Cancer
What are some different kinds of cancer?

- Lung
- Breast (women)
- Colon
- Bladder
- Prostate (men)
- Bloodstream
- Lymph nodes
- Fat
- Bone
- Muscle
How are Normal and Cancer Cell Division Different?

Normal cell division

Cancer cell division
How are normal and cancer growth different?
What is the difference between a benign tumor and a malignant tumor?

Benign

Malignant

Time
Why are malignant tumors dangerous?
What is cancer screening?
Why is cancer screening important?
What are some types of cancer screening?
How is cancer diagnosed?
What is a biopsy?
How is the biopsy analyzed?
What does a pathologist look for examining biopsy tissue?

<table>
<thead>
<tr>
<th>Normal</th>
<th>Cancer</th>
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<tbody>
<tr>
<td><img src="image1" alt="Normal Cells" /></td>
<td><img src="image2" alt="Cancer Cells" /></td>
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<td><img src="image3" alt="Normal Cells" /></td>
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<td><img src="image11" alt="Normal Cells" /></td>
<td><img src="image12" alt="Cancer Cells" /></td>
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What does a pathologist look for when he examines biopsy tissue with a microscope?

- Normal
- Hyperplasia
- Mild dysplasia
- Carcinoma in situ (severe dysplasia)
- Cancer (invasive)
What is the relationship between tumor grade and patient prognosis?

Patient Survival Rate

Low grade I or II

High grade III or IV

Years
What does Stage III cancer mean?

Five-Year Survival Rates for Patients with Melanoma (by stage)

Stage at Time of Initial Diagnosis

100%

Stage III Cancer
What Causes Cancer?
How could you explain the differences in the cancer incidence in different countries?
Is the incidence of these cancers due to genes, behavior, or environmental risk?

**Colon Cancer**
- Japan: 0
- Japanese families in U.S.: 50
- U.S.: 50

**Stomach Cancer**
- Japan: 100
- Japanese families in U.S.: 0
- U.S.: 70
What increases peoples’ risk of cancer?

- Sunshine
- X-ray
How do you know if you have genes that make getting cancer more likely?

Genetic Testing

1. Restriction enzymes cleave DNA into smaller segments of various sizes.
2. DNA segments are loaded into wells in a porous gel. The gel floats in a buffer solution within a chamber between two electrodes.
3. When an electric current is passed through the chamber, DNA fragments move toward the positively-charged cathode.
4. Smaller DNA segments move faster and farther than larger DNA segments.
What happens to genes to cause cancer?
How do mutations in oncogenes lead to cancer?

Growth factor → Receptor → Signaling enzymes → Transcription factors → DNA → Cell nucleus → Cell proliferation
How do mutations in tumor suppressor genes lead to cancer?

- Tumor Suppressor Gene Proteins
- DNA
- Signaling enzymes
- Transcription factors
- Cell proliferation
How do mutations in the p53 gene lead to cancer?
How do mutations in DNA Repair Genes cause cancer?
What other kinds of mutations can lead to cancer?

<table>
<thead>
<tr>
<th>The prime suspects</th>
<th>But</th>
<th>Other mutations also occur in:</th>
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<tbody>
<tr>
<td>Mutations in:</td>
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<tr>
<td>Oncogenes</td>
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<tr>
<td>Tumor suppressor genes</td>
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<td>DNA repair genes</td>
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Why does cancer risk increase with age?
What can people do to prevent cancer?
Does industrial pollution cause cancer?
Is There a Cancer "Epidemic"?
How would you answer each of these questions?