

# SCIENTIFIC AMERICAN

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## Approach enlists immune system to fight leukemia Leukemia patients may be able to avoid developing resistance to the drug GI...

By Julie Steenhuysen

CHICAGO (Reuters) - Leukemia patients may be able to avoid developing resistance to the drug Gleevec through a mathematical formula that predicts when they should receive an immune-boosting vaccine, researchers said on Thursday.

The approach, which marries math and medicine, may help extend the effectiveness of the drug and may even help cure some patients, they said.

"The hope really is to get patients off Gleevec ultimately," said Dr. Peter Lee of Stanford University School of Medicine, a leukemia specialist who worked on the study.

"It's very very early days, but that is the hope."

Gleevec, or imatinib, a once-a-day pill made by Novartis, transformed treatment of chronic myelogenous leukemia, or CML, because it is effective and easy to use.

Before its introduction in 2001, the five-year survival rate was 50 percent. That has jumped to 95 percent.

But patients must stay on the drug indefinitely, and the fear is that they may develop resistance to it, Lee said.

The idea behind the new approach is to get the body's own immune system to take over the fight against the cancer, said Doron Levy, a mathematician at the University of Maryland, whose study appears in Public Library Journal of Science journal PLoS Computational Biology.

The researchers developed a mathematical model based on immune responses of people with CML who were taking Gleevec for four years. "We saw it has a certain profile if you look at it over time," Levy said in a telephone interview.

When first diagnosed, the immune system of CML patients is low, but as they begin to respond to treatment, the immune system strengthens and starts to fight off the cancer.

As the drug continues to attack cancers cells, however, the body's immune response falls. That is the ideal point for introducing a cancer vaccine, Levy said.

Using their model and information gathered from patients' blood, Levy and colleagues think they can develop a personalized method of predicting when patients might get the most benefit from a vaccine.

"What you can try to do is to boost the immune response when it needs it he most," he said. "The timing is the crucial

issue."



The vaccine the researchers propose is an injection of the patient's own blood taken when they are first diagnosed, but purged of any cancer cells.

"You basically take the blood of the patient and introduce it back after you kill everything in it," Levy said.

He said the body recognizes these dead cells as foreign invaders, and starts to rev up the immune system.

Levy said patients would need monthly blood tests to monitor their immune systems and determine when the time is right for vaccine.

So far, the research is based on work on patients blood in the lab and on mathematical simulations, Levy said.

But the progress has been enough to win a five-year grant from the National Cancer Institute to continue studying the approach. The research is available

at: <http://www.ploscompbiol.org/doi/pcbi.1000095> .

CML is relatively rare. In the United States, it strikes about 4,600 people a year.

### **Further Reading**

[Could Our Own Proteins Be Used to Help Us Fight Cancer?](#)

[Looking at Yesterday's Genes for Tomorrow's Cures](#)

[A Deadline on Malaria \(Extended version\)](#)

[Is the U.N. Deadline on Curing Malaria Wishful Thinking?](#)

[The Midas Touch: Using Gold Nanoparticles to Block HIV](#)

[Recruiting a Dangerous Foe to Fight Cancer and HIV](#)

[The Search for a Universal Flu Vaccine: A Q&A with Walter Fiers](#)

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