Biomedical science

with Professor Lali Medina-Kauwe

Talking *points*

Knowledge

1. What is the blood-brain barrier?
2. What is an organ chip?

Comprehension

3. Why is it challenging to use intravenous drugs to fight brain tumours?
4. What three protein segments did Lali include in her bioengineered protein, and what role did each play in its ability to deliver drugs to brain tumours?
5. What are the advantages of Lali's new protein for treating brain tumours, compared to traditional chemotherapy?

Application

6. What other medical applications do you think bio-particles have?

Analysis

7. How and why did Lali use an organ chip to test the abilities of her bioengineered protein? What did she discover from this aspect of her research?
8. How and why did Lali use mice to test the abilities of her bioengineered protein? What did she discover from this aspect of her research?

Synthesis

9. What challenges do you think researchers will have to overcome before Lali's protein is clinically used as a treatment for brain tumours in humans?

Evaluation

10. Advances in biomedical science rely on animal testing, such as giving mice brain tumours then observing how they respond to a new treatment. What arguments for and against animal testing can you think of? How do you feel about the use of animals in biomedical research?

Activity

As a teenager, Lali loved creating contraptions from trash and objects she found around the house. This creative approach to engineering inspired how she develops new bio-particles as a biomedical scientist.

Gather up pieces of trash and objects from home or the classroom and create a 3D, interactive model of Lali's tumour-invading protein. Be as creative as possible! For example, you could use fridge magnets to replicate the magnetic-like attraction to HER3 or find a fun way to demonstrate the bio-particle's cargo-carrying feature. Why not also create models of the blood-brain barrier and a brain tumour, to show how the bioengineered protein interacts with them?

Once you have created your protein model, design a poster or information board that explains what each part of your model represents, how Lali's bioengineered protein crosses the blood-brain barrier and delivers drugs to brain tumours, and how Lali created it by combining segments of other proteins.

More *resources*

- Learn more about Lali's research: **cedars-sinai.edu/health-sciences-university/research/labs/medina-kauwe.html**
- The Institute of Biomedical Science has a video about what it is like to work in the field: **ibms.org/resources/discover-biomedical-science**