
Hunting a Killer

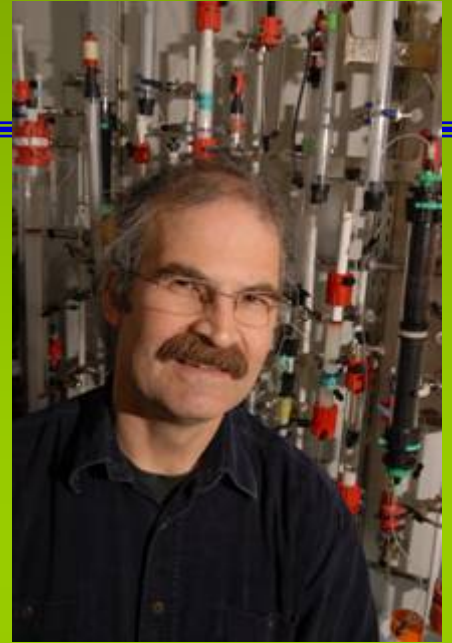
Cell Biologist Yuri Lazebnik:
Pursuing the Roots of Cancer

Findings

Department of Health and Human Services
National Institutes of Health
National Institute of General Medical Sciences

Yuri Lazebnik Fuses Cells

Cell biologist Lazebnik explores links between cell fusion and cancer.



Cell Fusion

- Is rare in most healthy cells
- Can cause genetic changes
- May be linked to cancer

Question:

What is another name for cell suicide?

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Answer: Apoptosis

Apoptosis under normal conditions

During development

- Sculpts fingers and toes
- Streamlines nerve connections in brain during development

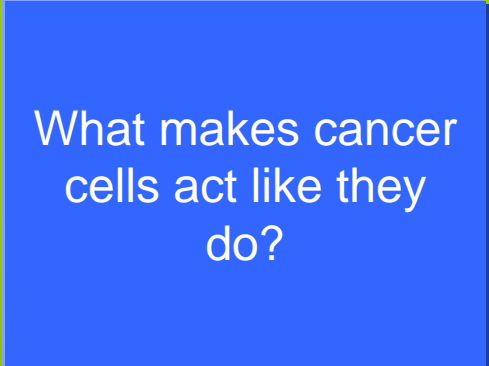
Throughout lifetime

- Removes old, worn-out cells from the body

Hunting Down a Serial Killer

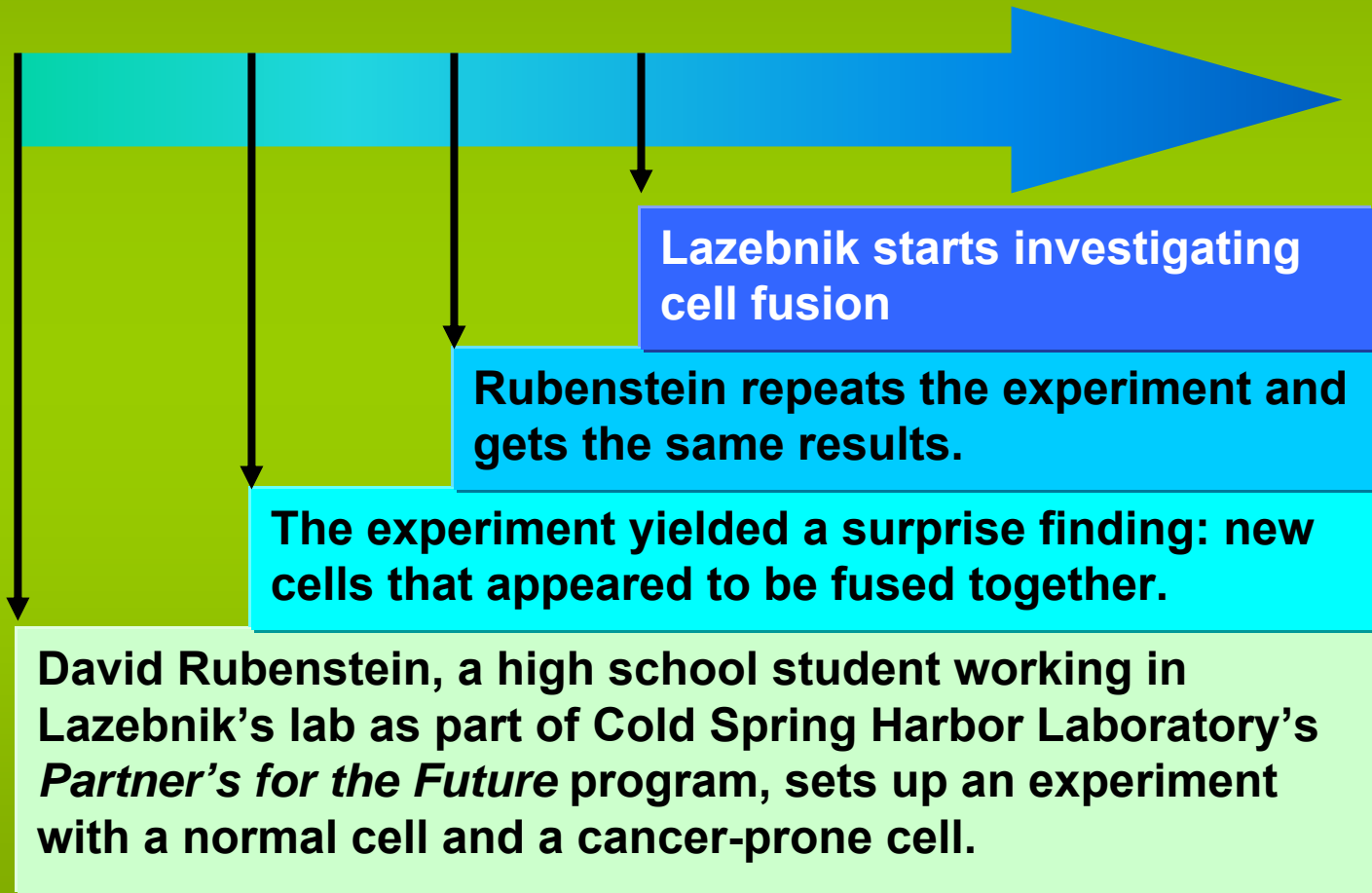
Cancer cells

- Move into neighboring tissues
- Damage or shut down vital organs
- Can be deadly
- Don't die off like normal cells do



What makes cancer cells act like they do?

