

Can a Computer Invent a Medicine?



Built from *The Molecule Machines: AI-Designed Drugs Reach Their First Real Exam* by Ejin Chung, Science & Technology Editor

Grades 4–8 · About 45 minutes · ★ everyone · ★★ older readers

Name _____

Date _____

1. Before You Read

★ How do you think scientists find out whether a new medicine is safe and whether it really works?

★ Someone tells you a new invention will "change everything." What would you want to see before you believe them?

2. The Short Version

Read this first. Older readers: read the full article too.

Tech companies have long promised that artificial intelligence (AI) will design new medicines. This year, that promise faces its first real test: AI-designed drugs are moving into human **clinical trials**.

Part of the story is already a success. Proteins are tiny parts of living things, and a protein's shape decides what job it does. For fifty years, scientists struggled to predict what shape a protein would fold into. Finding just one shape by experiment could fill a scientist's whole PhD. Then a family of AI models called AlphaFold learned to predict shapes in minutes, for almost every protein science knows. It won a Nobel Prize in chemistry.

But knowing a shape is not the same as having a medicine. A drug has to stick to the right protein, stay away from thousands of wrong ones, and survive the liver, which tries to break it down. About nine out of ten drugs that reach human trials fail, usually because the body is more tangled than scientists expected.

The real question is: can AI make better guesses, so fewer drugs fail? AI labs have now started early trials of medicines for cancer and the immune system.

Here is the catch. Early trials, called **Phase 1**, only check safety in small groups of people. Whether a drug actually works is tested years later. Ejin's score for 2026: the molecules are in the exam room, but no grades are posted yet.

3. Word Bank

Word	What it means
protein	a tiny part of every living thing; its shape decides what job it does
clinical trial	a careful test of a new medicine in people
candidate	a possible new drug that is still being tested
efficacy	whether a medicine actually works
undruggable	a target in the body that scientists thought no medicine could work on

★ Use **candidate** in a sentence of your own.

4. Check Your Understanding

★ 1. What hard problem did the AlphaFold models solve?

★ 2. About how many drug candidates that enter human trials end up failing?

☐ 1 in 10 ☐ 5 in 10 ☐ 9 in 10

★ 3. Knowing a protein's shape is not enough to make a medicine. Name two things a drug has to do inside the body.

★ 4. What does a Phase 1 trial check?

☐ whether the drug is safe ☐ whether the drug cures the disease ☐ how much the drug costs

★★ 5. Ejin says the real claim is about "better guesses," not "faster paperwork." Explain the difference in your own words.

5. Ejin's Scoreboard: Results, Not Demos

Ejin keeps a public scoreboard. One column shows what the hype promised. The other shows what the data has actually delivered. Find three more claims or promises in the article and fill in the scoreboard. Then mark each one:

- **proven:** the article says the results are in, and it worked.
- **not yet:** testing has started, but the results that could prove it have not arrived.
- **we don't know:** the article says nobody can tell yet, or there is not enough information to decide.

What the hype promised	What has actually been shown so far	Score
Example: AI can predict the shape of a protein.	AI models found protein shapes in minutes, for almost every protein science knows.	proven
		☐ proven ☐ not yet ☐ we don't know
		☐ proven ☐ not yet ☐ we don't know
		☐ proven ☐ not yet ☐ we don't know

★★ Pick one claim you marked "not yet" or "we don't know." What result would move it to "proven"?

6. Think Deeper

★ Ejin says the honest scoreboard for 2026 reads "molecules in the exam room, no grades posted." What does that mean? Why is it too early to call AI-designed drugs a success or a failure?

★★ Ejin wrote down, ahead of time, which results would make the scoreboard go up and which would make it go down. Why is it a good idea to say in advance what would prove you right or wrong?

7. Write Your Report

Write a short report answering this question: **Has AI proven yet that it can design better medicines?**

- **My answer:**
- **Reason 1 (from the article):**
- **Reason 2 (from the article):**
- **One thing the other side would say:**
- **My conclusion:**

For Teachers and Parents: Answer Key

Word bank sentence: Answers vary; check that the student uses candidate to mean a possible new drug still being tested.

1. Predicting what shape a protein folds into from its gene sequence. Finding one shape by experiment used to take a very long time; the models did it in minutes.
2. 9 in 10.
3. Any two: stick (bind) to the right protein; avoid thousands of wrong proteins; survive the liver, which tries to break it down.
4. Whether the drug is safe (Phase 1 measures safety in small groups of people).
5. "Faster paperwork" means doing the same old drug discovery more quickly, with drugs still failing at the same rate. "Better guesses" means AI designs drugs that fail less often because it understands molecular shape.

Scoreboard (sample answers):

Claim	Shown so far	Score
AI can design new medicines.	AI-designed candidates have entered early human trials; no results yet.	not yet
AI-designed drugs are safe in people.	Phase 1 safety trials are just starting.	not yet
AI-designed drugs will fail less often than nine in ten.	Too few candidates have been tested for the ratio to mean anything.	not yet or we don't know
AI can hit "undruggable" targets.	A couple of current candidates aim at such targets; no results yet.	not yet

Accept "not yet" or "we don't know" for any drug claim if the student explains that trial results are not in. Only the protein-shape breakthrough is "proven." **Follow-up:** candidates hitting "undruggable" targets in trials, or AI-designed drugs failing clearly less often than nine in ten once enough have been tested.

Think deeper: Open answers. The AI drugs have started being tested ("in the exam room"), but the results that show whether they work are years away ("no grades posted"); Phase 1 only checks safety. Ejin says anyone declaring victory now is "selling something" and anyone declaring failure is "guessing." For the ★★ question, strong answers say that naming the test in advance keeps you honest: you cannot change the rules after you see the results, and readers can check whether you were right.

Report: The best-supported answer is "not yet." Look for a clear answer, two reasons taken from the article (for example: Phase 1 only checks safety; efficacy results are years away; nine in ten drug candidates fail; a protein shape is not a drug), a fair statement of the other side (for example: the protein-shape breakthrough was real and won a Nobel Prize; some candidates aim at "undruggable" targets; the industry is investing huge sums), and a conclusion that matches the answer.