Using Primary Sources to show the Shifting Understanding and Public View of Cancer throughout the Last Century

Lesson Overview

Overview: This lesson is designed for high school level biology students. This lesson focuses on cancer and the history of the development of cancer research. After discussing cell division and normal mitotic divisions in the body, we will discuss what cancer really is and the abnormalities in the normal mitotic steps that can cause cancerous cells. We will be using primary sources, including old newspaper articles, awareness posters, and magazine covers that show past ideas, strategies, research, and treatments that were used and how research strategies and treatments for cancer changed over the past century with the discovery of new info.

Grade Range: 9-12

Objective: After completing this activity students will be able to:

• Explain what cancer cells are and the biological causes of cancer.
• Describe how cancer has been viewed by the public in America over the last century.
• Identify and explain past research strategies and treatments and how research strategies and treatments have evolved in the last century.
• Analyze old newspaper articles, awareness posters, and magazine covers to get an understanding of the history behind cancer research and the portrayal conveyed by these items.

Time Required: Three class periods of 50 minutes

Discipline/Subject: Biology


Era: Progressive Era to New Era, 1900-1929; Great Depression/World War II, 1929-1945; Postwar United States, 1945-1968

Illinois Learning Standards:

Science
12.A.5a: Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).
12.A.4b: Describe the structures and organization of cells and tissues that underlie basic life functions including nutrition, respiration, cellular transport, biosynthesis and reproduction.
13.A.4c: Describe how scientific knowledge, explanations and technological designs may change with new information over time (e.g., the understanding of DNA, the design of computers).

Materials

Analysis Tools: Poster Analysis and Written Document Analysis
PowerPoint Slides:

1. The Cell Cycle and Cancer
   How does a cell control its cell cycle and how does cancer develop?

2. How does a cell know when it is supposed to divide?
   - Every cell in the human body has a different time frame for the cell cycle.
   - We make about 300 billion new cells each day.
   - While some cells divide rapidly throughout life, others like muscle and nervous cells never divide once they are made.
   - What stage of the cell cycle are these cells stuck in?
   - In order for cells to know when they are supposed to divide we need some type of controls or timers.

3. Controls on Cell Division
   - Scientists have learned that human cells have built-in control systems by observing cells growing in petri dishes.
   - Contact inhibition

4. Controls on Cell Division
   - This also happens when the body is wounded.
   - The cells at the edge of an injury are stimulated to divide rapidly.
   - When the wound is nearly healed the rate of cell division slows down.
   - What does all this junk mean?
   - It shows that the controls for cell division can be turned on and off.
   - But how and why?

5. Cell Cycle Regulators: How do they work?
   - Scientists in the 1960s discovered that cells in mitosis contained a protein that when injected into a non-dividing cell would cause it to divide.
   - This protein is called cyclin, and the amount of it rises and falls within time with the cell cycle.
   - We now know there is a group of related proteins called cyclins that regulate the timing of the cell cycle in eukaryotic cells.

6. Cyclin Proteins
   - Cyclins and cell cycle regulation

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Internal and External Regulators

- Proteins that respond to events inside the cell are called internal regulators.
- Allow the cell cycle to continue only when other certain processes have happened inside the cell.
- Proteins that respond to events outside the cell are called external regulators.
- These tell cells to speed up or slow down the cell cycle.
- Growth factors stimulate the growth and division of cells, especially during embryonic development and wound healing.
- Molecules found on the surface of neighboring cells often have an opposite effect, causing cells to slow down or stop dividing.

Cell Cycle Checkpoints

- Other cyclin proteins serve as checkpoints during the cell cycle.
- These make sure all the parts of the cell are in good working order in order for the cell cycle to continue.
- We make 200 billion new cells per day; so could there be screw ups?
- Apoptosis may occur
- Programmed cell death

Apoptosis Steps

- Uncontrolled cell growth
- Cancer is a disorder in which some of the body’s cells lose the ability to control cell growth.
- Cancer cells do not respond to the signals that regulate the growth of most cells.
- DNA replication and mitosis are broken!
- Because of this the cells divide uncontrollably and form tumors that can damage the surrounding tissues

How do tumors develop?

