.

SCI.B.6.4 2010 Describe and model the process of meiosis and explain the relationship between the genetic make-up of the parent cell and the daughter cells (i.e., gametes).

Common Core Standards for Science

Key Ideas and Details

9-10.RS.1 Cite specific textual evidence to support analysis of science texts, attending to the precise details of explanations or descriptions.

9-10.RS.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

Craft and Structure

9-10.RS.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific context relevant to grades 9-10 texts and topics.

9-10.RS.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

Stage One: Desired Results

Data Used:

Debating Rubric and Cells Exam

Understandings:

Students will understand that...

1. All organisms are made up of cells.
2. Cells grow and divide by the process of either mitosis or meiosis.
3. The phases of cell growth include Interphase which is made up of G1, S, and G2.
4. The phases of cell division include Interphase, Prophase, Metaphase, Anaphase, Telophase, and Cytokinesis
5. Cells specialize to form tissues which form organs
6. There are ethical dilemmas in many areas of biology surrounding the use of human cells.

Essential Questions...

1. What are the steps in the process of gamete cell growth and division?
2. What are the steps in the process of somatic cell growth and division?
3. How are tissues and organs formed?
4. What are the legal and moral concerns of using human tissues and cells in science for testing and other purposes?
5. Consider the tension between religion and science, on what subjects do these institutions overlap or not overlap, and where do they function to inhibit or enhance each other?

Students Will Know...

1. Cells are the most basic unit of life.
2. Growth, Mitosis, and Meiosis are the processes of cell division.
3. Science cannot answer all questions (the tentative nature of science) but it is a framework for how we answer and solve difficult problems.
4. Morality and law are important in science (subjective nature of science) and determine the "limits" of science.

Students Will Be Able To...

1. Analyze and debate the ethical issues of the use of human cells in science testing.
2. Model the process of cell growth and division.
3. Describe that cells are the basic unit of life which specialize to form tissues, organs, and organ systems resulting in a complex organism.

Stage Two: Assessment

Performance Tasks: Debate, Cell Exam

Self Assessments: Exit slips, Homework, Closure Activities.

Standard Assessments: n/a

Other Assessments: Debate Rubric

Stage 3: Learning Plan

Learning Activities: *Instead of dividing my activities into weeks or days, I have chosen to divide my weeks into case study engagements. Students will spend time on each case study investigating articles, books, videos, multimedia, and lectures to connect the science of cell biology and the historical ethical issues described by The Immortal Life of Henrietta Lacks. The case studies are designed in to take about a week. During the entire unit students will be reading TILHL, but the main demonstration of the knowledge gained will be in the debate at the end of the unit*

Case Study #1: The Basic Unit of Life: The Cell

- Cell growth
- Cell division
- Lab on cell growth

Case Study #2: Cells and the Body

- Tissues
- Organs
- What are Stem Cells?
- Genetic Engineering--GATTACA

Case Study #3: Ethics

- Stem Cells
- Genetic Testing
- Human Trials
- HeLa
- Legal rights to samples from the human body

Case Study #5: Student led debate

- **Students will be grouped for a debate of ethical issues either student choice, book themes, or reflective of controversial Supreme Court Cases.**

Differentiation: During each case study, students will be provided with articles at various reading levels allowing them to self select an article or engagement at their appropriate level.

Resources: Case study packets created by instructor

Book Synopsis

A Summary By Random House, Inc.

In 1950, Henrietta Lacks, a young mother of five children, entered the colored ward of The Johns Hopkins Hospital to begin treatment for an extremely aggressive strain of cervical cancer. As she lay on the operating table, a sample of her cancerous cervical tissue was taken without her knowledge or consent and given to Dr. George Gey, the head of tissue research. Gey was conducting experiments in an attempt to create an immortal line of human cells that could be used in medical research. Those cells, he hoped, would allow scientists to unlock the mysteries of cancer, and eventually lead to a cure for the disease. Until this point, all of Gey's attempts to grow a human cell line had ended in failure, but Henrietta's cells were different: they never died.

Less than a year after her initial diagnosis, Henrietta succumbed to the ravages of cancer and was buried in an unmarked grave on her family's land. She was just thirty-one years old. Her family had no idea that part of her was still alive, growing vigorously in laboratories—first at Johns Hopkins, and eventually all over the world.

