Instructor Notes

Skin Cancer Investigation: A Multi-Component Project

The objective of this investigation is to compare the perceived and actual risks of getting skin cancer, while looking at ways to minimize these risks. Participants may have very little grasp of the severity of the threat of skin cancer or be unaware of the increase in the incidence of melanoma (the most deadly form of skin cancer) since the early 1900s. At the same time, they are vulnerable to advertising and media emphasis on the social value of the suntan. This project is intended to provide a means of integrating environmental health science principles into the earth, life, or health science curriculum in a way that is practical and meaningful for participants susceptible to peer pressure and misinformation surrounding suntans, sunburn, and tanning booths.

The activity is written for workshop participants and may need modification for classroom use.

Suggested Background Readings

- An Introduction to Toxicology
- A Scientific View of Risk

National Science Education Standards for Grades 5–12

Science as Inquiry

- Abilities Necessary to Do Scientific Inquiry
  Conduct scientific investigations. Students perform indoor and outdoor experiments that demonstrate the usefulness of different sunscreens for blocking ultraviolet (UV) light.

  Revise scientific explanations using logic and evidence. After analyzing their perception of a healthy lifestyle, students research facts about skin cancer and participate in a class discussion that identifies ways to reduce the risk of skin cancer. Based on scientific knowledge and the use of logic, students revise their initial views of healthy lifestyles.

Life Science

- Reproduction and Heredity
  Hereditary information is contained in genes. Students learn that perhaps the biggest risk factor for skin cancer is family history because humans inherit their skin type from their ancestors. Students determine the minimum recommended skin protection factor (SPF) sunscreen for their skin type.

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Science in Personal and Social Perspectives

- Personal and Community Health
  Many diseases can be prevented, controlled, or cured. Students learn many ways of reducing the risk of skin cancer.

  Personal choice concerning fitness and health involves multiple factors. Peer pressure, advertising campaigns, and media coverage that promote tanning can all influence personal decisions about healthy practices.

- Risks and Benefits
  Individuals can use a systematic approach to thinking critically about risks and benefits. Students research the topic of skin cancer to develop critical-thinking skills for assessing the relative risks of developing skin cancer and the estimated personal and social benefits of certain behaviors.

Safety

UV light can damage the eyes. Do not look directly at the light source and do not expose skin to the light for more than a few minutes as the UV light can cause sunburn.

Materials

For the Outdoor Sunscreen Experiment

Per class

- 3 sunscreen lotions of various strengths, SPF 4–55 (Choose one low, one medium, and one high number.)
- skin lotion containing no sunscreen (e.g., Jergens® or Vaseline® lotion)
- stopwatch (or other timer with a second hand)
- container of water
- tape

Per group

- Nature Print® paper (5½-in x 7½-in)
  Paper may be ordered from Nature Print, P.O. Box 314, Moraga, CA 94556; 925/284-3115, or fax 925/284-3120. The paper comes in packages of 15, 30, or 40 sheets. Prices per package are $4.60, $8.00, and $8.50, respectively.
- acrylic sheet (transparency) with oval patterns (drawn as indicated in Getting Ready)
- permanent (not water-soluble) marking pen or labels
- plastic cups
- cotton swabs
- paper towels

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For Getting Ready

These materials are needed to make the UV light observation chamber the first time the indoor sunscreen experiment is done.

- UV light ("black light")
- cardboard box with dimensions about 13 inches x 18 inches x 10 inches (large enough to hold standard paper sheets)
- box cutter
- masking tape

For the Indoor Sunscreen Experiment

Per class

- 3 sunscreen lotions of various strengths, SPF 4–55 (Choose one low, one medium, and one high number.)
- skin lotion containing no sunscreen (e.g., Jergens or Vaseline lotion)

Per group

- white bond copy paper or "neon" paper capable of fluorescing
  Test for fluorescence before use as described in Getting Ready, step 2.
- acrylic sheet (transparency) with pattern (drawn as indicated in Getting Ready)
- permanent (not water soluble) marking pen or labels
- 4 cotton swabs

For the Extension

Per class

- UV sensometer
  UV sensometers may be ordered from the South Seas Trading Company, P.O. Box 540, Kula, HI 96790, 808/876-0090 (50% discount if purchased for educational purposes).

