

# Unit 8

## Cell Biology and Cancer

### Description

Cancers result when genes required for normal cell function are mutated and the resulting cells undergo other changes, ultimately leading to uncontrolled growth. Two classes of these genes are proto-oncogenes and tumor suppressor genes. Knowing how these genes work in healthy individuals allows for the possibility of designing drugs that interfere with specific kinds of cancers.

### Menu of Unit Activities

**Note:** All activities, handouts, solutions, and tips can be found in the Appendix of this guide.

**Activity 1: No Cut-and-Dried Answers** (15 minutes + 30 minutes of video)

Ten statements about cancer to consider and discuss before and after the video.

**Activity 2: The Price of Proto-Oncogenes** (15 minutes)

A quick discussion about the function of proto-oncogenes to be done in the middle of viewing the video.

**Choose either Activity 3 or Activity 4:**

**Activity 3: Family History** (60 minutes)

Identification of an allele that contributes to breast cancer risk through pedigree and statistical analysis of families with a history of breast cancer.

**Activity 4: Dilemmas of Cell Biology** (60 minutes)

Three packets of exercises and discussions on p53 and aging; telomerase, cancer, and aging; and genetics of breast and colon cancer.

**Activity 5: The Big Picture** (30 minutes)

Discussion questions on the personal and societal impact of cancer and cancer prevention.

# Before the Session

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**Facilitator:** Copy and assemble the following activity materials. (See the Activities section in the Appendix of this guide for master copies of transparencies and handouts, plus Tips and Suggested Answers.)

**Activity 1: No Cut-and-Dried Answers** requires:

- One copy of the Yes/No, But... statements per person (master copy provided)
- Tips and Suggested Answers

**Activity 2: The Price of Proto-Oncogenes** requires:

- One transparency of the Discussion Questions

**Choose either Activity 3 or Activity 4:**

**Activity 3: Family History** requires:

- One copy of the Background Questions for each person (master copy provided)
- One copy of the Pedigrees and Data sheet for each person (master copy provided)
- One copy of the LOD Score Information for each person (master copy provided)
- One copy of the Discussion Questions per person (master copy provided)
- Tips and Suggested Answers

**Activity 4: Dilemmas of Cell Biology** requires:

- One copy of each of the three different Topic Packets (master copies provided)
- Three copies of the Cell Biology and Cancer unit online text chapter (available online at <http://www.learner.org/channel/courses/biology>)

**Activity 5: The Big Picture** requires:

- One copy of the Discussion Questions per person (master copy provided)

**Facilitator:** Make sure that the room has these supplies:

- pens or pencils and paper
- overhead projector and markers
- VCR and TV
- black/white board with chalk or markers

# Session Activities and Video

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## Activity 1a: No Cut-and-Dried Answers—Pre-Video Discussion (10 minutes)

- Read the Setup and have each person take a copy of the Yes/No, But... statements.
- Let each person go through the statements at their own pace, finishing in about 5–10 minutes.

**Facilitator:** Stress that participants can either agree or disagree, and should write down qualifying statements if they can't decide.

- Variation: Go through each statement as a group divided into two sides. Have people from one side of the room say a few words that support the statement as true. Then, the people on the other side of the room respond by saying a few words that suggest the statement is false.

## Video, Part 1 (6 minutes)

- Watch the first part of the Cell Biology and Cancer video.

**Facilitator:** Start timing the Cell Biology and Cancer video at the Annenberg/CPB logo and watch the first 5:54 minutes. Stop the video just after Dr. Robert Weinberg says, "Without the proto-oncogenes, embryos wouldn't be able to develop, adult tissues would not be able to be maintained. However, the price of carrying these proto-oncogenes in our genomes is occasionally they become damaged and mutated and convert into oncogenes, and thus become converted into agents for causing cancer."

## Activity 2: The Price of Proto-Oncogenes (15 minutes)

- Read the Setup.
- As a group, come up with a list of possible normal cellular functions that might be performed by proto-oncogenes.
- View the transparency of the Discussion Questions and talk about them as a group.

## Video, Part 2 (24 minutes)

- Finish watching the Cell Biology and Cancer video.

## Activity 1b: No Cut-and-Dried Answers—Post-Video Discussion (5 minutes)

- Spend a few minutes looking through the list of statements for the activity and see if anyone's opinions changed, or if there is new information to add to the qualifying statements.
- Compare the group's statements with those in the Tips and Suggested Answers section.

# Session Activities and Video, cont'd.

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## If you chose Activity 3: Family History (60 minutes)

- Read the Setup and arrange into pairs.
- Have each person take a copy of the Background Questions, one copy of Pedigrees and Data, one copy of the LOD Score Information, and one copy of the Discussion Questions.
- Spend 5–10 minutes working in pairs on the background questions.
- Spend 5 minutes going over possible answers as a group, comparing answers with those in the Tips and Suggested Answers section.
- Spend about 30 minutes going through the Pedigrees and LOD Score Information.
- As a group, spend 10 minutes discussing the questions, comparing group answers to those in the Tips and Suggested Answers section.

## If you chose Activity 4: Dilemmas of Cell Biology (60 minutes)

- Read the Setup and divide into three teams.
- Have each team take one of the packets.
- Spend 15–20 minutes working in teams on the packet.
- Have the teams switch packets and spend 15–20 minutes working on the new packet.
- Have the teams switch packets again and work on the final packet for 15–20 minutes.

## Activity 5: The Big Picture (30 minutes)

- Read the Setup and have each person take a copy of the Discussion Questions.
- Discuss the questions in pairs or as a group.

## Summary (5 minutes)

- If time permits, as a group or in pairs, define the major ideas or “take home” lessons of this unit and its applications.