Thirty-seven years after Henrietta's death, sixteen-year-old Rebecca Skloot was a high school student sitting in a biology class when her instructor mentioned that HeLa, the first immortal human cell line ever grown in culture, had been taken from an African American woman named Henrietta Lacks. His casual remark sparked Skloot's interest, and led to a research project that would take over a decade to complete. Her investigation of the true story behind HeLa eventually led her to form significant—and in some cases, life-changing—relationships with the surviving members of the Lacks family, especially Henrietta's daughter, Deborah.

In telling Henrietta's story, Skloot draws from primary sources and personal interviews to provide insightful narrative accounts of Henrietta's childhood, young adulthood, diagnosis, illness, and tragic death. She also explores the birth and life of the immortal cell line HeLa, and shows how research involving HeLa has changed the landscape of medical research, leading to not only scientific and medical breakthroughs, but also new and evolving policies concerning the rights of patients and research subjects.

As the story of HeLa unfolds, so does the story of Henrietta's surviving children, who for two decades were unaware of the existence of their mother's cells—and the multimillion-dollar industry that developed around the production and use of HeLa. Central to this narrative is the relationship between Skloot and Deborah. As Skloot tenaciously worked to gain Deborah's trust, Deborah struggled to understand what had happened to her mother and her mother's cells. The result of their relationship is an illuminating portrait of the enduring legacy of Henrietta's life, death, and immortality.

Jurskis, Amy. *The Immortal Life of Henrietta Lacks Teachers Guide*. New York: Randomhouse, 2012. <http://rebeccaskloot.com/wp-content/uploads/2011/03/RHsklootTeachersGuideLORES.pdf>

Rationale

The Immortal Life of Henrietta Lacks is a revealing story of a woman whose cancerous cells were taken from her and used to in the laboratory by hundreds of thousands of scientists as the first human cells which could be reproduced and grown in the lab. The use of these cells resulted in the development of some of the most radical medical advances of the twentieth century. The story explores the personal history of Henrietta Lacks, as well as her surviving family's story. The book is an excellent selection for high school age or advanced middle school age students because of the thought provoking topic which raises an innumerable amount of ethical questions in science.

It would be important for a teacher to consider some of the sensitive issues of the story revealed by the author, who acknowledges at a few points in the novel that the story she is sharing is a highly personal and sensitive one for the Lacks family. The fact that the author herself acknowledges this fact could, and should, trigger discussions of personal rights and the sharing of sensitive information--the reasons policies like HIPAA exist. Some of the sensitive topics include incest, mental illness, alcoholism, depression, poverty, and racism.

While these topics are often difficult for teachers to teach about, let alone bring up in the classroom, teachers should not shy away from these issues because they represent legitimate personal experiences. Furthermore, they exist because they are aspects of society that we can learn from and fix when they are acknowledged and students are educated about them. By ignoring these issues, teachers ignore their power to be agents of change and their influence to validate students who have had diverse personal experiences and have previously been made to feel unimportant, or illegitimate, because of who they are, or where they come from.

Through teaching this book in a science class, teachers have the unique opportunity to provide an interesting context to students learning about a subject which is often criticized for being too decontextualized and fragmented. Using this piece in science courses can also help to target students who are not as strong with mathematical or analytical thinking skills. By using a non-fiction piece to differentiate to these students, it is more likely that these students will successfully learn and master the difficult content.

Things Students Need to Know

Prior to beginning this unit on cell growth and reproduction, and in order for students to be able to understand the book, students need to understand...

...the structure of the cell and its organelles.

...the macromolecules which perform work in the body (proteins, DNA, carbohydrates, and lipids).

...the science of cancer, cancer cells, and cancer treatment history.

...the difference between nonfiction, creative nonfiction, and historical fiction.

...how medical treatment was different before and after the civil rights movement.

...Jim Crow Laws

...the importance of genetic diversity for health (typically covered in ecology but students may need help making this connection in the human population).

...how incest affects genetic diversity.

It would be helpful, but not entirely necessary for students to...

...be able to see scientists working with human cells in the laboratory setting.

...be able to see human cells under the microscope.

...have a question and answer session with a scientist who works with human cells in the laboratory.

Writing, Grammar, and Vocabulary Integration

While this is not an English class, throughout this unit, it will be important to address the vocabulary and grammar needs of the students reading The Immortal Life of Henrietta Lacks. This book may present significant difficulty to students who are lower level reading students; it is important to remember if the book is used in its entirety it should be with high school and upper level middle school readers. For diverse learners, it would be helpful to select specific sections of the book, or provide alternatives like group reading or read aloud sessions.