Investigation Guided by Surprise



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Cell Fusion

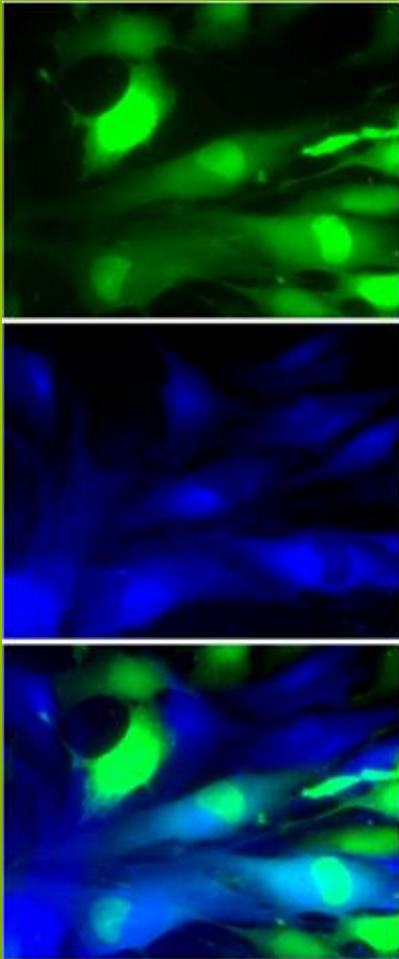
- Only five known examples of healthy cell fusion
- Fertilized eggs are the only fused cells that continue to divide
- Sometimes, healthy cells accidentally fuse

Name the five known examples of healthy cell fusion.

What would happen if other healthy fused cells continued to divide?

Do accidentally fused cells continue to divide?

Spontaneous Cell Fusion



- Some cancerous and cancer-prone cells
- Do not avoid cell fusion like normal cells
 - Readily merge together
 - Continue to reproduce
 - Could be the cause of diversity of cells with unpredictable characteristics in tumors

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What Makes Cells Fuse?

Lazebnik and Duelli investigate genes and molecules in fused cells

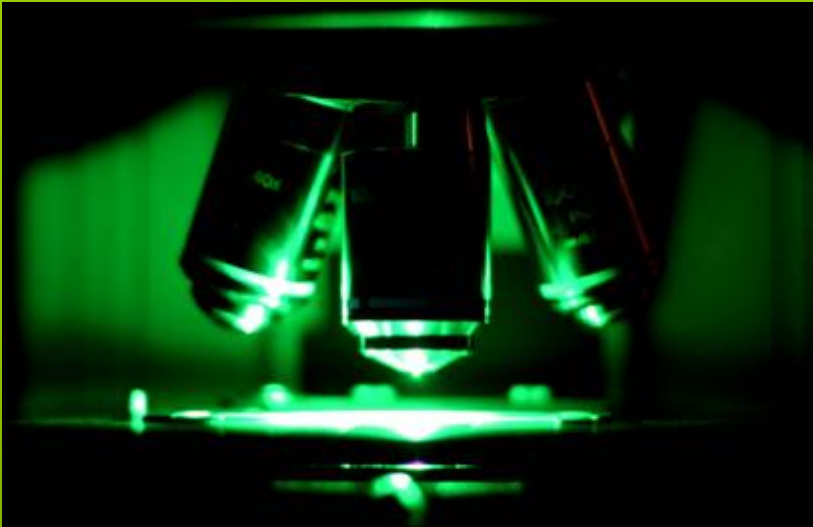


Observation #1: Cancer-prone cells squirt out a virus that causes an AIDS-like disease in monkeys.

Hypothesis: The virus might trigger cell fusion.

Observation #2: Fused cells develop genetic changes, or mutations.

Hypothesis: Some of the mutations can chart a course toward cancer.



Fluorescent microscope

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Viruses Can Make Cells Fuse

- **Measles and mumps viruses cause a type of cell fusion**
 - Also seen in some types of cancer
 - Don't continue to divide; die and are reabsorbed by the body

What are syncytia?

- **≥10% cancers at least partially caused by viruses**
 - Human papillomavirus (HPV)
 - Hepatitis B and C
 - Epstein-Barr virus (mononucleosis, or "mono")

Is there a link between viruses and cancer?

Questions About Viruses

What We Know

- Do all cancer-causing viruses turn into cancer?
 - No. Only 1-2% of women with HPV develop cervical cancer.
- Can scientists prevent virus-caused cancers by developing vaccines against the viruses?
 - In some cases, yes. Vaccines already exist for HPV and hepatitis B.

What We Don't Know

- What factors other than viruses contribute to cancer?
- Do viruses cause some of our cells to fuse?
- Does cell fusion cause, or contribute to, cancer?

Research Applications

What are the implications of using viruses as vehicles to deliver genes or medications to specific tissues if such a strategy relies on cell fusion?