Getting Ready

For Risks and Choices and Skin Cancer Research

You may want to photocopy Handouts 1 and 2 onto a single sheet of paper.

For the Outdoor Sunscreen Experiment

1. Cut each transparency to the size of the Nature Print Paper.
2. With a permanent marker, trace the pattern on the transparency four times leaving about 2–3 cm (1 inch) between the patterns. (One pattern will be needed for each of three SPF sunscreens and the skin lotion to be tested.)

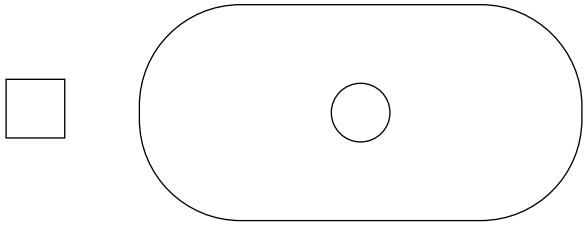

Figure 1: Oval pattern

3. Pour the sunscreen lotions and the skin lotion into the cups, and label each with the appropriate SPF number. (0 for the skin lotion with no sunscreen and SPF numbers for the three sunscreen locations.) Several students can share each container of lotion.

For the Indoor Sunscreen Experiment

1. Prepare a UV-light observation chamber from the cardboard box as follows:
   a. Remove the open flaps of the box's lid.
   b. Cut an arched opening on one side of the box as shown in Figure 2. (This will be the doorway through which paper will be put into the observation chamber.)
   c. In the bottom of the box cut an opening for the light fixture. Make the hole large enough to allow the light bulb to emit light into the box but small enough to hold the light's case so that the light fixture does not fall through the hole. Pattern the hole after the shape of the light fixture.
   d. With the box upside down, position the light in the hole prepared in step c so that the light beam is directed into the box. Tape the light in place with the masking tape. Refer to Figure 2 for the completed setup.

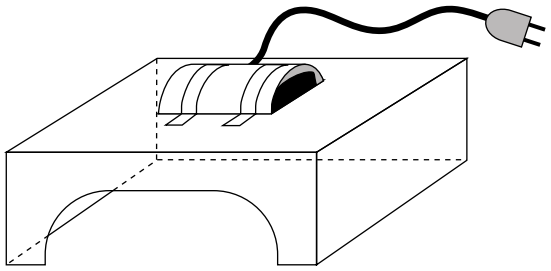

Figure 2: Prepare the ultraviolet-light observation chamber.

2. Test the paper to be used for fluorescence. Put a sheet into the UV-light observation chamber. Turn on the light to see if the paper will glow.
3. Draw the pattern in Figure 1 four times on each transparency as described in Getting Ready For the Outdoor Sunscreen Experiment.

Procedure Notes and Outcomes

The materials for this project include a number of readings. These readings are by no means exhaustive, but they include articles from a variety of viewpoints. Some articles

contain website addresses for the different sides of this issue. Participants should, of course, do most of the research on their own. The Internet is an incredible source of information, but one needs to judge the quality of the information carefully. Evaluating information in terms of its source is a part of the learning process.

A good lead-in to this activity is to show the class a set of pictures depicting a variety of activities or situations. The pictures may show air pollution in a big city, a polluted river, or people eating fatty foods or smoking cigarettes. Intersperse these with pictures of outdoor scenes, such as people swimming, playing volleyball on a beach, sailing, playing golf, gardening, or mowing the lawn. Ask the class which pictures represent their ideal life. Have the participants write a paragraph or two on several of the pictures that particularly strike them as representative of their future life.

Next ask the class which pictures represent something unhealthy or something healthy. Have the participants explain their answers. The participants are likely to think most of the outdoor activities are healthy. Next ask the participants if they can think of what the "healthy" activities have in common. Ask them to think of things that could actually be unhealthy about the activity they considered healthy. If by this time participants don't guess that exposure to sunlight is the common theme and skin cancer the common risk, show them a picture of people sunbathing. Pose the questions again. Ask the participants whether any of their descriptions of the ideal life included getting skin cancer.

