



search

>> **Advanced Search**

- HOME
- HEALTH
- GRANTS
- NEWS
- RESEARCH
- INSTITUTES
- ABOUT NIH

Home > News & Events

Email this page

Research Matters

Quick Links

- News Releases
- Events
- NIH Events Calendar
- Multimedia
- NIH Radio
- NIH Radio en Español
- NIH Podcast
- NIH Vodcast
- News in Health newsletter
- Research Matters eColumn
- NIH Record

Search Research Matters

search

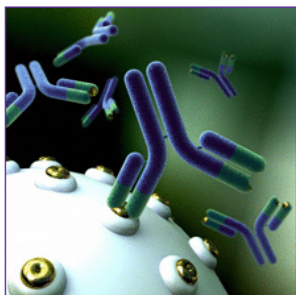
Find ANY word

Help

August 3, 2009

Genetic Switch Discovered for Disease-Fighting Antibodies

Scientists have identified 2 proteins that regulate the production of antibodies that fight disease-causing viruses and other pathogens. The findings have potential applications both for vaccine development and for treating autoimmune diseases, in which the body produces antibodies that attack itself.



Antibodies (Y-shaped) bind to antigens (gold) to immobilize invaders. Image courtesy of Anna Tanczos, Wellcome Images.

Your immune system protects you from infection with several layers of defense. A key component is a type of white blood cell called a B cell. These cells are responsible for making antibodies. Each activated B cell makes one specific type of antibody that recognizes a single antigen—a molecule that prompts the immune system to attack.

When the antibody binds to the antigen, other components of the immune system attack and immobilize the invader. B cells require activation by another class of white blood cell called T cells. A specific type of T cell, called a T follicular helper cell (TFH cell), is critical for activating B cells.

Most human vaccines fight diseases by inducing the right type of antibodies for long periods of time. This is called immunological memory. However, attempts to create vaccines to prevent some diseases, such as malaria, have failed because patients don't gain immunological memory. To design better vaccines, researchers led by Dr. Shane Crotty at the La Jolla Institute for Allergy and Immunology and Dr. Joe Craft at Yale University set out to understand the molecular events that promote antibody production in B cells. Their work was funded by NIH's National Institute of Allergy and Infectious Diseases (NIAID) and National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS).

The scientists infected mice with a virus and analyzed gene expression in TFH cells. They reported in the online edition of *Science* on July 16, 2009, that a gene called Bcl6 serves as a master switch to turn on development of the TFH cell. The Bcl6 protein is a transcription factor, which binds to the DNA of other genes to turn on gene expression. Bcl6 activates the genes that help immature TFH precursor cells to develop into fully functional mature TFH cells, which then stimulate B cells to create antibodies.

Without Bcl6, the researchers found, mature TFH cells don't develop, and the production of antibodies is blocked. When T cells making large amounts of Bcl6 are injected into mice, animals infected with a virus have a much higher proportion of T cells that become TFH cells—about 85%, compared with about 40% for unaltered T cells.

The researchers found that the "off" component of the master switch is a gene called Blimp-1. The Blimp-1 protein blocks the action of Bcl6 by preventing it from binding to DNA. T cells that make large amounts of Blimp-1 grow normally in mice, but produce 80% fewer TFH cells when the animals are infected with a virus.

Just days later—on July 23—an NIH-funded team from the M. D. Anderson Cancer Center confirmed in *Science* that they also connected Bcl6 to TFH cell development.

These findings may lead to new strategies for making more effective vaccines. They could also prove useful in developing therapies for autoimmune diseases. "Some autoimmune diseases are triggered by antibody-induced inflammation," Crotty says. "The ability to turn antibody production off may also offer therapeutic opportunities for these people."

—by Nancy Van Prooyen

Related Links:

- >> Immune System:
<http://www3.niaid.nih.gov/topics/immuneSystem/>
- >> Immunization/Vaccination:
<http://health.nih.gov/topic/ImmunizationVaccination/ImmuneSystem>
- >> Vaccine Research Center:
<http://www3.niaid.nih.gov/about/organization/vrc/>

[Back to NIH Research Matters](#)

This Week's NIH Research Matters

[Intensive Glucose Control Reduces Complications of Type 1 Diabetes](#)

[Gene Variants Linked to Blood Pressure in African-Americans](#)

[Genetic Switch Discovered for Disease-Fighting Antibodies](#)

Editor's Picks

- >> [Intensive Glucose Control Reduces Complications of Type 1 Diabetes](#)
- >> [Genetic Switch Discovered for Disease-Fighting Antibodies](#)
- >> [Scientists Decode Genomes of Deadly Parasitic Flatworms](#)
- >> [New Insights Into Novel H1N1](#)
- >> [Targeting Age-Related Macular Degeneration](#)

[^top](#)

[Archive](#) | [Subscribe RSS Feed](#) [XML](#) [\(What is RSS?\)](#)

This page was last updated August 3, 2009 .

[Contact Us](#) | [Privacy Notice](#) | [Disclaimer](#) | [Accessibility](#) | [Site Map](#) | [Search](#) | [FOIA](#) | [OIG](#) | [FAQ](#)



National Institutes of Health (NIH)
9000 Rockville Pike
Bethesda, Maryland 20892



Department of Health
and Human Services

