Activity 1
The Faces of Cancer

Focus: Students participate in a role play about people who develop cancer, assemble data about the people's experiences with cancer, then discuss the generalizations that can be drawn from these data.

Major Concepts: Cancer is a group of more than 100 diseases that develop across time. Cancer can develop in virtually any of the body's tissues, and both hereditary and environmental factors contribute to its development.

Objectives: After completing this activity, students will

- understand that there are many types of cancer,
- recognize that the incidence of cancer increases with age,
- understand that some people inherit predispositions to particular types of cancer,
- understand that some people make choices that increase their risk for cancer; and
- be able to explain that a person's chance of surviving cancer increases with early detection and treatment.

Prerequisite Knowledge: None

Basic Science-Public Health Connection: This opening activity introduces cancer as a public health issue that can be systematically studied using the methods of science (for example, gathering and analyzing data).

As described in *Understanding Cancer*, cancer is a group of diseases that are characterized by uncontrolled cell division. This uncontrolled division can compromise the function of an organism and ultimately may cause its death.

Each of us has a chance of developing cancer sometime in our life. On average, in the United States, men have a 1 in 2 lifetime risk of developing cancer and women a 1 in 3 risk. Many Americans, however, have a higher than average chance of developing particular forms of cancer. For example, smokers have a 10-fold higher risk of developing lung cancer compared with nonsmokers. Likewise, women who have a mother, sister, or daughter who has had breast cancer have about a 2-fold higher chance of developing breast cancer compared with women who do not have such a family history.

The National Cancer Institute estimates that approximately 8 million Americans alive today have a history of cancer. In 1998, more than 1 million new cases were diagnosed. In fact, cancer is the second leading cause of death in the United States, exceeded only by heart disease.

This activity introduces the module by reminding students that cancer is a public health issue in the United States. In the activity, students participate in a role play based on the relative incidence of various types of cancer in the U.S. population for a recent year. As part of the role play, each student receives information about one person who develops cancer. Students work in groups, discussing the relevant events of each person's life; as a class, they assemble data about the population as a whole. Students examine the data the class assembles and draw a set of important generalizations about cancer from them. These generalizations set the stage for subsequent activities in the module in which students learn how cancer develops and consider how claims about factors alleged to cause cancer are evaluated and acted upon.

Materials and Preparation

You will need to prepare the following materials before conducting this activity:

• identity envelopes (make 1 envelope per student)

  To make a set of identity envelopes for your class, first make one complete copy of Master 1.1, *The Faces of Cancer*. Cut each page along the lines to create five separate pieces of paper. Paste the piece that names and describes each fictitious person onto the front of an envelope, then place the remaining four pieces (labeled "0–19 years," "20–39 years," "40–59 years," and "60+ years") inside the envelope, in order from the earliest period of life to the latest.

• Master 1.2, *Team Summary* (make 1 copy per student)
• Master 1.3, *Drawing Conclusions from the Faces of Cancer* (make 1 copy per student)
• Master 1.4, *Summary Profile of the Faces of Cancer* (make 1 overhead transparency)

Procedure

With 1 in 3 Americans developing cancer in their lifetimes, it would not be unusual if one or more of your students is personally involved with cancer. It may be that the child's parent, family member, or even the child has or has had cancer. For some of these students, the topic of cancer may be disturbing. Because of this, we suggest that you watch your students for signs of discomfort with the topic (for example, reluctance to begin the activity, unusual quietness or reticence) and provide appropriate support.

It may be useful to begin the activity by asking students to indicate with a show of hands whether they have had an experience with cancer and offer those who raise their hands the opportunity to share it with the class. Emphasize that students also may keep this information private, if they so choose. During the team work, you may want to approach those students who raised their hands and assure yourself that they are handling the activity well.

If you have a student who is having serious difficulty with the topic, you may want to offer him or her a learning alternative to completing the activities in the module.

1. Introduce the activity by asking students to count off in sets of 6 (that is, 1, 2, 3, 4, 5, 6, and so on) and to write down their numbers.

Counting off in this manner sets up the demonstration of statistics that occurs in Step 2 and also identifies the teams into which students will organize in Step 5.

2. **Explain that the American public often is presented with statistics about various characteristics of the U.S. and world populations. Sometimes a good way to get a sense of what such statistics mean is to express them in terms of a group of real people. To illustrate this, conduct the following exercise.**

   • **Ask all the students who are number 2s, 3s, 5s, or 6s to stand. Explain that if the population in this class is representative of the American population, approximately 6 in 10 (or in this case, 4 in 6) of the people in the room will have children.**

     The proportion of U.S. citizens who have children is a rough estimate based on data from 1994 indicating that 42 percent of women aged 15 to 44 do **not** have children.