In order to address the vocabulary needs of students, I plan to integrate key vocabulary into vocabulary with the overall unit on cells. A unit on cells typically includes many new words for students which can only be learned in the context of the lessons themselves. To learn the new vocabulary I plan to use the following activities to teach mini-lessons on vocabulary, grammar, language construction, formal and informal voice, and scientific voice...

...Vocabulary Journal Keeping

In their interactive notebooks students will have a specific section designated to vocabulary for the unit on cells and The Immortal Life of Henrietta Lacks. Students will record their words in this section as well as one definition and sentence where they appropriately used the word.

...Vocabulary Trading Cards

Students will create a pocket in their notebook for vocabulary trading cards. At designated times in the unit, students will be instructed on a game or a trading period for their cards.

...Mini Jigsaw Session

Using a mini jigsaw, students will interact with small selected readings either from the text, journal articles, or their textbook to investigate voice and how writers use voice to convey meaning. They will share their findings with the class.

...Challenge Me

Students will be asked to challenge the teacher by recording a page number, paragraph number, and line number of a section of The Immortal Life of Henrietta Lacks which challenged them. They will be instructed to select a piece where they struggled to understand content, grammar, or other part of the section (these sections should be flagged with Post-It or other device per reading protocol). Teacher will then collect the pieces of paper in a hat/bag/box (or other anonymous manner) and address student needs in a mini-lecture which incorporates ideas, or addresses pieces separately for student understanding.

...Close Reading

There are some sections of The Immortal Life of Henrietta Lacks which should be addressed in a close reading setting. I would plan to have students read the small section and interact with the text through a free write and share activity, a whole class discussion, small section lab group discussions, or a reading circle activity.

Discussion Generation

The Immortal Life of Henrietta Lacks presents many opportunities to engage with students in discussion settings. The issues detailed below are just a few of many ideas for topics to use to “get students thinking.”

1. What is informed consent?

How do we give our consent? What kinds of consent do we give?

Think about the consent forms you or your parents sign for you to be able to participate in things like school, clubs, soccer tournaments or to receive treatments, surgeries, or medical attention.

Do you or your parents read the forms? If you do, do you understand what they say? Did Henrietta give consent for the doctors to take her cells? Look at the consent form on pg 31, do you believe the researchers had the rights to obtain a sample from Henrietta’s cervix to use in research?

2. How do we think about birth and death?

What are the implications of the author’s decision to use the term “birth” to describe the initial growth of HeLa cells? How do we consider birth and death? How does science define birth and death? Do these two definitions differ? How are these natural processes influenced by religion and faith? Why do you think these natural processes influenced by religion and faith?

3. Who has ownership?

Who owns human samples? Should people have ownership over the cells and tissues in their body? In the Afterword, Skloot summarizes the main issues and legislation surrounding the collection and use of human tissue samples. Using her summary, examine the evolution of laws concerning tissue research. Should people be given legal ownership of, and/or control over, their tissues? What implications does this have for science? Predict what this would have meant for Henrietta and her family?

4. What is the role of journalism in science?

Discuss the historical and contemporary influence that journalists writing about science have had on public perception and understanding of the subject. Why do you think science reporting is often sensationalized? Why is it important for science reporting to be accessible? How has fear or lack of understanding influenced public policy relating to science?

5. Why do you think there is a tension between science and religion?

There is often a tension between religious faith and science. Explore the importance of both religious faith and scientific understanding in the lives of the Lacks family. How does religious faith help frame the Lackses’ response to, and interpretation of, the scientific information they

receive about HeLa? How does Skloot's attitude toward the relationship between religious faith and science evolve as a result of her relationship with the Lacks family?

In addition, the following questions could be used to stimulate discussion...

1. What are the ethical concerns of cloning?
 - a. What are the ethical concerns of stem cell research?
 - b. What are the ethical concerns of using human samples?
2. How far is too far in science?
3. How do you predict society would change if we were able to select some genes to be expressed and others not to be, in other words "designing"?