Have participants write down five ideas they have about skin cancer. At the end of the investigation they'll revisit these ideas.

The purpose of this introduction is for participants to understand that some level of risk exists in nearly every facet of our lives. People commonly associate sunlight and the outdoors with healthy, tanned bodies; summer fun; and the good life. They rarely stop to consider how high levels of exposure to sunlight (UV light) can affect their chances of getting skin cancer at some point in their lives. Yet the possibility of developing some form of skin cancer is very real: 1 in 7 people will develop this disease if he or she lives long enough. (Have every seventh person in the room stand up.) At this point, you may want to show pictures of actual skin-cancer patients. These pictures can be rather graphic, but they will reinforce the point that skin cancer is neither healthy nor attractive.

Risks and Choices

For this activity, participants will discuss and consider the perceived risks of skin cancer versus the actual risks, the causes of those risks, and the choices related to those risks. The participants should be able to come to some conclusion about making responsible decisions in order to avoid skin cancer.

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Assign Handout 1: Perceived Risks for Getting Skin Cancer in Your Lifetime. Have the participants complete the checklist in groups of two to four and discuss their results. Answers to the questions will vary based on the participants' opinions and experience, but some suggested discussion points follow.

Factors that are generally considered to be high risk for developing skin cancer include excessive and unprotected daily sun exposure, sunbathing, and use of tanning booths—anything that involves excessive and/or unprotected exposure to UV radiation. Daily sun exposure is impossible to avoid in normal life. The participants should understand that if they are going to be in the sun for extended periods of time, they need to wear appropriate clothing and use the proper sunscreen for their phototypes. Other known high-risk factors for skin cancer include geographic location (those living closer to the equator or at higher elevations are exposed to more UV radiation), ozone depletion, and occupation. (Those who work outdoors all day and do not use the proper protection have a higher risk than those who work in offices.) Perhaps the biggest risk factor is a family history of skin cancer. Light-skinned people who freckle easily or those with a family history of skin cancer should be particularly wary of sunburn and long-term sun exposure.

Other possible risk factors for developing skin cancer include exposure to chemicals and chronic, repeated injuries to the skin. For example, some chemicals, like those in coal tar, are known to cause skin cancer in laboratory animals. Many scientists also think that cancer can develop from long-term irritation to the body's tissue. If some of your participants have moles in places that are rubbed continuously, such as where their feet press against their shoes or bra straps rub against their backs, they may want to see a doctor to determine whether removal of the mole is recommended. The key issue to reinforce to the participants is that they should avoid chronic skin irritation (including sunburn), look for any changes in their moles' color or texture, and watch for any unusual skin growth. Tell them that a doctor should always examine any changes they notice.

Several factors in Handout 1 are not usually associated with skin cancer. They include eating fatty foods, smoking cigarettes, and drinking alcohol. However, the participants should understand that these behaviors can lead to heart disease, diabetes, and other types of cancer, particularly lung cancer from smoking.

The role of hazardous waste dumps, tattoos, food additives, and certain medicines in causing skin cancer is unknown. Cancer usually takes many years to develop. Establishing a scientific, cause-and-effect relationship can be difficult. Determining the exact cause of someone's cancer is often impossible. You may want to inform the participants that science is an endless quest for the truth that sometimes involves things which may never be known for sure.

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Use of cosmetics and perfume is not necessarily a risk for skin cancer, although some people can develop allergies and other skin conditions by using or being exposed to them. For example, some synthetic perfumes used in male colognes are known to cause abnormal skin reactions to sunlight. The condition usually clears after use of the cologne is stopped.

Automobile exhaust is a source of air pollution but is not usually regarded as a cause of skin cancer. In fact, the skin-cancer risk in highly air-polluted, urban areas may be lower than in rural areas because the resulting smog and ozone help to filter out UV radiation. However, air pollution carries its own obvious health risks.

