Human Papillomavirus (HPV) and Cancer

Cancer Education Project
University of Rochester
Human Papillomavirus (HPV)
# Overview of HPV Activities

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Part 1:
“One Less” and “Tell Someone”

Infection Treatments To Watch

Gardasil
MERCK
Human papilloma virus
Cervical cancer

Human papilloma virus

Part 1:
“One Less” and “Tell Someone”

- A “hook” for HPV lesson series
- TV commercials
  - [http://www.gardasil.com/tv-commercial-for-gardasil](http://www.gardasil.com/tv-commercial-for-gardasil)
  - [http://www.youtube.com/watch?v=hJ8x3KR75fA](http://www.youtube.com/watch?v=hJ8x3KR75fA)
- PBL teams of 3-4 students
- “Facts” and “Questions” charts
After watching the video, students write one question about:

- Human Papillomavirus (HPV)?
- The Gardasil vaccine?
- An ELSI* implication?
  (*ethical, legal, or social issue *)
Part 2: HPV Vaccine and The Immune System

Part 2:
HPV Vaccine & the Immune System

Students will:

• View Gardasil TV commercial
  http://www.stronghealth.com/services/cancer/hpvMedia.cfm

• See National Cancer Institute (NCI) PowerPoint:
  “HPV Vaccine to Prevent Cervical Cancer”
  http://cancer.gov/cancertopics/understandingcancer/HPV-vaccine

• Make Notes from the NCI PowerPoint

• Complete a 3-2-1 Reflection Sheet
# Part 2: HPV Vaccine and Immune System

"Making Notes" pages from the HPV PowerPoint

<table>
<thead>
<tr>
<th>Title / Notes / Question</th>
<th>Notes, Comments, Drawings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HPV Vaccine to Prevent Cervical Cancer</strong></td>
<td></td>
</tr>
<tr>
<td>Title Page (no questions)</td>
<td></td>
</tr>
<tr>
<td><strong>Common Infection:</strong></td>
<td></td>
</tr>
<tr>
<td>Two facts about HPV:</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td><strong>Infection is Sexually Transmitted:</strong></td>
<td></td>
</tr>
<tr>
<td>What might “the virus is silent” mean?</td>
<td></td>
</tr>
</tbody>
</table>
This PowerPoint presentation from the National Cancer Institute explains the science behind the development of a new vaccine against high-risk types of human papillomaviruses, which can lead to cervical cancer over time.

These PowerPoint slides are not locked files. You can mix and match slides. In the Notes section, you will find explanations of the graphics.
Infection Is Sexually Transmitted

[Diagram showing individuals wearing t-shirts labeled 'HPV']
Common Infection

Infected with HPV
### Many Types of HPVs

#### Different HPVs–Different Infections

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Harmless</strong></td>
<td>No warts or cancer</td>
</tr>
<tr>
<td><strong>Warts-Linked</strong></td>
<td>Genital warts</td>
</tr>
<tr>
<td><strong>Cancer-Linked</strong></td>
<td>Most clear up</td>
</tr>
<tr>
<td></td>
<td>Some persist, but no abnormalities in cervix</td>
</tr>
<tr>
<td></td>
<td>Some persist, some abnormalities in cervix</td>
</tr>
<tr>
<td></td>
<td>A few persist and progress to <strong>cervical</strong> cancer</td>
</tr>
</tbody>
</table>
Virus Penetrates Cervix

Uterus

Cervix

HPV infection

Vagina

Papillomavirus

Layers of epithelial cells
Virus uncoats virus

Nucleus

Epithelial cell interior

Viral DNA enters nucleus

mRNAs for viral proteins E6 and E7

Virus "uncoats"
Virus Disables Suppressors

Cancerous epithelial cells

Healthy cells

Mucus

E7 viral protein

Suppressor protein 1

Degraded suppressors

E6 viral protein

Suppressor protein 2

Cancerous epithelial cells
Virus-Like Particles
The Vaccination
Antibodies Prevent Infection

Antibodies = \( \gamma \)

Papillomavirus

No DNA strands can escape the capsid
Pap Test Still Necessary

- Normal Pap test
- Abnormal Pap test
More Work Ahead
Part 3:
HPV Vaccine and Cervical Cancer

Steady decline
The death rate for cervical cancer has fallen nearly 70 percent since 1969.