   • **Invite the students who are standing to sit, then ask all the students who are number 3s or 6s to stand. Explain that if the class population is representative, approximately 3 in 10 (or in this case, 2 in 6) of the people in the room will be involved in an alcohol-related automobile accident sometime in their lifetimes.**

     A fact sheet published by the National Highway Traffic Safety Administration in 1997 (Traffic Safety Facts 1997, National Highway Traffic Safety Administration, http://www.nhtsa.dot.gov/people/ncsa/ovrfacts.htm) estimated that about 3 in every 10 Americans would be involved in an alcohol-related motor vehicle accident at some time in their lives.

   • **Invite the students who are standing to sit, then ask all the students who are number 1s or number 4s to stand. Explain again that if the class population is representative, approximately 1 in 3 (or in this case, 2 in 6) of the people in the room will develop cancer sometime during their lifetimes. Ask students if this statistic surprises them.**

     Answers will vary.

   • **Finally, ask about one fourth of the students who are standing to sit (for example, if 10 students are standing, ask 2 or 3 to sit). Explain that the number of students left standing represents the approximate percentage of the U.S. population who will die of cancer (about 25 percent). Note that the work of scientists and health care professionals across many years has increased the gap between the number of people who develop cancer and the number of people who die from it, and ask your students what factors they think are contributing to this increased gap.**

In March 1998, the National Cancer Institute, American Cancer Society, and Centers for Disease Control and Prevention announced that cancer incidence and death rates for all cancers combined and for most of the top 10 sites declined between 1990 and 1995, reversing an almost 20-year trend of increasing cancer cases and death rates in the United States. Point out that this provides evidence that cancer research has paid off in thousands of human lives saved. Suggest that some students may want to consider a career in cancer research.

Students likely will answer that it is the result of increased preven
tion, earlier detection, and improved treatment.

3. **Invite the students who are still standing to sit, then ask the class whether there is any way to know who will develop cancer and when.**

Students may answer that there is no way to know for sure, but, in general, old people, people who smoke, and people exposed to exces sive radiation develop cancer. Accept all reasonable answers without comment; the purpose of this questioning is to encourage students to express what they already know about cancer and to highlight the fact that there is no definitive way to know who will develop cancer. If stu dents make questionable claims about risk factors or other aspects of cancer, you may wish to respond that many claims are made about cancer and then ask students how they could investigate such claims. You may also wish to point out that Activity 4, *Evaluating Claims About Cancer*, addresses this question.

4. **Explain that in this activity, students will learn more about who develops cancer, when, and why, by assuming the identities of 30 [insert the num-ber of students in your class] fictitious people who develop cancer and building a profile of some of the key events in these people's lives.**

Current statistics reveal that only 1 in 3 Americans will develop cancer during their lifetimes. In this activity, however, each of the 30 fictitious people develops cancer. The activity is structured in this way to offer all students similar experiences and to provide maximum richness and variety to the stories of cancer the students encounter. Students will be reminded of the 1 in 3 risk of developing cancer when they complete the questions on the bottom of *Drawing Conclusions* (see Step 18).

5. **Direct the students to organize into teams based on the number they received during the count-off (all students with number 1 should form one team and so on).**

Students will work in teams of four to five throughout the activities in the module. To ensure that students working together as members of one team have a common foundation of experience and understanding, we recommend that you keep students in the same teams for all of the activities.

6. **Distribute one identity envelope to each student and explain that the outside of the envelope contains a description of the person that student is to become. Ask students to read the descriptions on the envelopes they receive and share who they are with the other members of their teams. Ask students *not* to open their envelopes at this time.**

We suggest that you do not try to match male students with male names and female students with female names. Instead, distribute the envelopes randomly throughout the class. This strategy simplifies the

process of distributing the envelopes and avoids the problem that your class may contain a different number of males and females than the identity envelopes do.

To make the activity fun, encourage students to read the description of the person they have "become" to themselves, then introduce themselves (in first person) to the other members of their team. As students move through the activity, encourage them to "tell" their stories to the rest of the team, using first person language and representing the person they have become as realistically as they can.