Related Books

Invisible Frontiers: The Race to Synthesize a Human Gene

Stephen S. Hall

Invisible Frontiers is the story of the birth of the biotechnology industry through the synthesis of the first human gene and the subsequent production of human insulin or humulin. The story follows the work of major scientists throughout the country from Harvard and MIT to UCSF and Eli Lilly and their individual work, collaborative work, or thriving competition to synthesize a human gene. Stephen Hall does a fantastic job of creating images and metaphors which give the complex science he describes context and simplicity. The interviews featured in the story offer perspective of real scientists and give great insight into the nature of laboratory work most people would never be able to see. Both *Invisible Frontiers* and *The Immortal Life of Henrietta Lacks* share the true background stories of significant scientific contributions. They share similar themes of challenging ethics, the nature of science, genetics, and cellular biology.

Survival of The Sickest

Sharon Moalem

Survival of the Sickest describes the human relationship to health and disease from an evolutionary perspective. Moalem challenges readers to consider the way they think of illness and our bodies. He describes that the conditions we have today are things which might have given our ancestors a leg up on the competition against fighting disease. With many small asides, the book can be read in independent chapters making it ideal for case study reading or reinforcing learning about any topic. The book also offers readers the chance to understand the diversity of culture and background and how this knowledge is a powerful tool for disease prevention. Readers have the opportunity through this book to learn about challenges facing particular demographics of people, the historical relevance of diseases, and the evolutionary relatedness of conditions we have today and the diseases we may develop in the future. It shares the similar themes of genetics, and health.

Dr. Franklin's Island

Ann Halam

An airplane crashes in the jungle of Ecuador and the only survivors are three children, Semi the narrator of the story, Miranda, and a boy Arnie. The children are taken hostage by Dr. Franklin and his assistant Dr. Skinner. The doctors perform transgenetic experiments on the children turning them into either a bird or a manta ray or a snake. The story has many twists and turns and is a larger metaphor for learning trust, pain, moral responsibility, and human identity. It challenges readers understanding of our interference and interaction with nature

and natural relationships. While this is a fiction book, it share the similar theme of ethics in science with *The Immortal Life of Henrietta Lacks*, but in a creative, science fiction setting.

The House of the Scorpion

Nancy Farmer

The story is set in the future in the country of Opium controlled by drug lord Matteo Alacran or El Patron who is 148 years old. The main character, Matt, is a clone of El Patron who the drug lord plans to use for his organs when his own begin to fail. Matt was grown from a set of cells taken from El Patron long ago and were implanted in a surrogate. When Matt is young, he was treated like a contaminated animal and abused by people on El Patron's compound until El Patron learned of his condition and brought him into his home to protect him. However, Matt does not know about his true identity and purpose until it is revealed to him in a cruel joke. Finally El Patron has a heart attack and it becomes apparent that Matt will have to provide him with a new heart so he and Maria, his love, attempt to flee, but he is caught and brought back to the house to be prepped to give El Patron a new heart. However, Celia, the cook who cared for Matt while he was young, was slowly poisoning him with arsenic so when his organs are implanted they will kill El Patron. The story ends with El Patron and his workers dying, and Matt dismantling El Patron's regime. This story, while fiction, relates to *The Immortal Life of Henrietta Lacks*, through the topics of cellular growth and reproduction, as well as scientific ethics.

Eva

Peter Dickinson

Eva wakes up from an accident to find she is paralyzed. Her family assures her she will be fine and she soon learns that she is actually a chimpanzee. In her accident her body was so badly damaged that her consciousness was transferred to a chimpanzee using an experimental procedure. Eva learns to adapt to her new body, but she has strange dreams of places she has never seen before, and that Kelly, the chimp she was transplanted to, has never experienced. Eva learns she must accept the chimp parts of herself. She attends school and spends time adjusting to chimp life in the Reserve with the other chimps. She meets another chimp there called Sniff who is intelligent and intrigued by her. Then, she meets Grog Kennedy an animal rights activist who prompts her that the chimps should return to the wild because human populations are in decline and will not take care of the captive animals for much longer. They devise an escape plan, and Eva escapes with the other chimps to an island near Madagascar. Eva cuts herself off from other humans to save the chimpanzee population and the tale ends with her forty-one years later imagining a future where her band of chimpanzees becomes the new dominant race. This story shares the central theme of ethics in science as a new experimental procedure is used to save the life of a young girl gravely injured in an accident. It is a fiction book, but is a story which would be suitable for students with diverse needs because of it's readability and storyline.

Student Activities

While *The Immortal Life of Henrietta Lacks* will be read in majority independently, the following activities are designed to increase student engagement and learning about science will using the book as a guide. When used together the following pre-reading, during-reading, and post-reading activities will helps students to meet the long-range goals, big ideas, enduring understandings, and essential questions outlined in the unit map.