Assign Handout 2: Perceived Ways to Help Prevent Skin Cancer in Your Lifetime. Have participants complete the checklist and discuss the results, as with Handout 1. Discuss participant answers to the checklist as time permits. Answers to the questions will vary based on the participants' opinions and experience, but some suggested discussion points follow.

The most important things that participants can do to reduce their risk of getting skin cancer is to avoid sunburn, know their family history of skin cancer and then act appropriately, use good sense while sunbathing (don't overdo it and be sure to use appropriate sunscreen for skin type), wear protective clothing outdoors including sun glasses, and have a doctor examine their skin and moles during annual checkups. It is not necessary to avoid all outdoor activities or to have all moles removed from the body, unless the moles show peculiar changes. Some sun exposure is necessary for the production of Vitamin D . Using a sunscreen of SPF 30 or higher is primarily a good idea for people who are particularly prone to sunburn. Lower SPF numbers are sufficient for those who tan easily, have darker skin, or live in areas with low UV levels. Some makeup is being manufactured with a built-in SPF and is becoming a choice for consumers.

Reading all food labels and avoiding smoking and drinking are good health practices, but they will not necessarily reduce the participants' risk for skin cancer. Avoiding foods with red dye is also unlikely to reduce their risk. The participants should pay attention to the known risk factors for skin cancer and not confuse them with other health issues.

Certain antibiotics and anti-diabetic medications can cause abnormal skin reactions to sunlight. Reading medicine labels is probably a good idea to maintain healthy skin. People taking these medications should use sunscreen and avoid prolonged exposure to sunlight.

Carpooling and planting more trees are good for the environment because they help reduce CO_2 in the atmosphere. High levels of CO_2 contribute to global warming. The participants should understand that ozone depletion (which could lead to more incidences of skin cancer) and global warming are separate environmental concerns.

Red-headed or blond participants cannot reduce their risk of skin cancer by dyeing their hair a darker shade. Susceptibility to skin cancer is determined by one's genes, not appearance. A knowledge of one's phototype and family history is the best indicator of one's susceptibility to getting skin cancer.

Skin Cancer Research

Next have participants research the topic of skin cancer. This task is key to the project because it allows the participants to develop critical-thinking skills to assess the relative risks in life and the media's presentation of them. Assign Handout 3: Critical Thinking Reference, and spend some time discussing the importance of developing an eye for accurate and reliable sources of information. You may want to bring in a tabloid article, an op-ed piece from a daily newspaper, and a *Scientific American* article to demonstrate how each supports or documents the information it contains.

Assign groups to read sections of *Saving Your Skin* (Kenet and Lawler) or another comprehensive resource on the topic. Handout 5: Websites is another source of information. For example, visit the *http://www.maui.net/~southsky/introto.html* (#3 on the list) and print out and distribute the text of "An Introduction to Skin Cancer." Assign each participant in the group a number and a task for that number:

- Participant #1 reads for the main idea and states that to his/her group of four participants.
- Participant #2 highlights selected details and shares that with the group of four participants.
- Participant #3 records important facts for Participant #4 to report to the class, based on the findings of participants 1 and 2.
- Participant #4 reads for reinforcement of all of the above and reports to the class.

Outdoor Sunscreen Experiment

This experiment uses sunlight and photosensitive paper to demonstrate sunscreen's ability to block UV light. Have participants complete Handout 4, then do Activity 1. You may decide to do only the outdoor experiment or only the indoor experiment (described below) depending on the time available and the weather. After doing the activity, you may want to have participants try to explain how the photosensitive paper works and then review the following explanation as a group.

A variety of photosensitive papers are available and they may not behave in exactly the same way, but the overall processes are probably similar. Some light-sensitive paper is coated with a water-soluble, bluish-green compound called iron(III) hexacyanoferrate(III), $Fe[Fe(CN)_6]$. The common name for this compound is Berlin green. It is made by reacting

potassium ferricyanide, $K_3Fe(CN)_6$, and ferric ammonium citrate (a compound of iron(III), ammonia, and citric acid of undetermined structure).