Tip from the field test. Before distributing the envelopes, you may wish to explain that some students will be asked to assume the identities of people quite different from themselves (for example, a different sex, or ethnic or cultural group). Explain that this is an inevitable consequence of the activity's structure and ask all students to do the best job they can representing the people whose identities they have assumed.

7. **While students are discussing their new identities, distribute one copy of Master 1.2, *Team Summary*, to each student.**

8. **Explain that the students' task in the next few minutes will be to use the *Team Summary* to summarize information about the lives of the fictitious people in their team. Point out that the descriptions they just read contained information about whether each person had a history of cancer in his or her family. Ask students to use this information to complete Section 1, Family History, on their *Team Summary*.**

   Give the students 1–2 minutes to complete this task. If necessary, explain that having a "history of cancer in the family" means having a biological relative (grandparent, parent, sibling, aunt, or uncle) who has or has had cancer.

9. **Explain that inside each envelope is a set of four cards that provide additional information about each person's life. Direct students to remove the cards from their envelopes and place them *face down* on the desks in front of them so that the cards are in sequence, with the card labeled "0–19" years on top and the card labeled "60+ years" on the bottom.**

   Each student should have four cards. Some of the fictitious people were "born" in the early 1900s and are "old" enough to be 70 or 80; others were born much later (for example, in the 1970s or 1980s). Nevertheless, we have extended these peoples' lives to 60+ years, even though this time stretches well into the 21st century. This approach allows the activity to illustrate a wide range in choices and health care options across the 20th century. The approach also gives each student a chance to have four cards and participate to the end of the activity.

10. **Invite the students to turn over and read the cards labeled "0–19." Give the students a few minutes to share the information they learn with the**

other members of their teams, then challenge them to use this informa-
tion to complete the "0–19 years" column in Section 2, Cancer History, of
their *Team Summary*.

To heighten the activity's drama, do not allow students to read all of
their cards at once. Insist that the students in each team progress
through the life stages in sequence together.

As students begin to read their cards, they may need help understand
ing how to fill in Section 2 of the *Team Summary*.

11. **Instruct students to turn over the rest of their cards in sequence, share the
information the cards contain, then use this information to complete
Section 2 of their *Team Summary*. Challenge the students to look for pat-
terns or trends in the data they are collecting and explain that when the
class pools all of its data, the students will be able to determine the
degree to which the patterns they see in their team's data also appear in
the pooled data.**

The black dot that appears on one of the four cards for each person
shows when mutations may have occurred that eventually contributed
to the development of cancer. Some students may ask what this dot rep
resents. **Do not explain the dot at this point.** Respond that students will
discover the dots' significance at the end of the activity (see Step 16).

12. **After the students complete Section 2 of their *Team Summary*, ask them if
they noticed any choices or other risk factors that may be related to the
cancer people developed. Instruct students to go back through their cards
to identify these factors, then list them in Section 3, Possible Risk
Factors, of their *Team Summary*.**

Some of these risk factors are smoking, sun exposure, high fat diet,
early sexual activity, and genetic predisposition for cancer. A major fac
tor that is not specifically noted is aging. The explanation for increased
incidence of cancer with aging is explored in Activity 3, *Cancer as a
Multistep Process.*

13. **As the teams complete their summaries, distribute one copy of Master
1.3, *Drawing Conclusions from the Faces of Cancer*, to each student.**

14. **Display the transparency that you prepared from Master 1.4, *Summary
Profile of the Faces of Cancer*, and explain that you will complete the
table as the teams share the information they have collected. Explain
that as you complete each row of the table, you will give the teams 2–3
minutes to discuss and record a conclusion they can make from the
pooled data.**

To illustrate, ask each team to report how many people in that team
did and did not have a history of cancer in their families. Then, ask the
students what pattern they see in the pooled data and what conclusion

it leads them to make. Direct students to write their answers into the space provided on their copies of *Drawing Conclusions from the Faces of Cancer.*

Students should see that some people have a family history of cancer whereas other people do not. If students have difficulty expressing this idea, ask them whether the number of "yes" answers (the number of people who did have a family history of cancer) equals the total num ber of people who developed cancer (everyone in the class), and what this discrepancy means.

15. **Complete each row of the *Summary Profile* in turn, first asking teams to share their data with you, then totaling the data and entering them into the table. After you complete each row, give the teams time to discuss and agree on their conclusion and fill it into their worksheets.**

    • In the second row, students should see that the number of people who develop cancer increases with age (that is, the incidence of cancer increases with age). If students have difficulty expressing this idea, you may wish to ask a guiding question such as "What do you notice about the number of people who develop cancer in each life stage?" Encourage students to write their conclusion as a statement (for exam ple, "The number of people who develop cancer increases with age.").