Pre-Reading Activities

K, W, L, R Chart (Gallagher, 43)

In their science notebooks, students will create a KWLR chart with four columns (See “Pre-Reading Activity-One” below). In a whole class activity, the instructor will lead students through the first few columns of the KWLR activity by brainstorming with students. It would be helpful to prompt students with the topics they would need to know before reading the book (See “Things Students Need to Know” above) in addition to the book title, and ideas of cell growth and division. This way student can be accessing background knowledge that will help them in reading the book and connect to the information they will be learning about cell growth and division. The instructor will then take students through the W, or Want to Know section. Students will record the class notes in their notebooks. As the reading continues, students will be provided with time to update their L, or Learned, sections. At the conclusion of the book students will complete their R sections, or post-reading research. This is a critical section in a science class because it models the scientific process which usually ends with more questions than answers.

Agree or Disagree

Many of the issues brought forward in *The Immortal Life of Henrietta Lacks* are controversial issues in science. As a part of this unit, the instructor should be encouraging students to consider their personal values and challenging their opinions with scientific facts and events. This activity is planned to get students thinking about the reading, as well as considering how events and ideals shape science in preparing for the debating process at the end of the book and unit. In this activity, students will receive a piece of paper with various agree or disagree statements. They will be asked to paste the paper into their notebooks and respond to the statements by circling agree or disagree. They will also be asked to share their rationale by writing about two statements. Students will be asked to turn to their elbow partner to share their response for one question. See “Pre-Reading Activity-Two” below.

If/Then Statements

This activity is designed to prepare students to think like a scientist and use what they know to predict out comes through hypothesizing. Students will receive a sheet of paper to paste in their notebooks. It will contain the stems of If/Then statements. Students will be asked to finish the statements and then create some of their own statements about cells, life, or science. The stems of the statements will include themes from *The Immortal Life of Henrietta Lacks*, as

well as facts about cell growth and division. Students will have the opportunity to review these statements at the end of the unit for their validity and then asked to revise their statements. This represents the empirical nature of science as science is always changing as we learn more information. See “Pre-Reading Activity-Three” below.

During Reading Activities

Focus Groups (Gallagher, 59)

Focus groups would be an important during reading activity for this book because of it's complexity. Students would be grouped by their lab groups, which would be a heterogenous mix of student ability levels, backgrounds, and genders. The focus groups would be responsible for their different topics and would meet throughout the unit to compile notes in their notebooks. They would then present out to the class their notes and important facts from their groups periodically. This activity would serve to help students make connections to science content and gains in presentation and speaking skills for their final debate. For *The Immortal Life of Henrietta Lacks* the focus topics would include...

1. Henrietta Lacks
2. Rebecca Skloot
3. Dr. George Gey
4. Deborah Lacks
5. Theme 1: Relationships. Those in the book between family members, doctors and family members, the author and doctors
6. Theme 2: Ethical debates.
7. Theme 3: Moral Issues.
8. Theme 4: Race.
9. Theme 5: Science of cells

Trouble Slips (Gallagher, 69)

Because of the challenging nature of the text, students would need to have some strategy for monitoring their reading comprehension as they worked through the book. Troubles slips function like book mark pieces where students can mark particular spots of difficulty. The trouble slips could be used in tandem with vocabulary or grammar troubles. The instructor should collect the slips and either address concerns as a class, or pass the slips back out to students who work collaboratively through the troubling areas. See “During Reading Activity-Two” below.

Say/Mean Chart (Gallagher, 92)

In their student notebooks, students will create a T chart with “Say” on the left side, and “Mean” on the right side. This activity functions to prompt higher level reading and deeper connections to the scientific information in the text. Students will record important passages of their choice, which is the literal comprehension, and then on the right, they will write what the

passage means, the inferential comprehension. Students will be scored in this activity based on the number of passages they choose and the detail of their inferential comprehension notes. This activity will help students make connections with some of the more difficult sections of the book. See “During Reading Activity-Three” below.

