An Anthropic Model Designs Proteins That Stick to Scorpion Toxins

Kabui, Charles

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Anthropic used an internal AI research model to design small proteins from scratch ("de novo") that stick tightly to scorpion toxins, a step toward new antivenoms. Inside Claude Science, its workbench for scientists, the model spent 64 hours generating 318,484 designs and picking 180. The team added 31 more. Two contract labs, Adaptyv Bio and Twist Bioscience, tested all 211 against their five target toxins from four regions. A binder had to hold on in every

repeat at each lab that tested it, with a strength of 1 micromolar or better (a lower number is a tighter grip), and show no grip on an unrelated human protein. Seventeen passed.

A 2008 review estimates over 1.2 million scorpion stings a year and more than 3,250 deaths, with children hit hardest. Antivenoms are typically made from horses injected with venom milked from thousands of scorpions. That can take months, and each covers only a few toxins. Outside experts Susana Vázquez Torres and Timothy Jenkins called it a promising first step. Anthropic released all 211 designs and the lab data.

No binder has been tested in cells or animals for neutralizing a toxin, meaning stopping it from reaching nerve cells. Every test used lab-made toxins, not venom, so Anthropic does not claim an antivenom. The two best, both against the Mexican toxin Cn2, gripped more than 100 times tighter than the 1 micromolar bar. None of the 151 designs aimed at several toxins qualified as a binder for more than one.

Read More: Claude Science builds a complete ultraviolet sky map and OpenAI's GPT-Rosalind, a model for biology and drug discovery

Sources:

- How Claude designed protein binders against scorpion neurotoxins (Anthropic)
- De novo design of protein binders against scorpion toxins with Claude, technical report (Anthropic)
- scorpion-toxin-binder-design: all 211 designs and their data (Anthropic, Hugging Face)
- Epidemiology of scorpionism: a global appraisal (Chippaux and Goyffon, Acta Tropica)
- Claude Science, an AI workbench for scientists (Anthropic)

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