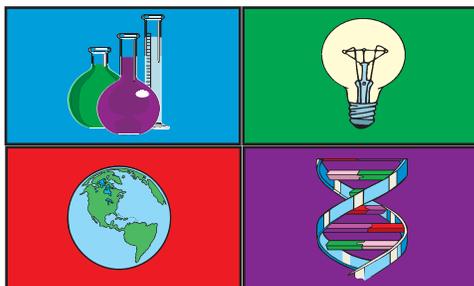# Science TODAY™ Challenge
Teacher Edition

USA TODAY
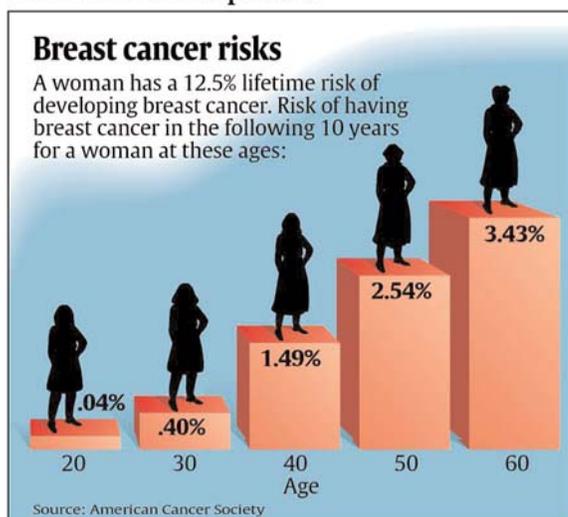
NO. 1 IN THE USA

Breast Cancer Risks

By: Jeff Lukens

USA TODAY Snapshots

Breast cancer risks

A woman has a 12.5% lifetime risk of developing breast cancer. Risk of having breast cancer in the following 10 years for a woman at these ages:

.04% (20), .40% (30), 1.49% (40), 2.54% (50), 3.43% (60) — Age

Source: American Cancer Society

By Cindy Hall and Marcy E. Mullins, USA TODAY

Activity Overview:

The USA TODAY Snapshot™ "Breast cancer risks" shows the percentage of women in several age categories that, statistically, develop breast cancer. Students will notice that the percentages increase as women get older. In this activity, students will calculate the overall percent chance that a woman has of being diagnosed with breast cancer, and they will also predict the breast cancer rates for ages not included in the USA TODAY Snapshot. In addition, students will read a USA TODAY article featuring additional statistics and a case study to further their understanding of some of the possible causes of breast cancer.

Concepts:

- Evaluate the prevalence of breast cancer throughout a woman's life.
- Interpolate and extrapolate from a mathematical model of cancer rates.
- Become aware of some of the causes and preventions of breast cancer.
- Research the various means by which cancer is treated.

Activity at a Glance:

- Grade level: 9-12
- Subject: Biology, Health, Anatomy and Physiology, Genetics
- Estimated time required: 40-50 minutes

Materials:

- TI-83 Plus family or TI-84 Plus family
- Overhead TI-ViewScreen™ calculator for instruction/ demonstration
- Student handout
- Transparency
- TI-Navigator™ Learning System, if available
- Internet access
- USA TODAY newspapers (recommended)

Prerequisites:

Students should be able to:

- enter data in the list registry of the graphing calculator.
- graph data from the lists.
- reate regression models.
- interpolate and extrapolate from a regression model.
- navigate a website.
- make calculations on the home screen of the graphing calculator.

This activity works with

TI navigator
A Classroom Learning System

This activity was created for use with Texas Instruments handheld technology.

Breast Cancer Risks

Objectives:

Students will:
- evaluate the prevalence of breast cancer throughout a woman's life.
- interpolate and extrapolate from a mathematical model of cancer rates.
- become aware of some of the causes and preventions of breast cancer.
- research the various means by which cancer is treated.

Background:

There is unlikely to be a physician's diagnosis that will strike more fear into the heart of a woman than the diagnosis of breast cancer. It is nearly impossible to find someone who has not been either directly or indirectly affected by this disease. Breast cancer is like many other forms of cancer in that a little education about the disease can go a long way toward prevention of the disease. To be sure, heredity plays an extremely important role in the incidence of breast cancer. Additionally, however, healthy and thoughtful lifestyle choices are vital as well. Obesity, smoking, alcohol use, and a sedentary lifestyle can all have an impact on cancer rates,and on a person's general health.

Preparation:

- Provide one graphing calculator for each student.
- Each student should have a copy of the corresponding student activity sheet.

