

Cross-Curricular Discussion: Q

Directions: The following list of discussion questions is provided to help you take notes, brainstorm ideas and test your thinking in order to be more actively engaged in class discussions related to this article. All questions in this section are related to topics covered in "[Gene therapy fixes rare skin disease.](#)"

BIOLOGICAL SCIENCES**Discussion questions:**

1. What are stem cells?

2. How might stem cells be used for therapy?

3. What methods can be used to change the DNA in a cell for gene therapy?

4. How can gene therapy be used to repair genetic abnormalities in cells?

Extension prompts:

5. What are some potential risks of gene therapy?

6. Students should assemble into groups based on which of the following statements best describes how the students feel. Once students gather into groups, allow students time to discuss their beliefs and do additional research. Have groups think about additional factors that could affect or change their position, like the cost and availability of gene therapy. Then have each group of students explain why they believe their statement and address counterarguments from other groups:

- *Gene therapy should not be used on humans.*
- *Gene therapy should be used on humans to cure potentially fatal illnesses (“butterfly” skin, cystic fibrosis), but not for any other reason.*
- *Gene therapy should be used on humans to cure potentially fatal illnesses, but also other, generally non-fatal health risks (tendency toward nearsightedness, obesity, baldness).*
- *Gene therapy should be used on humans to cure both fatal and non-fatal health risks, but also to alter intellect, physical appearance or any other characteristic students (or their parents) might desire.*
- *Gene therapy should be used on humans for any purpose including giving people, if possible, hearing ranges beyond what people can normally hear, the ability to see colors not normally visible to humans or tolerance to extreme temperatures.*

CHEMICAL SCIENCES

Discussion questions:

1. What are laminins? What is the extracellular matrix?

2. How do cells stick to the extracellular matrix?

Extension prompts:

3. Mutations in laminin genes can cause the “butterfly” skin condition, but what are possible effects of mutations in collagen genes?

ENGINEERING AND EXPERIMENTAL DESIGN

Discussion questions:

1. How could you use laminins for other applications?

Extension prompts:

2. “[Gene therapy fixes rare skin disease](#)” mentioned genetic-barcode-like analysis of cells. What other applications could there be for genetic barcoding methods?

3. In addition to treating patients with the “butterfly” skin disease, what are some other possible applications of treating and growing skin?