Post Reading Activities

Most Valuable Idea (Gallagher, 159)

After finishing the reading for *The Immortal Life of Henrietta Lacks* students will be asked to create a page in their notebooks dedicated to understanding the main idea of the book. Students may choose whatever they believe to be the main idea for the book and they are to communicate it in a complete sentence at the top of the page. Then students write in a T chart below this sentence. On the left side of the chart, student paste an article from a paper or magazine which also has the same main idea as the book. On the right side of chart students write their rationale for why this idea is relevant today and how the article and the book are connected. This activity helps students to make connections between this book and events happening around them everyday. From this activity students will come to a better understanding that questions in science play an important part in our everyday lives. See “Post Reading Activity-One” below.

Hunt for the Authors Purpose (Gallagher, 165)

In this activity students will create rationales for what they believe to be the authors main purpose of the book. They will write a short rationale complete with three evidences. These will then be compiled by the teacher and used to inform the debate activity. Students with like ideas will be grouped for debates on the themes they identify to be important in the *The Immortal Life of Henrietta Lacks*, positions will be assigned by the instructor. Students will be posed with a question and then allowed one class period to compile research to support their position. In the next class period students will complete their debate in their peer groups. See “Debate Rubric” below.

Pre Reading Activity-One

Example of a KWLR chart (Each student fills out L and R sections for themselves).

K	W	L	R
<ul style="list-style-type: none"> • Every living thing is made up of cells. • Immortal means to live forever. • All cells contain DNA • DNA is made up of the bases Adenosine, Guanine, Cytosine, and Thymine. • Cancer can be deadly. • Cancer is the uncontrollable growth of cells. • When people have cancer sometimes they have to get chemotherapy. • Henrietta is my Grandma's name • Cells are made up of organelles like mitochondria, nucleus, and lysosomes. 	<ul style="list-style-type: none"> • Who is Henrietta Lacks? • How do we get bigger? • Why is cancer so bad? • How do they test medicine? • How can you live forever? • Why are cells so small? • How do scientists test cells? • How do we know if cells are bad? • What are stem cells? • What is HIPPA? • What is consent? 		

Pre Reading Activity-Two

Please circle whether you "Agree" or "Disagree" with the following statements. Please provide your rationale to two or more statements.

Agree or Disagree No matter the circumstances, I think it would be cool to live forever.

Rationale:

Agree or Disagree Using animals to test human medicines is an important part of the discovery process for modern drugs.

Rationale:

Agree or Disagree I think it is important for other people, besides me and my doctor, to have access to my medical information

Rationale:

Agree or Disagree I think it is okay for my doctor to take samples from my body like hair, cells, or tissues, to test for diseases or to use in research.

Rationale:

Agree or Disagree It is okay to test a baby for a genetic condition before it is born.

Rationale:

Pre Reading Activity-Three

Complete the following statements. Your response should reflect a viable “then” consequence to the “If” stem of the sentence.

1. If cells were to live forever, then _____.
2. If scientists were to cure cancer, then _____.
3. If cells grow uncontrollably, then _____.
4. If scientists test babies for genetic conditions before they are born, then _____.
5. If there is not enough genetic difference between parents, then _____.

During Reading Activity-Two

Page Number: 10

Paragraph Number: 2

What seems to be the trouble?

References to mitosis? What is this process? Where does it take place? What does it have to do with cells?

Words, grammar, or other concerns?

Mitosis, anaphase, telophase

During Reading Activity-Three

Say	Mean
<ol style="list-style-type: none"> 1. One of her doctors wrote: 'Told she could not have any more children. Says if she had been told so before, she would not have gone through with treatment.' But by the time she found out, it was too late" (p. 48) 2. "...it as understood that black people didn't question white people's professional judgement" (p. 63) 3. "But I tell you one thing, I don't want to be immortal if it mean living forever, cause then everybody else just die and get old in front of you while you stay the same, and that's just sad." 4. Lurz sat in his chair, legs crossed, looking at the photo of Elsie. "You have to be prepared," he told Deborah, his voice gentle. "Sometimes learning can be just as painful as not knowing." (p. 271) 5. "I later learned that while Elsie was at Crownsville, scientists often conducted research on patients there without consent, including one study titled "Pneumoencephalographic and skull X-ray studies in 100 epileptics." (p. 276) and "Since at least the 1800s, black oral history has been filled with tales of 'night doctors' who kidnapped black people for research. And there were disturbing truths behind those stories" (p. 165). 	<ol style="list-style-type: none"> 1. People are not always well informed of the true consequences of medical procedures by those who are most educated and responsible for our treatment. Whose responsibility is it to share the meaning of treatments in layman's terms if doctors cannot do so? 2. In some cases the lies of racist culture had been indoctrinated so deeply that people did not even realize they were not unequal and that they had rights to understand medical treatment. 3. Living forever means nothing if you don't have anyone to share it with; you would witness people grow old and change and you would always be stuck in one place. 4. Learning and understanding important things about science and about life are not always straightforward, and as we come to know more things our world views become more complicated than they become clear. 5. Scientists have not always obtained consent from groups who they did not feel had equal rights. Sometimes they conducted hurtful studies on groups who could not give their consent to the medical team.