Classroom Management Tips:

- Students will have a better understanding of how to read the graphic and retrieve data if you use the transparency for a class discussion before the students start working.
- Remind students to read carefully all parts of the graphic before they start collecting data.
- Students can work individually or in small groups on this activity. Working in groups is especially helpful as they learn the various features of the calculator.

Data Source:

American Cancer Society

National Science Education Standards

Grades 9-12: Science in Personal and Social Perspectives

PERSONAL AND COMMUNITY HEALTH

The severity of disease symptoms is dependent on many factors, such as human resistance and the virulence of the disease-producing organism. Many diseases can be prevented, controlled, or cured. Some diseases, such as cancer, result from specific body dysfunctions and cannot be transmitted.

Personal choice concerning fitness and health involves multiple factors. Personal goals, peer and social pressures, ethnic and religious beliefs, and understanding of biological consequences can all influence decisions about health practices.

Selection of foods and eating patterns determine nutritional balance. Nutritional balance has a direct effect on growth and development and personal well being. Personal and social factors--such as habits, family income, ethnic heritage, and body size, advertising, and peer pressure--influence nutritional choices.

Additional Resources:

- Student handout
- Transparency
- TI Technology Guide, for information on the following: TI-83 Plus family, TI-84 Plus family, List Editor
- TI-Navigator™ Basic Skills Guide for information on using the TI-Navigator Classroom Learning System

Breast Cancer Risks

Activity Extension:

- USA TODAY often has articles, data and graphics about cancer, cancer rates and new findings through research. Remind students to scan USA TODAY for updates and more information, data and graphics.

- Every Monday through Thursday, the USA TODAY Life section features articles on healthy living-including the topics of weight control, exercise and the effects of smoking and alcohol consumption. Use these resources to enhance your discussions with students about healthy lifestyle choices.

- Extend your discussions and research other forms of cancer --the causes, treatments, mortality and preventions.

- Ask students to interview people whom they know have been affected by cancer. Have students write and/or discuss the results of their interviews.

Curriculum Connections:

- Algebra I
- Statistics

Breast Cancer Risks

Assessment and Evaluation:

Q. **What is the independent variable in your graph?**
A. Age

Q. **What is the dependent variable in your graph?**
A. Breast cancer risk

Q. **Does the graph most closely resemble a linear model? Explain.**
A. No. In general the risk of breast cancer increases at a greater rate as a woman gets older, so the graph is non-linear. A logistic regression actually fits the data the best.

Q. **Carefully read the information in the USA TODAY Snapshot "Breast cancer risks." During which age span does a woman have a 1.49% chance of developing breast cancer?**
A. 40-49 years

Q. **Use the regression model to predict the percent chance that a woman in her 70s will develop breast cancer.**
A. *3.65%*

Q. **Use the best regression model to predict the percent chance that a woman who is 35 years old will develop breast cancer.**
A. 0.84%

Q. **Why do you think the risk of developing cancer increases with increasing age?**
A. The odds of having faulty cell divisions increases.

Q. **In the "Activity Overview", cancer was described as cell division that has become uncontrollable. What is this type of cell division called, whether it is under control or not?**
A. Mitosis

Q. **Explore the Imaginis website that is listed under "Additional Information." What was the death rate of people diagnosed with breast cancer in the year 2000 in North America? To calculate this, divide the number of new cases by the deaths.**
A. 25.3%

Breast Cancer Risks

Assessment and Evaluation (continued):

Q. **What was the death rate of people diagnosed with breast cancer in South Central Asia in the year 2000?**
A. 48%

Q. **Explain why these death rates are so different.**
A. There is better health care in North America. This includes more awareness of the disease, better detection and better treatment.

Assessment and Evaluation Pertaining to the Article

Q. **In the study done on the females who were in school between the years 1922 to 1935, what percentage of those women died as a result of breast cancer?**
A. 3.4% (29 of 858)

Q. **According to the data in the article, if a town had a population of 50,000 women, how many of them, on average, would be expected to die of breast cancer?**
A. 1500 (3% of 50,000)

Q. **Assume that all 50,000 of the women in the town were overweight as children. Now how many would be statistically expected to die from breast cancer?**
A. 3000 (6% of 50,000)

Q. **Assume that there are 100 million women living in the United States right now. If half of them were overweight as children and half were not, how many of these 100 million women would be expected to die of breast cancer?**
A. 4.5 million (4.5% x 100,000,000)

If you are using the TI-Navigator Classroom Learning System, send the provided LearningCheck assessment to your class to gauge student understanding of the concepts presented in the activity. See the TI-Navigator Basic Skills Guide for additional information on how this classroom learning system may be integrated into the activity.