Molecular Genetics
with Dr Hua Bai

Talking *points*

KNOWLEDGE

1. Where would you find plasmalogens?
2. What are lipids?

COMPREHENSION

3. What is oxidative stress, and what effect does it have on the body?
4. What functions do peroxisomes perform in our cells?

APPLICATION

5. How could CRISPR screening help researchers study genetic disorders like sickle cell anaemia?

ANALYSIS

6. How has CRISPR technology influenced the field of molecular genetics?
7. Hua is developing a laboratory course that will give students hands-on experience with CRISPR technology. What are the motivations behind this?

SYNTHESIS

8. Hua and his team have identified certain proteins, called transcription regulators, that play a role in initiating a cell's defence mechanism against peroxisomal damage. How might this knowledge lead to the development of a treatment for diseases that are associated with peroxisomal damage?

EVALUATION

9. Some scientists hope that we will one day be able to slow down or even stop the ageing process. To what extent do you think this would be a good thing, and why?
10. How important do you think it is to give students hands-on experience of complex laboratory techniques, and why?

Activity

To age or not to age, that is the question!

Many researchers in the field of molecular genetics and beyond are investigating new ways of slowing down the ageing process. These new techniques may have the potential to improve the health of elderly people and extend their lifespans.

Some people believe that these new methods for extending our lifespans may not be such a good idea. Would access to these new techniques and medicines be fair and equal? What if they are very expensive? What about concerns of over-population? How would society change if people lived longer? Does life lose its meaning if we can go on living for as long as we like?

On the other hand, there could be major benefits. People may be able to maintain a good quality of life for much longer, allowing them to stay active and healthy. We could also begin eradicating some of the most common diseases related with age that can often have heart-breaking consequences, such as Alzheimer's and dementia.

What do you think?

Get into groups of five and debate this topic. One person should chair the debate, while the others split into pairs, with one pair arguing for anti-ageing treatments and the other arguing against them.

Take time to research and construct your arguments. The chairperson should familiarise themselves with both sides.

The chairperson begins the debate by asking each pair to make their opening argument. The debate continues with the pairs posing and counterarguing specific points. The chairperson ensures pairs take turns to raise new points and that the debate is polite and timely. End the debate with closing statements from each side.

As a group, consider how you now feel about anti-ageing treatments? How has the debate influenced your opinion?

This is a complex subject, both scientifically and ethically, so it is important to remember that everyone will have their own opinions about it. Listen carefully, be respectful of what other people think and remember that everyone is entitled to their own opinions.

More *resources*

- Iowa State University has a Biotechnology Outreach Education Center that runs research experiences for undergraduate students and has a library of educational resources for high-school students: boec.biotech.iastate.edu
- Iowa State University has a Program for Women in Science and Engineering which helps students connect their passions to STEM careers: www.wise.iastate.edu/outreach
- Iowa State University also has an Extension and Outreach programme whose mission is to engage all Iowans in research and education to address real-life challenges: www.extension.iastate.edu