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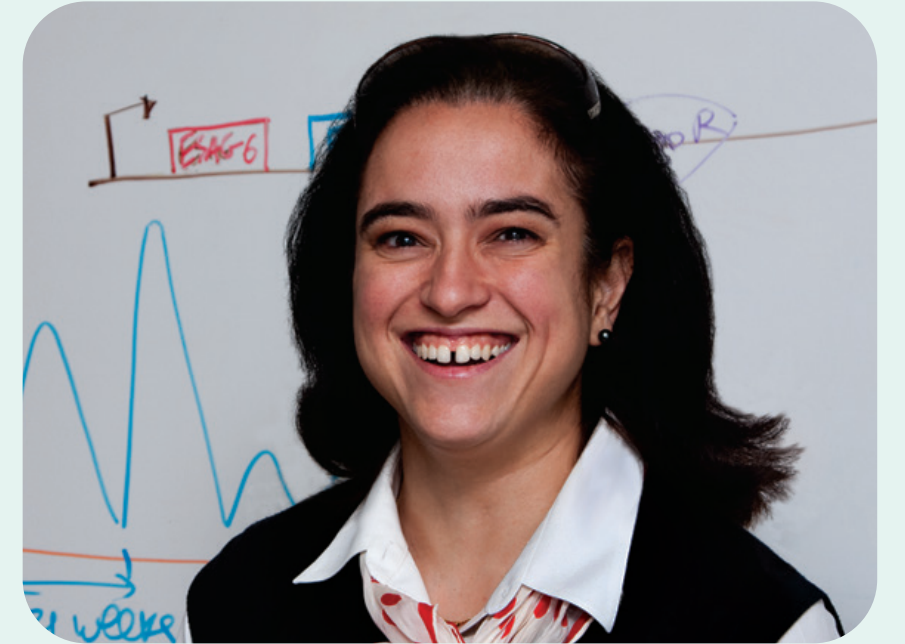


50TH ANNUAL ROCKEFELLER UNIVERSITY  
HOLIDAY LECTURES ON SCIENCE  
ESTABLISHED BY ALFRED E. MIRSKY

# Battle of the Mutants

Using Genetics as a Weapon to Fight Disease

Lecture by **Nina Papavasiliou**, Associate Professor



**Monday,  
December 28,  
2009**

**10:30 a.m. – 2:30 p.m.**

Lunch served  
12 – 1 p.m.

Lecture will be held  
in **Caspary Auditorium**

The Rockefeller University  
1230 York Avenue  
(at East 66th Street)  
New York, NY 10065

“It’s critical that the immune system get this exactly right. Fail to notice a deadly virus, and you’ll get an infection and die. Get trigger happy, and the immune system could attack cells you’d rather hang onto.”

Your body’s immune system does not have the laws of mathematics on its side. Although it must protect you from an infinite number of germs, it’s equipped with a mere 20,000 genes. With nothing more to go on, it must be able to recognize and mount an attack against any virus, bacteria or parasite it encounters — most of which it has never encountered before and has no way to identify.