When exposed to UV radiation, Berlin green undergoes a chemical reaction; the water-soluble Berlin green is converted to water-insoluble iron(III) hexacyanoferrate(II), $Fe_4[Fe(CN)_6]_3$. The common name for this product is Prussian blue. Light-sensitive paper that is coated with Berlin green reacts to form Prussian blue when exposed to light which contains some UV radiation, such as sunlight or incandescent light. On any part of the paper not exposed to UV light, the Berlin green is not changed. When a piece of exposed light-sensitive paper is rinsed in water, the water-soluble Berlin green is washed out, but the insoluble Prussian blue remains on the paper. This leaves a light silhouette against a deep blue background of Prussian blue. The intensity of the blue color depends upon the nature and intensity of the light source and the exposure time. The longer the exposure time, the darker the blue color. Likewise, the greater the intensity of the light, the darker the color.

Plausible Answers to Questions

1. Note any difference between the sunscreening abilities of the low and high SPF numbers. Compare areas with and without sunscreen lotion.
   Paper covered with high SPF sunscreen shows hardly any color change. The color change is greater for sunscreens with low SPF numbers, and greatest for areas without sunscreen.
2. Relate your findings to the recommended SPF for your own skin phototype.
   Answers will vary.

Indoor Sunscreen Experiment

This experiment uses fluorescent paper, sunscreen, and a UV lamp (black light) instead of sunlight to demonstrate sunscreen's ability to block UV light.

Fluorescence occurs when UV light strikes a material that can absorb the UV light and only during the time the UV light is active. Fluorescent paper contains such materials. To observe fluorescence, any lights in a room must be dimmed. Most white bond paper contains optical brighteners, materials that absorb UV and emit white light, thus making the paper seem whiter than it would without these chemicals. Consequently, both "neon" or Day-Glo™ and white bond papers glow under UV light.

Sunscreen lotions contain ingredients that absorb UV rays from the sun (and thus protect skin from burning). When sunscreens are applied over fluorescent papers, they screen out the UV light and prevent the affected areas of the paper from fluorescing. The varying ability of different sunscreen lotions to absorb UV is rated in terms of SPF, Sun Protection Factor; the higher the SPF number, the greater the protection against UV light from the sun. White copy paper that has been covered with sunscreen SPF 4 appears grayish under

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UV light, while white paper covered with sunscreen SPF 55 appears almost black. The white paper covered with lotion containing no sunscreen would glow as paper that has not been treated.

Have participants complete Handout 4, if they did not do it for the outdoor experiment. Then do Activity 2.

Plausible Answers to Questions

1. After about 30 seconds, lift up the transparency and note any difference between the sunscreening abilities of the low and high SPF numbers. Compare areas with and without sunscreen lotion.
   Paper covered with high SPF sunscreen appears almost black. The fluorescence is greater on areas with sunscreens with low SPF numbers, and greatest for areas without sunscreen.
2. Relate your findings to the recommended SPF for your own skin phototype.
   Answers will vary.

Skin Phototypes

You may wish to discuss the interplay of high/low genetic and exposure risks factors (see Handout 4). Answers to the questions will vary based on participants' opinions and experience. Another option would be to show the National Institute of Health slide presentation, Understanding Gene Testing: A Slide Lecture (Free from NIH), which explains the effect of UV on DNA. Call 1-800-4-CANCER and request items #K712, A Slide Lecture, and #T922, the accompanying booklets.

This NIH material is also printable from http://rex.nci.nih.gov, website #7 on Handout 5.

Independent Research

Have participants report their independent research findings to the class. If desired, you may want to have participants fill out Handouts 1 and 2 again and as a class compare the before and after data.

Summarizing What Was Learned

Analyze how this investigation demonstrates the importance of distinguishing between perception of risk factors and actual risk. Does the study demonstrate the need to become educated about actual risk? Determine whether there are questions still unanswered. Discuss conclusions that participants have reached regarding choices they will make to protect themselves from skin cancer.