Cervical cancer mortality rate
8 per 100,000
7.7
1969
2.5
2003

SOURCES: American Cancer Society; AP National Center for Health Statistics

http://msnbcmedia4.msn.com/i/msnbc/Components/Art/HEALTH/060828/AP_CERVICAL.gif
Part 3:
HPV Vaccine and Cervical Cancer

Students will:

• In Jigsaw “home groups,” get one of four readings and decide on Top 5 facts.
• In reading “specialty groups,” brainstorm top facts and decide on Top 3.
• Discuss Top 3 with “home group” members.
• Complete Personal Reflection sheet as Ticket-to-Leave.
Part 4: The Pap Test

http://www.steadyhealth.com/articles/user_files/4540/Image/HPV_pic2.jpg
Part 4:
The Pap Test

Students will:

• Receive directions about “Save the Last Word for Me” reading strategy.

• Read Mayo Clinic handout and complete “significant passage” task.

• Meet in groups of 3 to complete the “listening & reacting” protocol.

• Complete The Pap Test review sheet
Part 5: Cancer Detection: A Laboratory Simulation

Students will:

• Perform visual, radiation, and chemical testing on images of simulated biopsy samples to test for the presence of “abnormal” cells

• Estimate the chances of a biopsy sample being cancerous

• Write a lab report
Question?

What are two science laboratory skills that are critical to the work of a crime scene investigator (CSI)?
Answer!

Observation (accurate and detailed)

Analysis of Data
Goal of The Pap Test Lab:

.... to understand medical professionals use three different kinds of observation and data analysis techniques to detect cancer cells when given a biopsy (tissue sample) from a person suspected of having cancer.
Introduction to the Lab: Student Version

1. Form into teams of 2-3 students.
2. Obtain 1 copy of the lab per team.
3. Read the first 4 paragraphs.
4. Be able to name the 3 procedures.
5. Be able to identify 3 medical careers involved in cancer detection.
Pre-lab

For each student, obtain:

1 Cancer Detection Lab Report Form
2 biopsy images
1 cotton swab

For each lab group, obtain:

1 UV light source
1 bottle of “antibody”
Visual Detection

- Study the two images carefully to identify what you believe are differences between “normal” and “abnormal cells.
- Use a pencil to mark suspected abnormal cells with an “Ab.”
- Be ready to state your hypothesis (Q-1).
Visual Detection

Brainstorm a list of different hypotheses that might be used to visually detect differences between “normal” and “abnormal” epithelial cells.

(Q-2)
Radiation Detection
(Safety Warning: UV light)

- Shine a UV light on your biopsy samples.
- Use a pencil to mark suspected abnormal cells with “UV.”
- Discuss differences between normal & abnormal cells (Q-3).
- Accept or reject hypotheses (Q-4).
Chemical Detection

- Use the swab to add a very light coating of “antibody” to cell membranes of “UV” cells, and describe observations (Q-5).
- Coat all the cell membranes in both images.
- Count your team’s biopsies (not cells) that show abnormal cells (Q-6).
Estimating Odds

• What is the class’s “operation definition” of an “abnormal” biopsy sample (Q-7)?

• What data have to be collected to estimate the odds that a biopsy sample will be cancerous? (Q-8)?

• Calculate the odds and show your work (Q-9).
Summary ("a" or "b")

“a”: Write one sentence (or group of sentences) that summarize the main idea(s) behind this simulated cancer detection lab.

“b”: Choose one vocabulary word (or main idea) from this lab and write a Cinquain (a 5-line poem) to summarize this lab.
Rules of Writing a Cinquain

<table>
<thead>
<tr>
<th>Line</th>
<th>Count</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1</td>
<td>1 word</td>
<td>Title</td>
</tr>
<tr>
<td>Line 2</td>
<td>2 words</td>
<td>Nouns or adjectives that describe Line 1</td>
</tr>
<tr>
<td>Line 3</td>
<td>3 words</td>
<td>“-ing” words that tell what Line 1 does</td>
</tr>
<tr>
<td>Line 4</td>
<td>4 words</td>
<td>Your personal, emotional reaction to Line 1</td>
</tr>
<tr>
<td>Line 5</td>
<td>1 word</td>
<td>Synonym for Line 1 (foreign words are OK)</td>
</tr>
</tbody>
</table>

A word and its root or derivatives can be used only once! (e.g., *life, living, alive*)
Cinquain Example

Cancer
Abnormal Growth
Hiding, Dividing, Metastasizing
Should’ve Worn Enough Sunblock!
Tumor
Part 6:
Why Not the Boys?

http://www.plannedparenthood.org/ppaustin/images/Texas%20Capital%20Region/hpv_vaccine.jpg
Part 6: Why Not the Boys?

Students will:

• Read a Board of Education press release about mandating Gardasil vaccine for all middle school students

• Complete 8-step decision-making model to formulate position statements for BOE
  • Steps 1-3 as whole class
  • Steps 4-6 in teams
  • Steps 7-8 individually