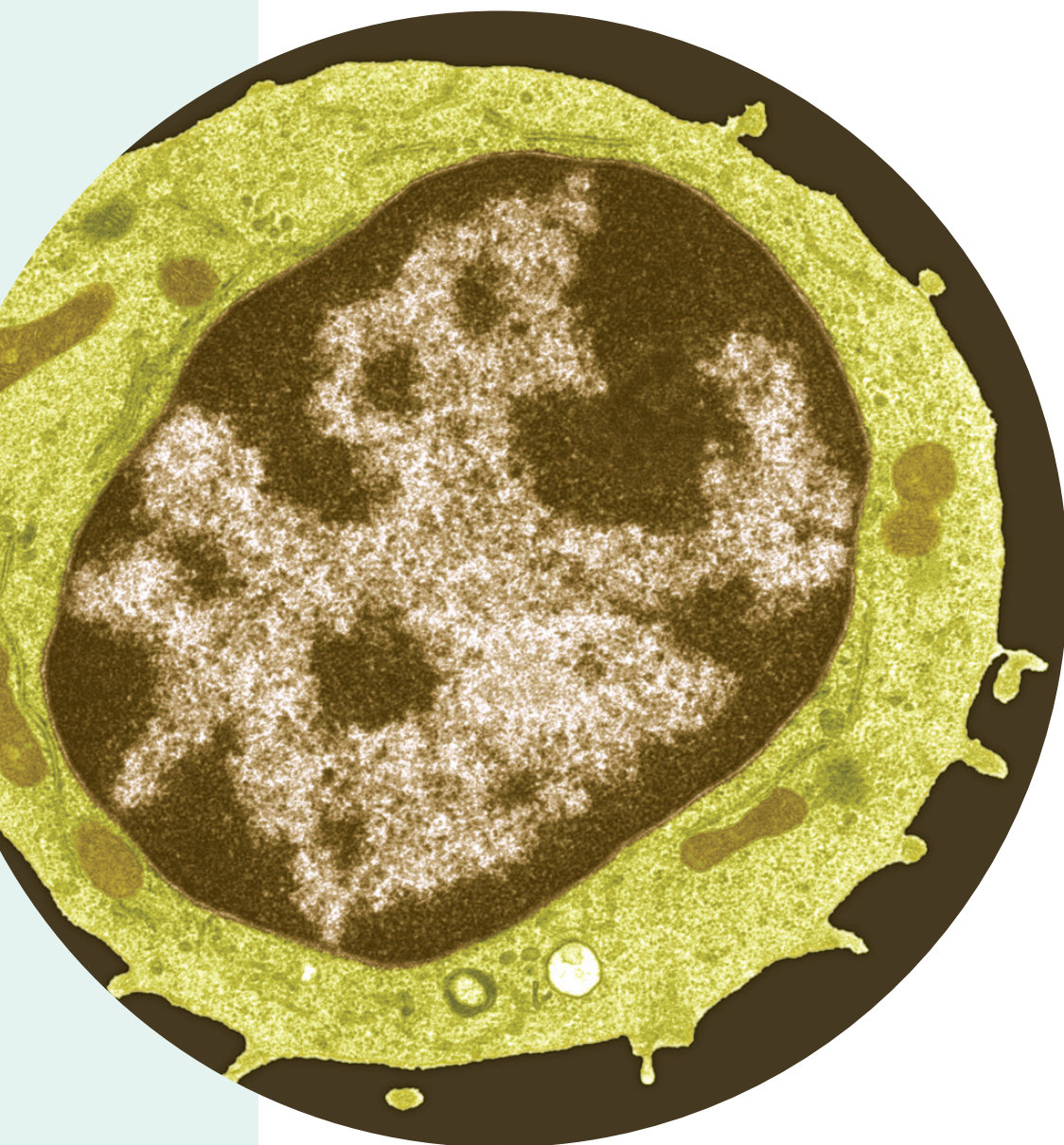
With the odds so clearly stacked against it, the immune system is forced to improvise. By directing immune cells known as B cells to rearrange sections of their own DNA, the body can reshuffle its genetic deck, snipping segments of code from one chromosome and reinserting them in another. This ability to cut and paste its genes allows the body to make the most of its limited DNA and gives it the genetic blueprints it needs to build a new cadre of germ-busting weapons.

The strategy works, but it’s a dangerous game. It could activate cancer-causing genes or turn the immune system against the body’s own tissues, such as your pancreas, cartilage or skin (the causes of juvenile diabetes, rheumatoid arthritis and psoriasis, respectively).

Despite its risks, the strategy has become a victim of its own success, co-opted by the very microorganisms it’s designed to fight. Trypanosomes, for instance, the parasites responsible for sleeping sickness, are able to rearrange their *own* DNA to disguise themselves from killer cells that have been sent after them. The cat-and-mouse game is one reason why some infections become chronic, killing their victims just as they’re on the verge of recovery.

Join Rockefeller University’s Nina Papavasiliou, a geneticist and immunologist who studies the interaction between the immune system and the ways in which pathogens can evade it, for a multimedia tour of the high-stakes battle between our bodies and the microorganisms that try to outsmart it.

Read more about immunity, learn about trypanosomes and see a video of Dr. Papavasiliou at [www.rockefeller.edu/holidaylecture](http://www.rockefeller.edu/holidaylecture).



Left: B cell  
Middle: Trypanosomes  
Right: Tsetse fly

