



# MALARIA RESEARCH

With Professor Richard (Rick) Bucala

## Talking points

### KNOWLEDGE

1. What is a cytokine, and MIF, specifically?
2. What is RNA, and mRNA and saRNA?

### COMPREHENSION

3. How does malaria avoid immunologic memory?
4. What are the drawbacks of current malaria vaccines?

### APPLICATION

5. “Resistance to antibiotic treatment is developing and prevention strategies such as mosquito nets are only partially effective,” says Rick. Why do you think these two anti-malaria strategies are limited in their effectiveness?
6. Why do you think biochips are useful for allele detection in sub-Saharan African populations, compared to lab-based analytical techniques?

### ANALYSIS

7. What advantages does the vaccine developed by Rick’s lab have compared to other malaria vaccines?
8. Rick says that combatting malaria involves “epidemiology, mosquito ecology, parasite biology, immunology and genetics”. From your knowledge of these disciplines’ and online definitions if you need them, why do you think each of these disciplines is necessary to combat malaria? Can you think of any further disciplines that likely have an important role to play?

### EVALUATION

9. Funding for disease research comes from public and private sources. With a finite amount of funding, how do you think decisions are made about which diseases to study? Consider malaria, in particular, a prevalent and deadly disease that principally affects developing nations.

## Activity

Design an infographic to demonstrate the lessons learned in the article, in particular:

- How malaria exploits our immune system
- How malaria can be combatted through the development of an RNA vaccine

Think about the following while designing your infographic:

- Choose your target audience: young children, people your own age, the general public or scientists? How will this choice affect how you design your infographic?
- What are the key points you want to include? Which might you want to research so you can explain in more detail? Which points are not necessary to include?
- Consider your use of imagery and diagrams. Infographics tend to use simplified ‘icons’ of objects that convey their relevant traits clearly. For instance, consider how you might represent MIF, the malaria parasite, and RNA.
- What is your take-home message that you want people to remember? What is the purpose of your infographic – to inform, inspire, both, or something else?
- Use text, but sparingly. Too much text can put off a viewer, but you want to include enough to explain the ideas sufficiently.

Show your infographic to your classmates, and take a look at theirs, too. What themes are common throughout, and where did you go in different directions? What aspects do you like more or less? If you were to do it again having seen your classmates’ designs, what might you do differently?

## More resources

- This article from the Yale School of Medicine explains more about the work of Rick’s lab into malaria and RNA vaccines.  
[medicine.yale.edu/news/yale-medicine-magazine/article/an-end-to-malaria/](https://medicine.yale.edu/news/yale-medicine-magazine/article/an-end-to-malaria/)
- This *Nature* article explores the advent of RNA vaccines and why they are so promising for complicated diseases such as malaria.  
[www.nature.com/articles/d41586-021-00019-w](https://www.nature.com/articles/d41586-021-00019-w)
- This video from UC San Francisco explores why malaria is so hard to tackle and further methods for combatting it, such as the release of malaria-immune mosquitos.  
[www.youtube.com/watch?v=m2oDu2JmPBM](https://www.youtube.com/watch?v=m2oDu2JmPBM)