    • In the third row, students should see that cancer can develop in almost any tissue and organ in the body. They also may note that some types of cancer are more common than others.

    You may wish to ask students whether the fact that no one in this sample developed brain or uterine cancer means no one in the U.S. population gets this type of cancer. Students should recognize that this is not true. You also may wish to invite students to suggest other types of cancer that did not occur in this population and list them under "other" in the third row of the table.

    • In the fourth row, students should see that some people make choices or experience life events that increase their risk of developing cancer.

    Tip from the field test. Students may have difficulty distinguishing factors that increase risk for cancer from those that do not. If students express some uncertainty, ask them how they could find out about risk factors. You may wish to refer students to the Web site for the National Cancer Institute (http://www.nci.nih.gov) as an excellent source for current and reputable information about cancer.

16. **Ask whether anyone can suggest what the black dot on each person's set of cards might mean. Entertain several answers. If necessary, explain that these dots represent the period of life during which mutations may have occurred that eventually contributed to the development of cancer. Explain that students will learn more about these mutations in Activity 2. Ask the students to discuss in their teams what they notice about the dots.**

Give the students several minutes to look at the dots and discuss what they observe. If students seem to be confused about what they should be noticing, ask them guiding questions such as "What do you notice about the period of life in which each person's dot occurs and the period in which that person's cancer was detected?"

Be sure that students understand the difference between the period of life in which the mutations associated with the development of cancer occurred and the period in which the cancer was detected. In some cases, the dot appears in the same period of life that the cancer was detected. In most cases, however, the dot appears many years before the cancer was detected.

17. Ask two or three teams to report what they observed about the dots and initiate a class discussion about the significance of these observations.

Help students understand that cancer develops across time and often many years intervene between the first cancerous changes and the symptoms that cause a person to seek medical help.

As part of this discussion, you also may wish to ask students (1) what factors in people's lives improve their chance of recovering from cancer (for example, early detection and treatment); (2) what factors reduce their chances of early detection (for example, poor access to health care, either because of where they live or their socioeconomic status); and (3) what factors increase their chances of early detection (for example, par ticipation in opportunities to be screened for cancer). Challenge stu dents to support their answers by referring to specific people they learned about in this activity.

18. Close the activity by asking students to complete the Discussion Questions on the bottom of *Drawing Conclusions* either in class or as homework. Briefly discuss their answers with them at the end of the period or at the beginning of the next.

Question 1 In this activity, all students in the class assumed the role of someone who developed cancer sometime in his or her life-time. Is this an accurate representation of the risk of cancer among the American population? Explain your answer.

No, this is not an accurate representation. Students should remember the opening exercise in which they learned that current statistics indi cate that only 1 in 3 Americans develops cancer sometime in his or her lifetime. Point out that in this activity, students studied 30 people who *all* got cancer, but this does not mean that everyone will get can cer in his or her lifetime.

Point out as well that students should not extrapolate from the *rates* of cancer illustrated in the activity. Although the general trends illus trated in these 30 people are accurate (for example, rates for lung, colon, and breast cancer are higher than rates for cervical, pancreatic,

Collect and review the students' completed worksheets to assess their understanding of the activity's major concepts.

and ovarian cancer), rates for other cancers are artificially exagger ated as a result of the small sample size. A striking example of this exaggeration occurs in the case of retinoblastoma. We included retinoblastoma to illustrate an example of a hereditary cancer, even though its incidence in the U.S. population is 1/12,000 to 20,000, not 1/30 as implied in this activity.

Question 2 What explanation can you offer for the observation you made about the incidence of cancer compared to age?

Answers will vary. Some students may suggest that it is related to the fact that cancer develops across time (which they learned when you discussed the black dots with them). Because older people have lived longer, they have a greater chance of developing it. Students will return to this question in Activity 3, *Cancer as a Multistep Process.*

Question 3 What is the most interesting or surprising thing you learned from this activity? What is the most important? Why?

Answers will vary.

Asking students to name the most important thing they learned challenges them to identify the activity's key ideas. If students have difficulty with this, ask questions based on the objectives in *At a Glance.*

Extend or enrich this activity by asking students to bring to class current newspaper or magazine articles about cancer. Display these in your classroom and, at the close of Activity 5, invite students to comment on them, drawing on what they learned about cancer during the preceding activities.

Potential Extensions