Show the class the same pictures you used to introduce the investigation. Discuss how the choices participants make can help them achieve a healthy (skin-cancer-free) adulthood and retirement, free of surgery, disfigurement, and medical bills resulting from skin cancer, perhaps even saving their own lives.

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Have participants look back at the skin cancer ideas they wrote down at the beginning of the investigation. Discuss the accuracy of these ideas as a class. You may also want to have the participants return to Handouts 1 and 2 to see if they would change any of their original answers based on what they've learned.

Extensions

1. Use the following alternative presentation to complete this Skin Cancer Investigation in a shorter time period. Complete the introduction, Risks and Choices, and Skin Cancer Research. Set up stations for participants to complete. You may set up six stations as follows, to be completed in one 45-minute period. Allow about 3 minutes per station. The stations are as follows:

   a. Pictures of melanoma and other skin cancers, as well as benign moles, printed from the Internet websites handout. (Your library may also have books with such pictures.)

   b. Who am I? (See Handout 4.) Participants analyze their skin phototypes and determine the recommended SPF of their skin protection product.

   c. Test for UV radiation at a window or outside by using a sensometer.

   d. Test for UV radiation near a TV and a computer, also using a sensometer.

   e. View website #6 on Handout 5 to find a definition of "UV index" and see a UV radiation index for selected cities.

   f. Experiment with sun-sensitive paper.

   After the participants have visited all of the stations, discuss the facts learned about skin cancer, questions raised, and topics for further research.

2. Have participants do some research on their own, based on unanswered questions or specific interests. For example, they could learn about medications that require avoiding sunlight, interview someone who has or had skin cancer, research tanning beds, study ozone depletion, interview a dermatologist who treats melanoma, or conduct Internet research on air conditioning units in cars (see Handout 5), or on tattoos and their effects on skin.

3. A meaningful follow-up activity would be a project to inform all participants in the school of the seriousness of skin cancer risks.

References

Baird, C. *Environmental Chemistry;* W.H. Freeman: New York, 1995.

Kenet, B.; Lawler, P. *Saving Your Skin;* Four Walls Eight Windows: New York, 1994.

Manahan, S. *Environmental Chemistry,* 4th ed.; Lewis: Chelsea, MI, 1990.

Mortensen, L. et al. *Global Change Education Resource Guide;* U.S. Department of Agriculture: Silver Spring, MD, 1996.

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Sarquis, J.; Sarquis, M.; Williams, J. "Experimenting with Light-Sensitive Paper," *Teaching Chemistry with TOYS: Activities for Grades K–9;* McGraw-Hill: New York, 1995; pp 275–281.

Seldon, T. *Exploring the Environment;* Hamilton County Department of Environmental Services: Cincinnati, OH, 1996.

"Sunscreens," *Consumer Reports.* 1991, *56,* 400–406.

Handout 1: Perceived Risks for Getting Skin Cancer in Your Lifetime

Read through the list below. Indicate with a checkmark whether you think each item is a "no-risk," "low-risk," "moderate-risk," or "high-risk" factor for developing skin cancer. If you're not sure or don't know, check the last column.

Perceived Risks of Getting Skin Cancer in Your Lifetime				
	No risk or low risk	Moderate risk	High risk	Not sure or don't know
1. fatty foods				
2. food additives				
3. drinking alcohol				
4. daily sun exposure				
5. tanning booths				
6. smoking				
7. geographic location				
8. large number of skin moles				
9. auto emissions (exhaust)				
10. hazardous waste dumps				
11. wearing makeup				
12. occupation				
13. exposure to chemicals				
14. sunbathing				
15. family history of skin cancer				
16. tattoos				
17. medicine				
18. individual genetic makeup				
19. injuries to skin				
20. ozone depletion				

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Handout 2: Perceived Ways to Help Prevent Skin Cancer in Your Lifetime

Place a check mark in front of things you think can be done to reduce the risk of skin cancer.

