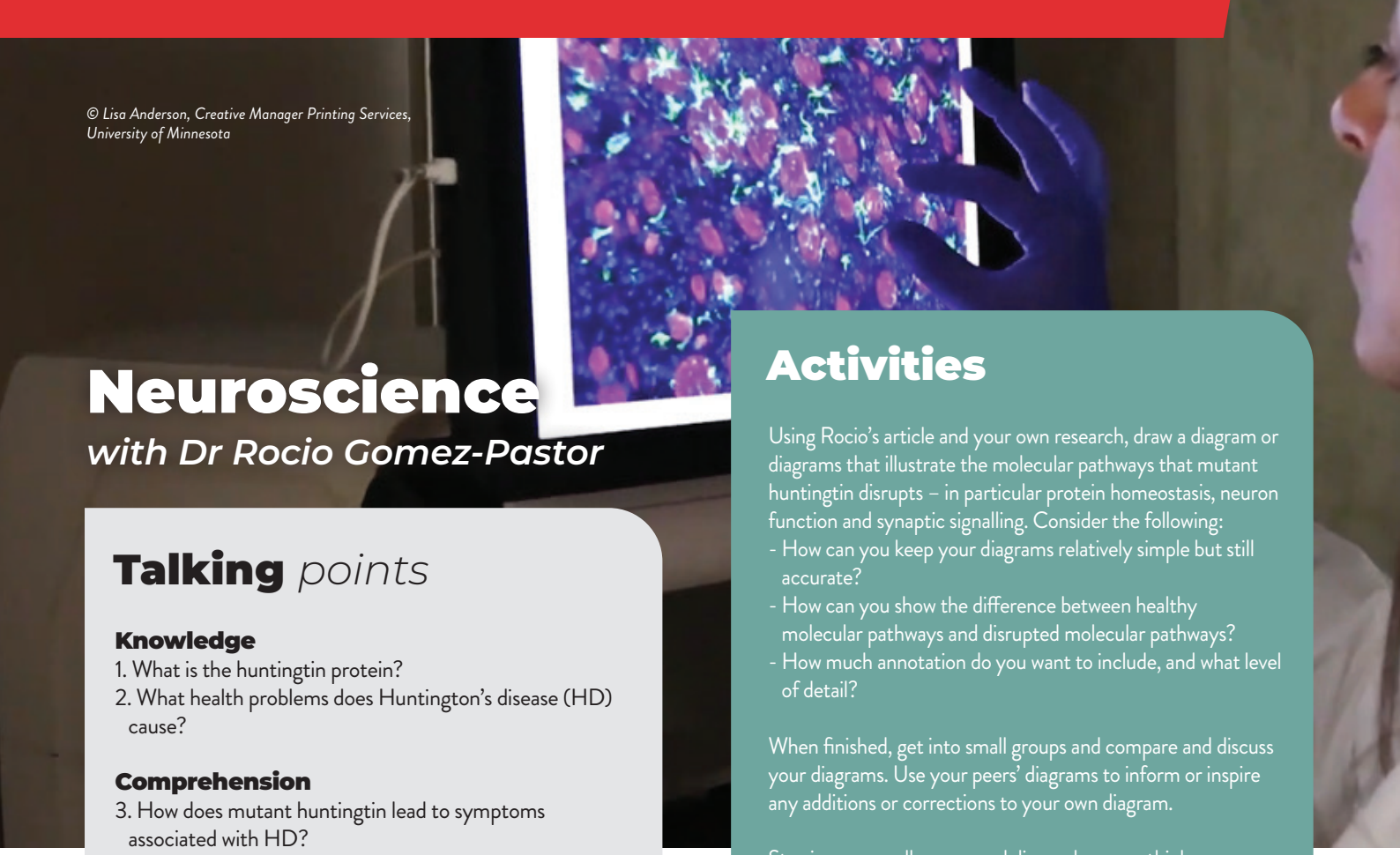

Neuroscience

with Dr Rocio Gomez-Pastor

Talking *points*

Knowledge

1. What is the huntingtin protein?
2. What health problems does Huntington's disease (HD) cause?

Comprehension

3. How does mutant huntingtin lead to symptoms associated with HD?
4. How do synapses work, and why are they important?
5. Why do Rocio and her team use mouse models for their research?

Application

6. "By combining molecular biology, cell biology and behavioural studies, we can gain a more complete understanding," says Rocio. Give an example of how the team incorporates each of these fields in their work.
7. "Insights from our work may also apply to other neurodegenerative disorders where protein misfolding and synaptic dysfunction play a role," says Rocio. What questions would you ask to learn more about these further potential applications of the team's research?

Analysis

8. Given that HD is an inherited disease, why do you think symptoms usually only begin to appear in middle age?

Synthesis

9. Using the information in the article, suggest how a therapy to treat HD might target a molecular pathway.

Evaluation

10. "Advances in genetics, imaging and computational tools are making new discoveries possible," says Rocio. What types of discoveries do you think Rocio might be referring to? Explain your reasoning.
11. There are ethical considerations regarding research that uses animals such as mice. Given current and potential future technological advances, to what extent do you think that animal models in neurological research could become defunct in the future, and why?

Activities

Using Rocio's article and your own research, draw a diagram or diagrams that illustrate the molecular pathways that mutant huntingtin disrupts – in particular protein homeostasis, neuron function and synaptic signalling. Consider the following:

- How can you keep your diagrams relatively simple but still accurate?
- How can you show the difference between healthy molecular pathways and disrupted molecular pathways?
- How much annotation do you want to include, and what level of detail?

When finished, get into small groups and compare and discuss your diagrams. Use your peers' diagrams to inform or inspire any additions or corrections to your own diagram.

Stay in your small groups and discuss how you think therapeutic treatments could potentially prevent, mitigate or reverse the disruption to the molecular pathways. Consider, for example, therapies that:

- address the creation of the mutant huntingtin protein itself
- replace the damaged molecules or otherwise restore pathway function
- prevent the mutant huntingtin protein from causing damage.

When complete, look up your preferred therapeutic idea and see if it has been researched or suggested by neuroscientists. If it has, does it follow a similar approach to your suggested approach? If it has not, can you find out why not?

Present your most promising idea to the class with a quick overview of how it works and whether it has been researched or trialled in the real world.

More *resources*

- Keep up to date with Rocio's work through her lab's website: **sites.google.com/umn.edu/gomez-pastor-lab/news**
- Brainfacts.org is a website authored by neuroscientists. Its page on Huntington's disease gives more information about the disease, ongoing research and potential treatments, and includes links to further resources: **brainfacts.org/diseases-and-disorders/neurological-disorders-az/diseases-a-to-z-from-ninds/huntington-s-disease**
- This article in The Conversation describes a recent exciting breakthrough in treating HD through gene therapy, though also urges caution around its implication: **theconversation.com/a-new-treatment-for-huntingtons-disease-is-genuinely-promising-but-heres-why-we-still-need-caution-266062**