



# Machine learning in medicine

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## Talking points

### Knowledge

1. What is an electrocardiogram (ECG)?

### Comprehension

2. Why is it important to treat a heart attack as soon as possible?
3. What are the issues associated with patients who have chest pain but no ST elevation on their ECG?
4. Why is artificial intelligence (AI) capable of detecting patterns in data that humans cannot?

### Application

5. What questions do you think the team asks healthcare professionals to assess the usefulness of their AI tool in clinical settings?
6. Diagnosis of mental health conditions can be challenging as symptoms are often not physical and are therefore difficult to accurately detect. How do you think AI could help in this situation?
7. Patient privacy is often a challenge for training medical machine learning tools. Why do you think this is, and what potential solutions would you suggest?
8. The rise of antibiotic resistance is a serious concern for society. We are overusing antibiotics, causing bacteria to evolve and become resistant to them faster than we are discovering new effective antibiotics. How could AI tackle this societal problem?

### Evaluation

9. To what extent do you think our increasing reliance on AI for healthcare needs could be problematic? What challenges could this pose in the future, and how could these potential risks be addressed?

## Activity

### Design a medical AI tool

Reread the description of how Salah, Christian and Ervin developed and trained their AI tool to detect heart attacks from ECGs using patient data. How could a similar process be used to diagnose other health conditions?

Choose a medical condition (e.g., arthritis, stroke, Alzheimer's disease, cancer, diabetes, etc.) and research online to discover its symptoms and methods of diagnosis. What are the current challenges in diagnosing the condition?

Design a process to train an AI tool to automatically diagnose the condition. Consider the following:

- What type of data would you input into the machine learning algorithm? (e.g., blood chemistry, X-rays, ECG tracings, etc.)
- Whose data would you use to train your AI tool?
- What sample size would you need?
- How would you test your tool's effectiveness?
- How would you ensure your tool is continuously learning and improving?
- How would you address issues surrounding patient privacy?

## More resources

- You can find more details about the team's AI tool in this news article: <https://www.pitt.edu/pittwire/features-articles/new-ai-research-looks-to-better-diagnose-heart-attacks-hospital-arrival>
- The team's research was also featured in this news video: [www.wtae.com/article/pittsburgh-ai-heart-attack-study/44391024](http://www.wtae.com/article/pittsburgh-ai-heart-attack-study/44391024)
- This TEDx talk by Dr Marzyeh Ghassemi discusses how machine learning can enhance healthcare: [www.youtube.com/watch?v=zpcOjNtd-70](https://www.youtube.com/watch?v=zpcOjNtd-70)
- This article discusses eight ways in which machine learning is assisting medicine: [www.nature.com/articles/s41591-020-01197-2](http://www.nature.com/articles/s41591-020-01197-2)