1. _____ Plant more trees.
2. _____ Read all food labels.
3. _____ Read medicine labels carefully.
4. _____ Don't drink alcohol and don't smoke.
5. _____ Avoid sunburn.
6. _____ Carpool.
7. _____ Blonds and redheads should dye their hair black.
8. _____ Get a DNA test.
9. _____ Know your family history of skin cancer.
10. _____ Purchase sunscreen SPF 30 or higher.
11. _____ Have all moles removed.
12. _____ Use good sense when sunbathing.
13. _____ Don't use makeup or eat foods with red dye in them.
14. _____ Have a doctor examine your skin, especially moles, at an annual checkup.
15. _____ Avoid outdoor sports.
16. _____ Avoid outdoor occupations.
17. _____ Avoid outdoors, period.
18. _____ Wear protective clothing outdoors.
19. _____ Wear sunglasses that filter UV rays.

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Handout 3: Critical Thinking Reference

1. What is the source of the information? (Television programs, newspaper articles, popular books, scholarly publications, and educational materials all have different intended audiences, purposes, levels of complexity, and standards for documenting the information presented.)
2. Has the source been reliable in the past? (For example, consider some tabloid predictions.)
3. What are the author's credentials and background? (Distinguish between popular writers and writers who are acknowledged experts in the subject matter. Also, just because a writer is an expert in one field doesn't mean he or she is an expert in another field.)
4. What do other experts say about the issue?
5. Does the author support information with specific facts and references? (Some popular books and articles contain minimal or no references. Readers should be wary of these sources, particularly if the subject matter is controversial.)
6. Is the author associated with a particular institution or organization? (Some organizations have certain values and goals. This doesn't mean that the information they provide is necessarily invalid or unreliable, but one should be aware of the overall viewpoint of the organization and watch out for biases.)
7. In a scholarly article, how valid are the research methods and analyses?
8. Does the evidence support the conclusion?
9. Where can I find more information? Opposing viewpoints?

Handout 4: Skin Phototypes and Skin Protection

Human Skin Phototypes		
Reaction to Sun	Unexposed Skin	Common Minimum Recommended Skin Protection Factor
Always burns easily; never tans	white	SPF 20 to 30
Always burns easily; tans minimally and with difficulty	white	SPF 12 to under 20
Burns minimally; tans gradually and uniformly	white	SPF 8 to under 12
Burns minimally; always tans well	light brown	SPF 4 to under 8
Rarely burns; tans profusely	medium brown	SPF 2 to under 4
Never burns; tans profusely	dark brown or black	SPF 2 to under 4

Questions

1. Determine which human skin phototype is yours.
2. Which unexposed skin color is yours?
3. What is your recommended skin protection product?
4. How are your choices different/similar to those of your classmates?

Handout 5: Websites

The following websites are just some of the many sources of information on the Internet regarding skin cancer, sun exposure, and ozone depletion.

1. http://skincancer.cool.net.au/home.html (accessed February 27, 2001)
   (An Australian site covering the dangers of skin cancer and how to prevent it.)
2. http://matrix.ucdavis.edu/tumors.html (accessed February 27, 2001)
   (Contains tutorials on melanoma and other skin cancer; for second year medical students.)
3. http://www.maui.net/~southsky/introto.html (accessed February 27, 2001)
   (An introduction to skin cancer, definitions, assessing risks, heredity, environmental factors, UV sensometer, and links to related websites.)
4. http://www.nsc.gov.sg/ (accessed February 27, 2001)
   (Provides medical information from the Singapore National Skin Center. Use the index on the left side of the webpage for links to educational information and skin cancer pictures.)
5. http://www.bananaboat-sun.com/ (accessed February 27, 2001)
   (Click on "what's your spf?" Participants input data regarding skin type, number of hours anticipated sun exposure, etc., and this website advises a sunscreen.)
6. http://www.epa.gov/sunwise/index.html (accessed February 27, 2001)
   (The Sunwise School Program was developed by the EPA and the National Weather Service (NWS) to educate teachers and students. Contains links to daily national UV maps, archived data for cities, an interactive crossword puzzle, etc. Click on the UV Index Listings link for this information.)
7. http://rex.nci.nih.gov (accessed February 27, 2001)
   (Click on Public, then Publication Index, Health Communicators, and Understanding Gene Testing.)
8. http://www.epa.gov/docs/ozone/index.html (accessed February 27, 2001)
   (Contains information about the science of ozone depletion and links to other environmental topics.)
9. http://www.niehs.nih.gov/external/a2z/home.htm (accessed February 27, 2001)
   (Environmental Diseases A–Z. Click on "Facts about environmentally related diseases and health risks.")
10. http://www.mpip.net.org/ (accessed February 27, 2001)
    (The Melanoma Patients' Information Page is a noncommercial site that provides information and support to melanoma patients and their caregivers.)

