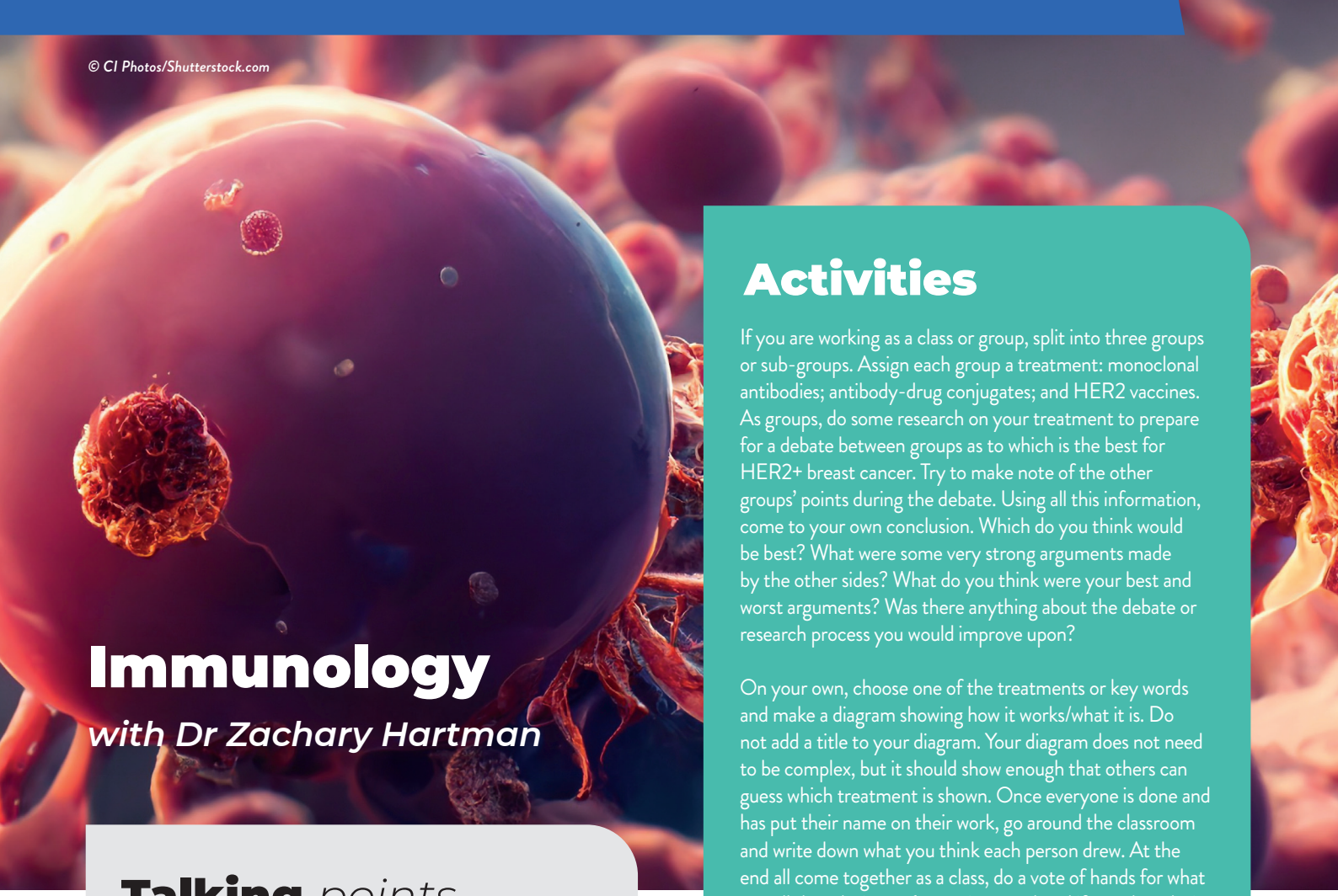

Immunology

with Dr Zachary Hartman

Talking *points*

Knowledge

1. What are antigens?
2. What are antibodies?

Comprehension

3. How did the field of immunology begin?
4. What is the difference between monoclonal antibodies and antibody-drug conjugates?
5. What is the difference between 'self' and 'foreign' antigens?

Application

6. What would Zachary and his research team need to do if an HER2 vaccine caused an immune response against normal, healthy cells?
7. Why do you think both chemotherapy and monoclonal antibodies are used as standard treatment for breast cancer?

Analysis

8. To what extent do you think that the results from *in vivo* experiments will be the same when human clinical trials are carried out, and why?

Evaluation

9. How successful do you think HER2 vaccines will be, and why?
10. What do you think are the advantages and disadvantages of targeted antibodies?

Activities

If you are working as a class or group, split into three groups or sub-groups. Assign each group a treatment: monoclonal antibodies; antibody-drug conjugates; and HER2 vaccines. As groups, do some research on your treatment to prepare for a debate between groups as to which is the best for HER2+ breast cancer. Try to make note of the other groups' points during the debate. Using all this information, come to your own conclusion. Which do you think would be best? What were some very strong arguments made by the other sides? What do you think were your best and worst arguments? Was there anything about the debate or research process you would improve upon?

On your own, choose one of the treatments or key words and make a diagram showing how it works/what it is. Do not add a title to your diagram. Your diagram does not need to be complex, but it should show enough that others can guess which treatment is shown. Once everyone is done and has put their name on their work, go around the classroom and write down what you think each person drew. At the end all come together as a class, do a vote of hands for what you all thought it was (e.g., raise your hand if you thought it was a vaccine) and then reveal the truth!

If you are working on your own, make notes about each of the treatments before preparing a short statement about which treatment you think is the most effective and why. Add a diagram to inform your reader further.

More *resources*

- Visit the Hartman lab homepage to keep up to date with Zachary's work: **www.hartman-lab.org**
- Learn more about Zachary's vaccine work: **physicians.dukehealth.org/articles/could-mrna-vaccines-change-way-cancer-treated**

  www.dailymail.co.uk/health/article-10728807/Cancer-vaccine-using-tech-Covid-jabs-game-changer-scientists-say.html

  www.newsobserver.com/news/technology/article262727717.html

  www.corporate.dukehealth.org/news/new-insight-howbreast-cancer-drug-works-could-lead-improvements
- Learn more about cancer treatments: **www.cancerresearchuk.org/about-cancer/treatment**