

IMMUNOLOGY AND MICROBIOLOGY

WITH PROFESSOR HANS HAECKER

Talking points

KNOWLEDGE

1. What is inflammation?
2. What is a toll-like receptor?

COMPREHENSION

3. What is the purpose of the drug screening process?
4. What are the similarities and differences between immunology and microbiology?

APPLICATION

5. How have each of the disciplines mentioned in the glossary contributed to the Haecker Lab's work?
6. What questions would you ask to find out more about how AI is being incorporated into immunology and microbiology?

ANALYSIS

7. What has the team learned about ABIN1, and why did they need to combine the results of several different types of experiments to make these conclusions?
8. What was the issue about drug screening for interactions with TLR-driven gene activations, and how did the team overcome it?

EVALUATION

9. In the past, the rate of data creation has typically limited the pace of scientific progress. These days, scientists may have huge datasets but are limited in their ability to process this information. Based on the article and your own thoughts, what do you think are the next steps to overcome this limitation?
10. There is ongoing debate about the ethics of using animals (such as mice) within scientific research. What arguments can you think of for and against the use of animals for studies such as those in the Haecker Lab? What is your conclusion?

Activity

A lot of the Haecker Lab's work focuses on research with applied uses for drug development. Choose an inflammatory disease – for instance, lupus, psoriasis, rheumatoid arthritis or asthma – and look up a pharmaceutical treatment for this disease. Then, research the process that led to its development, which should follow a timeline like the one below:

- Discovery, which could include:
 - a. Research into inflammation and immune system functioning
 - b. Drug screening
 - c. Implementation of new technologies
- Preclinical research, which could include:
 - a. In vitro experiments
 - b. In vivo experiments
- Clinical research (trials using people)
 - a. Review by official licensers (in the USA, this is the Food and Drug Administration (FDA))
 - b. Release and monitoring
 - c. Any further research, refinement or improvement

Make sure your timeline is accessible and engaging, and makes effective use of key words and illustrations. Share it with your classmates. Do they have interesting insights from their chosen disease/treatment? What parallels are there with the area you focused on?

More resources

- The Haecker Lab has a website where you can learn more about the team's work. It also sometimes invites high school students in to learn about its research:
medicine.utah.edu/pathology/research-labs/hans-haecker#research
- This video from IMGENEX uses animations to give an overview of the TLR pathway:  www.youtube.com/watch?v=iVMIZy-Y3f8
- This paper from Chen et al. provides a comprehensive overview of the science behind inflammation:
www.ncbi.nlm.nih.gov/pmc/articles/PMC5805548