- Tumors can be benign or malignant.
- Cancer cells can spread or metastasize in the body disrupting normal activities and causing serious medical problems or death.

Metastasis

- From what we have learned about cancer it is very likely that humans have been battling the disease since our existence began.
- Let’s take a look at a timeline about the history of cancer.

The History of Cancer

- Some of the things we know cause cancer:
  - Smoking
  - Alcohol
  - Radiation Exposure (UV)
  - Chemical Exposure/Drugs
  - Genetics (cancer genes)
  - Viruses, etc.
  - Other carcinogens
- No matter the cause of the cancerous cells, the controls over the cell cycle are interrupted.
- Either the cyclin proteins or the DNA itself is damaged and the cell keeps reproducing uncontrollably.

What causes cancer?

- Using Primary Sources to show the Shifting Understanding and Public View of Cancer throughout the Last Century
Using Primary Sources to show the Shifting Understanding and Public View of Cancer throughout the Last Century
Library of Congress Items:
Title of Source: Don’t fear cancer fight it!
URL of Source: http://www.loc.gov/pictures/item/98518521/

Title of Source: Cancer kills in the prime of life 95 percent of cases of cancer are in those over 35
URL of Source: http://www.loc.gov/pictures/item/98518295/

Title of Source: Don’t fight cancer alone. Ask these agencies for advice.
URL of Source: http://www.loc.gov/pictures/item/98518679/

Title of Source: X-Ray, radium, surgery – the three recognized treatments for cancer. Consult your doctor or health bureau.
URL of Source: http://www.loc.gov/pictures/item/98515040/

Title of Source: Beware the cancer quack. A reputable physician does not promise a cure, demand advance payment, advertise.
URL of Source: http://www.loc.gov/pictures/item/98518641/

Title of Source: More women die of cancer than do men 70 percent of the 35,000 women who die annually of cancer of the breast and uterus could be saved if treated in time.
URL of Source: http://www.loc.gov/pictures/item/98518551/

Title of Source: Early is the watchword for cancer control. Early diagnosis, early treatment will save many lives. Early cancer can be cured.
URL of Source: http://www.loc.gov/pictures/item/98518328/

Title of Source: The Mt. Sterling advocate., December 08, 1921, Image 4
URL of Source: http://chroniclingamerica.loc.gov/lccn/sn86069675/1921-12-08/ed-1/seq-4/

Title of Source: The Salt Lake herald-Republican., September 11, 1910, Section Three, Page 14, Image 35

Online Resources:
Title of Source: Clues to a Deadly Riddle (Google Books) Life Magazine
URL of Source: http://books.google.com/books?id=B1IEAAAMBAJ&pg=PA76&dq=clues+to+a+deadly+riddle&hl=en&sa=X&ei=HT6HT-DJG42H8gGp-8HACA&ved=0CD0Q6AEwAA#v=onepage&q=clues%20to%20a%20deadly%20riddle&f=false

Title of Source: CancerQuest
URL of Source: http://www.cancerquest.org/cancer-timeline-introduction.html
### Procedures