Post Reading Activity-One

Shelbi's "Most Valuable Idea" from *The Immortal Life of Henrietta Lacks*

MVI: *Sometimes people make decisions they feel are important for the "good" of the group, but are not always the correct moral or ethical choices.*

Human genome sequencing: the real ethical dilemmas

While many of the dystopian predictions of human genome sequencing have proved alarmist, there are some real questions to be addressed. Science alone cannot provide the answers.

By Mark Henderson

Good science fiction always tries to be thought-provoking about the present, not just the future. Rarely has this been accomplished as successfully as in Andrew Niccol's movie *Gattaca*. Released in 1997, just as the sequencing of the human genome neared completion, this dystopian vision portrayed a world divided by DNA. Power and prestige are the preserve of "valids" with ideal genomes, while the genomic flaws of the "in-valids" mark them out as a genetic underclass. It immediately became an influential frame for the ethics of a nascent technology as it emerged into public view.

As our ability to read DNA and apply its insights to medicine has advanced in the decade and a half since *Gattaca*, its influence on public discussions of genomics has continued to be felt. Optimism about the potential health benefits of DNA sequencing is invariably matched by concern about pernicious new kinds of discrimination. For the most part, the cautious discussion this has catalysed has been welcome. The advent of personal and medical genomics does pose challenges for society, which ought to be resolved through broad public engagement. They can't be settled by science alone.

The *Gattaca* frame, that DNA means destiny and discrimination, has however outlived its usefulness. The deeper understanding of genetics unlocked by the genome sequence has shown that many of society's fears are founded on a misconception. And as genomics starts to create real opportunities to deliver better patient care – the US National Institutes of Health last week announced pilot studies to evaluate sequencing of newborn babies – there is a danger that these fears will divert us from more pressing issues that we need to think through.

The misconception that drives many a myth about genomics is that it is a simple and deterministic science. This is not just born of *Gattaca*, but of headlines that proclaim the supposed discovery of "genes for" obesity, binge-drinking and so on, and of the long-running and often futile nature versus nurture debate. It also reflects the way many of the first genes discovered to have medical importance are indeed deterministic – people with the Huntington's mutation will get the disease, as will those with two copies of the recessive cystic fibrosis variant.

But for the most part, the genome does not work this way. Genomics is much better understood as a complex and probabilistic science, in which a constellation of genetic variations makes the odds, but many other factors, environmental as well as biological, decide the outcome.

This intricate model, to which nature and nurture both contribute, applies to most of the major causes of ill health – most cancer and heart disease, diabetes and mental illness. It applies, too, to broader traits such as intelligence, personality and risk-taking. And it has some important consequences for genome ethics.

As soon as we consider genetics this way, the risks of substantial discrimination loom less large. It is just not going to be possible to undertake simple genetic tests for intelligence, say, or athletic ability, and to be confident in the results. Too many genes are involved, never mind environmental factors. An employer who wants to hire bright staff will always get more reliable results from a relevant aptitude test. Height is strongly influenced by genes, but nobody in their right mind would measure it with a DNA test. So it is with other complex traits. There may be a case for outlawing genetic discrimination, but because it won't work, not because it will.

Even where health is concerned, a probabilistic view can be reassuring. Here, the great concern is about insurance, that providers will demand genetic profiles before cherry-picking only the best risks, leaving many people uninsurable. Yet this fear assumes there is such a thing as a perfect or near-perfect genome. The probabilistic view tells us that everyone will have elevated genetic risks of certain conditions, but that these differ from person to person: mine might be diabetes, yours cancer. Insurance companies are businesses in need of customers. If they rule out everyone at high genetic risk of disease, they will have nobody to cover. We may need a new safety net to protect the minority with truly deterministic genetic variations, such as Huntington's carriers, but for the rest of us, the market will likely suffice.

