



## How We Get Our Skin Color

### INTRODUCTION

Your skin covers your entire body and has many functions that are important for your health. In this interactive exploration, you'll learn about the structure and function of skin, as well as the factors that affect skin color. The concepts you'll explore apply not only to skin but also to many other biological traits.

### Before and After the Exploration

*Before* you start the interactive exploration, watch the [How We Get Our Skin Color](#) video, then answer the following questions.

- Summarize the main idea or purpose of this video.
- List at least **two** things you learned from the video.
- List at least **two** questions that you still have.

Now complete the rest of the worksheet (Parts 1–5 below), or whichever parts are indicated by your instructor. *After* you have completed those parts, answer the following questions.

- Were the questions you listed above answered or not? If so, describe the answers.
- If you have any more questions, list them in the space below.
- Did your understanding of skin, skin color, or any other concepts change as you worked through the interactive exploration? If so, how?

### PART 1: What Is Skin?

Launch the [interactive exploration for How We Get Our Skin Color](#), which uses the same video. The video will now have five pause points, which are indicated by blue markers on the video's timeline.

- At each pause point, the video will stop playing, and a popup labeled "More Info" will appear.
- You can click the popup to open more information below the video. Hover over bold underlined terms to view their definitions.
- You can resume playing the video by clicking "Resume Animation" at the bottom of the page.

Play the video until you reach the first pause point, "What Is Skin?" Click the popup to open more information (below the video) on skin layers and vitamin D. Use this information to answer the following questions.

1. Describe the major function(s) of each of the three main skin layers:
  - a. Epidermis
  - b. Dermis
  - c. Hypodermis

2. Why is vitamin D important for our health?
3. What is the connection between skin, sunlight, and vitamin D?
4. Outline a possible treatment for a child who is at risk for rickets. Why would you recommend that treatment?

### **PART 2: What Are Skin Cells?**

Resume playing the video until you reach the second pause point, “What Are Skin Cells?” Click the popup to open more information (below the video) on skin cells in the epidermis and why humans are mostly hairless. Use this information to answer the following questions.

5. Where does the name “keratinocyte” come from?
6. What are stem cells, and how do they help the skin continue to grow new layers of cells?
7. Summarize the life cycle of a keratinocyte. Where are the youngest keratinocytes in the skin found? The oldest?
8. The top layer of the epidermis is made of dead keratinocytes. What is the function of this layer?
9. What is the function of melanocytes?
10. How does a melanocyte’s shape relate to its function?
11. When did human ancestors become mostly hairless?
12. Why do you think that mostly hairless bodies and sweat glands were advantageous in our ancestors’ environments?

### **PART 3: What Is Melanin?**

Resume playing the video until you reach the third pause point, “What Is Melanin?” Click the popup to open more information (below the video) on how melanin is made and one of the genes that affects skin color. Use this information to answer the following questions.

13. Complete the following statement by filling in the blanks.  
Melanin is a \_\_\_\_\_ that is produced in organelles called \_\_\_\_\_ in specialized cells called \_\_\_\_\_.
14. Consider the two main types of melanin.
  - a. What are they called, and how do they differ?
  - b. In general, how do these two types of melanin affect skin color?

15. Would you expect people with different skin colors to have different numbers of melanocytes? Why or why not?
16. The *MC1R* gene, which impacts skin color, has multiple versions called **alleles**. Consider the allele (version) of *MC1R* that is most common among populations in the tropical regions of Africa.
- Which type of melanin does this allele produce?
  - Why is this allele so common among populations in the tropical regions of Africa?

#### **PART 4: How Does Melanin Protect Cells?**

Resume playing the video until you reach the fourth pause point, “How Does Melanin Protect Cells?” Click the popup to open more information (below the video) on how melanin protects skin from UV damage. Use this information to answer the questions below.

17. In Part 1, you learned that UV radiation is important for making vitamin D. However, too much UV radiation can damage the body.
- Name **two** molecules in the body that can be damaged or destroyed by UV radiation.
  - How does melanin protect these molecules from UV radiation?
18. What are pyrimidine dimers, and what causes them?
19. Why are pyrimidine dimers dangerous to the body?
20. How can having pyrimidine dimers lead to cancer?

#### **PART 5: How Does Sunlight Cause Tanning?**

Resume playing the video until you reach the fifth and final pause point, “How Does Sunlight Cause Tanning?” Click the popup to open more information (below the video) on the different types of UV radiation and how they affect melanin production. Use this information to answer the questions below.

21. Complete the following statement by filling in the blanks.  
UV radiation has \_\_\_\_\_ wavelengths and \_\_\_\_\_ energy than visible light and infrared radiation.
22. What are the positive and negative effects of UVB exposure? (There is more information about this in Parts 1 and 4.)
23. Consider the relationship between the global patterns of skin color and UV radiation. How does this relationship provide evidence that skin color evolved through natural selection?
24. What is the selective pressure for darker skin color? For lighter skin color?

25. Explain the difference between constitutive and facultative skin color.
26. What causes skin to tan? What causes skin to sunburn?
27. Consider the following argument: “It’s good to get a tan because darker skin offers more protection from damaging UV radiation. So, if you have a lighter skin color, you can keep yourself safe by getting a tan.” Do you agree? Explain why or why not.
28. Create a concept map that includes **all** the following words and phrases:
- 7-dehydrocholesterol
  - DNA
  - Epidermis
  - Keratinocytes
  - Melanin
  - Melanocytes
  - Melanosomes
  - Skin
  - Skin color
  - Three layers
  - UV radiation
  - Vitamin D

Put each phrase in a box and use arrows to show connections between the phrases. Label your arrows with verbs or linking words, as shown in the example below.