<table>
<thead>
<tr>
<th>Procedure Step #</th>
<th>Resource or Material Used</th>
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<tbody>
<tr>
<td>1. On day one of the lesson we will discuss the normal processes of cell division and the controls for the process built into our cells. We will discuss how these controls can get damaged through DNA mutation causing uncontrolled cell growth which is cancer. We will also discuss how cancerous cells can spread through metastasis.</td>
<td>PowerPoint</td>
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<td>2. The second day of the lesson we will then take a step back and ask if we always knew what caused cancer and ask the students to think about how their grandparents and great grandparents may have felt about cancer when they were the student’s age.</td>
<td>Powerpoint</td>
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<td>3. Next, we will view a timeline of major events in cancer research and treatments on the Cancerquest website and discuss the major findings in cancer research</td>
<td>PowerPoint Online Resource</td>
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<td>4. Next, I will show a series of old newspaper articles from the early 1900s on the Smartboard that discuss the understanding of cancer, the possible causes of cancer, the treatments of cancer, and the public view of cancer at the time. We will pick one of these newspaper articles and analyze it using the Written Document analysis form.</td>
<td>LOC Items Analysis Tool</td>
</tr>
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<td>5. Next, I will show a series of old awareness/warning posters from the 1930s and 1940s that describe warning signs of cancer and what people should do to “fight” cancer. The students will work in groups to use the analysis tools to go in depth to find underlying themes and strategies built into these posters. (American Society for the Control of Cancer). We will also discuss a Life Magazine cover and article from 1962 describing how cancer might be “infectious”.</td>
<td>LOC Items Analysis Tool Online Resource</td>
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<td>6. Next, we will discuss how doctors treated cancer in this time period and how these treatments were developed. We will discuss a poster showing the three acceptable treatments for cancer at the time and the “quackery” of other treatments.</td>
<td>PowerPoint LOC Items</td>
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<td>7. Video clip over the race for the cure for cancer in the 1940s and 1950s from a video about the life of Henrietta Lacks (The Way of all Flesh) documentary.</td>
<td>PowerPoint</td>
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<td>8. Day Three: Discuss and review the advertisements and articles from day one. Discuss how the views of cancer and cancer research have changed over time. Lead into more about the current cancer research and causes of cancer.</td>
<td>PowerPoint</td>
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### Evaluation

I will evaluate student learning by asking critical thinking questions throughout the lesson and discussion to check for understanding. I will also evaluate the students by discussing with them and collecting and grading their analysis tools to ensure their understanding of the posters and newspaper articles. The students will later take a quiz over the material to assess the understanding.

### Extension

Students can learn more about Henrietta Lacks and the development of the HeLa cell line by researching her story on the web. Her harvested cancer cells have been growing since 1951 and have the basis for a plethora of great discoveries in the cellular world. This related directly to the objectives of learning how cancer cells are mutated and how they do not follow the normal cell cycle pattern.

### Author Credits:

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POSTER ANALYSIS

First Glance
Looking at the poster, identify

The title
What emotions did you feel when you first saw the poster?

Symbolism

People
Person or character used
What do they symbolize?

Objects
Items used
What do they symbolize?

Colors
Colors Used
What do they symbolize?

The Message
Are the messages in the poster primarily visual, verbal or both? How?

Who do you think was the intended audience for this poster?

What do you think the creator hoped that people would do after seeing this poster?

After Viewing
The most effective posters use symbols that are simple, attract your attention and are direct. Is this an effective poster? Why or why not?

List three things that you infer from this poster.
1.
2.
3.
Using Primary Sources to show the Shifting Understanding and Public View of Cancer throughout the Last Century
DON'T FIGHT CANCER ALONE

ASK THESE AGENCIES FOR ADVICE

YOUR STATE OR LOCAL MEDICAL SOCIETY
YOUR STATE OR LOCAL HEALTH DEPARTMENT
CANCER COMMITTEE OR STATE MEDICAL SOCIETIES
THE WOMEN'S FIELD ARMY OF THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER

U.S. PUBLIC HEALTH SERVICE IN COOPERATION WITH THE AMERICAN SOCIETY FOR CONTROL OF CANCER

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Using Primary Sources to show the Shifting Understanding and Public View of Cancer throughout the Last Century
BEWARE
THE CANCER QUACK

A REPUTABLE PHYSICIAN DOES NOT PROMISE A CURE DEMAND ADVANCE PAYMENT • ADVERTISE

U.S. PUBLIC HEALTH SERVICE IN COOPERATION WITH THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER
MORE WOMEN DIE OF
CANCER THAN DO MEN

70 PERCENT OF THE
35,000 WOMEN WHO
DIE ANNUALLY OF CANCER OF THE BREAST AND UTERUS COULD BE SAVED IF TREATED IN TIME

U.S. PUBLIC HEALTH SERVICE IN COOPERATION WITH THE AMERICAN SOCIETY FOR CONTROL OF CANCER