Thinking this way does not mean that genomics poses no social or ethical challenges – far from it. If a genome does not always predict, it can identify, raising questions around privacy and access. Should medical DNA records be released to the police? Should parents be allowed to view their children's genomes when this could reveal unexpected paternity or more?

We also need to think hard about the kind of genomic information it is appropriate to share directly with patients and doctors, and how they can be helped to interpret the complex probabilities it might reveal. When data might be alarming but uncertain or not actionable, do we have a right to know? How do we best protect against genomic snake oil, the dubious "health horoscopes" that have already hit the market?

These are important issues without easy answers, which we have to debate as a society. We can't afford to be distracted by intriguing thought experiments which don't match up with the science. Like good science fiction, good public engagement has to be informed by reality. Science might not have the answers, but it can help with the questions.

Explanation of Connection

*Both *The Immortal life of Henrietta Lacks* and this article address the idea of unintended consequences of science advances which challenge morals and ethics in science. There are many questions science can answer but there are also those which we have to answer for ourselves.*

While genetic screening represents an option which could help parents to prepare for the medical needs of their children, it could also quickly lead into genetic design and discrimination based on superior genetics. DNA sequencing is just one facet in the complex issue of genomics, but it is highly contested and debated because of how quickly it could lead into this and other ethical dilemmas.

*The *Immortal Life of Henrietta Lacks* describes many of the ethical debates in science which have led to the development of the Nuremberg Codes, HIPAA, informed consent, and many other clarifications of human rights. When Dr. Gey was working to reproduce human cells in the lab, he would have had no idea that his advancement which changed the face of science and medicine would have also led to other advances for human rights.*

Class Debate Rubric

Category	5	4	3	2	1	Totals
Respect for Other Team	All statements, body language, and responses were respectful and were in appropriate language.	Statements and responses were respectful and used appropriate language, but once or twice body language was not.	Most statements and responses were respectful and in appropriate language, but there was one sarcastic remark.	Statements, responses and/or body language were borderline appropriate. Some sarcastic remarks.	Statements, responses and/or body language were consistently not respectful.	
Information	All information presented in this debate was clear, accurate and thorough.	Most information presented in this debate was clear, accurate and thorough.	Most information presented in the debate was clear and accurate, but was not usually thorough.	Some information was accurate, but there were some minor inaccuracies.	Information had some major inaccuracies OR was usually not clear.	
Rebuttal	All counter-arguments were accurate, relevant and strong.	Most counter-arguments were accurate, relevant, and strong.	Most counter-arguments were accurate and relevant, but several were weak.	Some counter arguments were weak and irrelevant.	Counter-arguments were not accurate and/or relevant.	
Use of Facts/Statistics	Every major point was well supported with several relevant facts, statistics and/or examples.	Every major point was adequately supported with relevant facts, statistics and/or examples.	Every major point was supported with facts, statistics and/or examples, but the relevance of some was questionable.	Some points were supported well, others were not.	Every point was not supported.	
Organization	All arguments were clearly tied to an idea (premise) and organized in a tight, logical fashion.	Most arguments were clearly tied to an idea (premise) and organized in a tight, logical fashion.	All arguments were clearly tied to an idea (premise) but the organization was sometimes not clear or logical.	Arguments were not tied well to an idea.	Arguments were not tied to an idea at all.	
Understanding of Topic	The team clearly understood the topic in-depth and presented their information forcefully and convincingly.	The team clearly understood the topic in-depth and presented their information with ease.	The team seemed to understand the main points of the topic and presented those with ease.	The team seemed to understand the main points of the topic, but didn't present with ease.	The team did not show an adequate understanding of the topic.	
Presentation Style	Team consistently used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Team usually used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	Team sometimes used gestures, eye contact, tone of voice and a level of enthusiasm in a way that kept the attention of the audience.	One or more members of the team had a presentation style that did not keep attention.	The team's presentation style did not keep the attention of the audience.	
Totals:						

Citations

Gallagher, Kelly. *Deeper Reading: Comprehending Challenging Texts, 4-12*. Portland, Me.: Stenhouse, 2004. Print.

Jurskis, Amy. *The Immortal Life of Henrietta Lacks Teachers Guide*. New York: Randomhouse, 2012. <http://rebeccaskloot.com/wp-content/uploads/2011/03/RHsklootTeachersGuideLORES.pdf>

Skloot, Rebecca. *The Immortal Life of Henrietta Lacks*. New York: Broadway Paperbacks, 2011. Print.