11. http://www.mcmaster.ca/ehp/sint.htm (accessed February 27, 2001)
(An objective review of ozone depletion and skin cancer. For advanced students.)

12. http://www.sepp.org (accessed February 27, 2001)
(Alternative viewpoints on ozone depletion and other environmental issues.)

Activity Instructions 1: How Well Does Sunscreen Work? Outdoor Experiment

The harmful effects of UV rays on the skin and the use of sunscreen lotions are topics of interest in today's world. In this activity you will investigate a variety of sunscreens by studying their effect on a paper coating that reacts in sunlight.

Safety

UV light can damage the eyes and is the component of sunlight responsible for sunburn. Do not look directly at the sun.

Procedure

1. Tape the transparency to a piece of the Nature Print paper. Label the squares on the transparency with the SPF numbers of the lotions to be tested: 0 for the skin lotion with no sunscreen and the SPF numbers for the three sunscreen lotions. Also, use a permanent marker to write the appropriate SPF numbers directly on the paper.
2. Using a cotton swab, put enough of each sunscreen into the appropriate small circle in the center of the pattern to completely fill it. (The circle in the center of the pattern helps to standardize the amount of lotion being used. Use a fresh swab for each lotion.)
3. Spread out the lotion with the cotton swab so that it completely fills the large oval outline. Try to stay inside the lines and make an even coating.
4. Expose the paper and transparency to direct sunlight according to the instructions that come with the paper. Use a stopwatch to make sure groups do not vary the exposure time.
5. Go back into the classroom or in the shade and remove the transparency. Place the paper into a container of water for about 30 seconds or as directed on the paper's package.
6. Place the paper on a flat surface to dry.

Questions

1. Note any difference between the sunscreening abilities of the low and high SPF numbers. Compare areas with and without sunscreen lotion.
2. Relate your findings to the recommended SPF for your own skin phototype.

Activity Instructions 2: How Well Does Sunscreen Work? Indoor Experiment

The harmful effects of UV rays on the skin and the use of sunscreen lotions are topics of interest in today's world. In this activity you will investigate a variety of sunscreens by studying their effect on papers that fluoresce under UV light.

Safety

UV light can damage the eyes. Do not look directly at the lamp in the observation chamber.

Procedure

1. Label the small squares on the transparency with the SPF numbers of the lotions to be tested: 0 for the skin lotion with no sunscreen and the SPF numbers for the three sunscreen lotions.
2. Using a cotton swab, put enough of each sunscreen lotion (with the SPF number in the adjacent square) into the appropriate small circle in the center of the pattern to completely fill it. (The circle in the center of the pattern helps to standardize the amount of lotion being used. Use a fresh swab for each lotion.)
3. Use the cotton swab to spread out the lotion so that it completely fills the large oval outline. Stay inside the lines and make an even coating.
4. Repeat steps 2 and 3 for each lotion to be tested.

UV light can damage the eyes. Do NOT look directly at the light, and do not expose skin to the light for more than a few minutes, as the UV light can cause sunburn.

5. Push an untreated piece of white or fluorescent paper through the arched doorway into the UV-light observation chamber. Turn on the light and note whether or not the paper fluoresces.
6. Place the transparency that has been treated with the lotions over the white or fluorescent paper and put it under the UV light in the observation chamber.

Questions

1. After about 30 seconds, lift up the transparency, and note any difference between the sunscreening abilities of the low and high SPF numbers. Compare areas with and without sunscreen lotion.
2. Relate your findings to the recommended SPF for your own skin phototype.

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