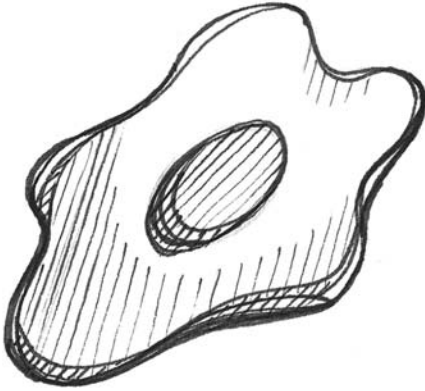


the immune system in pictures

text by PATRICIA KAHN / illustrations by LEW LONG

THE IMMUNE SYSTEM is a collection of different types of white blood cells that defend us against disease-causing invaders. Some of the main actors:



Antigen-presenting cells

detect the invader and trigger the immune system to respond.



Helper T-cells

(also called *CD4+ T-cells*) direct the immune system's attack.



B-cells

produce Y-shaped molecules called *antibodies*, which help destroy invaders in the bloodstream.



Killer T-cells

destroy cells that have become infected.

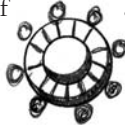
THE BODY has a huge number of white blood cells—a few hundred thousand in just a single drop of blood.

LET'S LOOK AT HOW

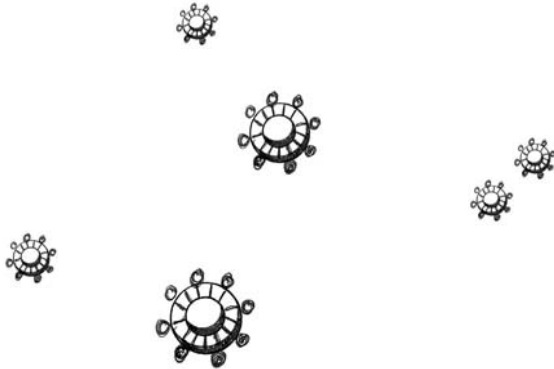
these white blood cells work together to attack invaders.

EVERY GERM THAT INVADES YOUR BODY

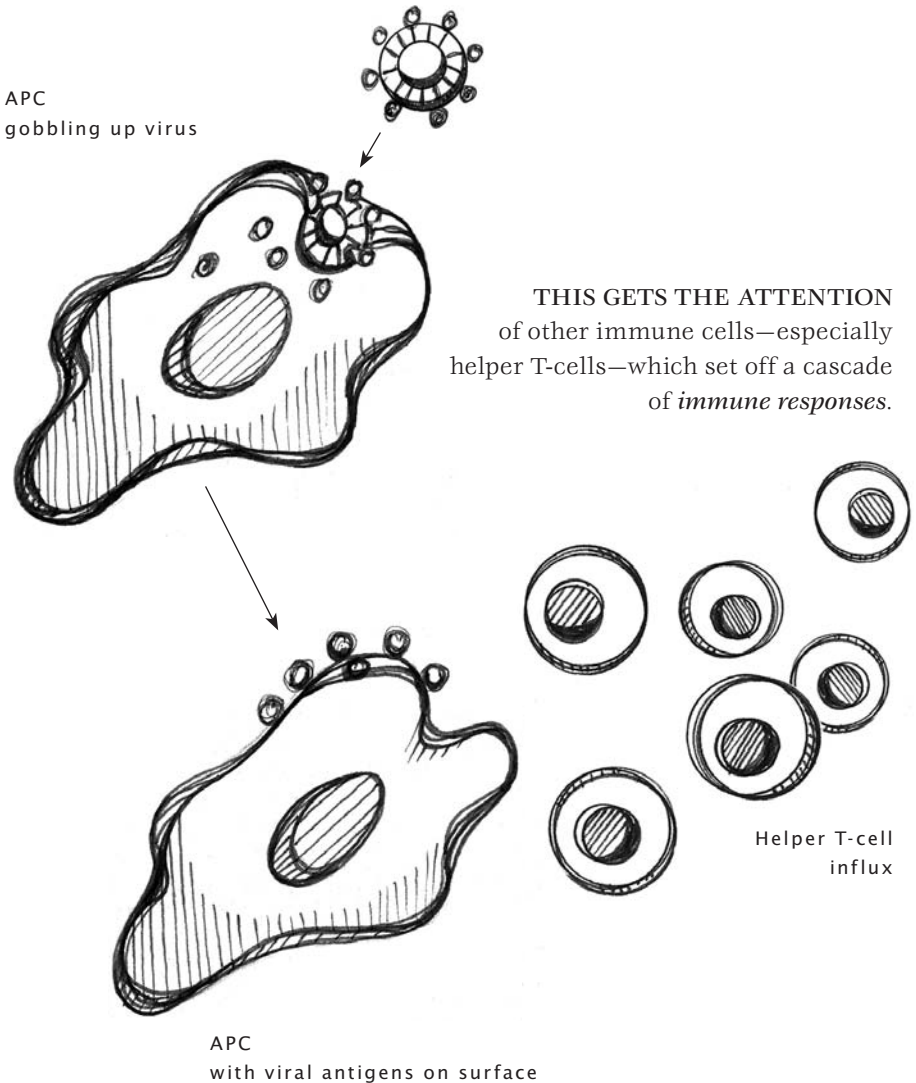
has unique "identification marks" on its surface. These are called *antigens*, and they are what alerts your immune system to the presence of an invader.

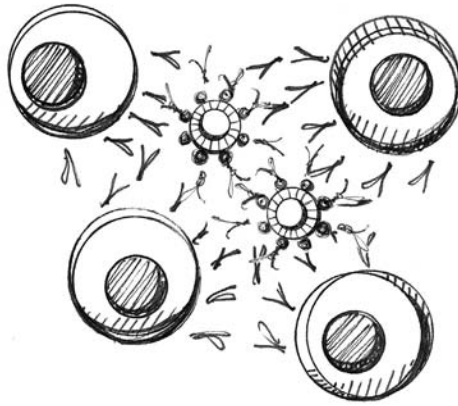


Virus



SOON AFTER INFECTION,
the invader—let's say it's a *virus*—is gobbled up by certain types
of white blood cells, including antigen-presenting cells (APCs).
APCs then take the virus apart and insert pieces of viral
antigens on their surface.



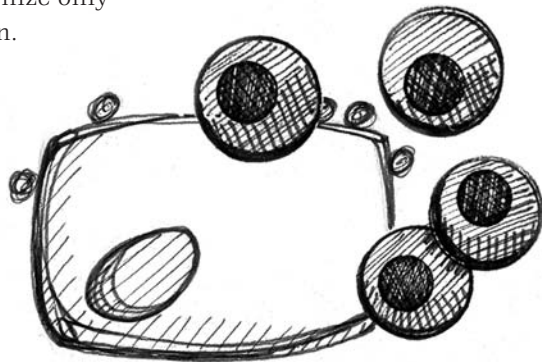


B-cells and antibodies surrounding viruses, with some antibodies binding to virus

ONE SET OF RESPONDERS, called B-cells, multiplies into a powerful squad that makes millions of antibody molecules. Each B-cell makes only one kind of antibody, which recognizes only one type of antigen—fitting it like a key in a lock.

By binding to antigens on the invader, antibodies can often stop it from doing further harm and infecting other cells. Scavenger cells called macrophages roam the body, then come along and clean up by eating the antigen-antibody complex.

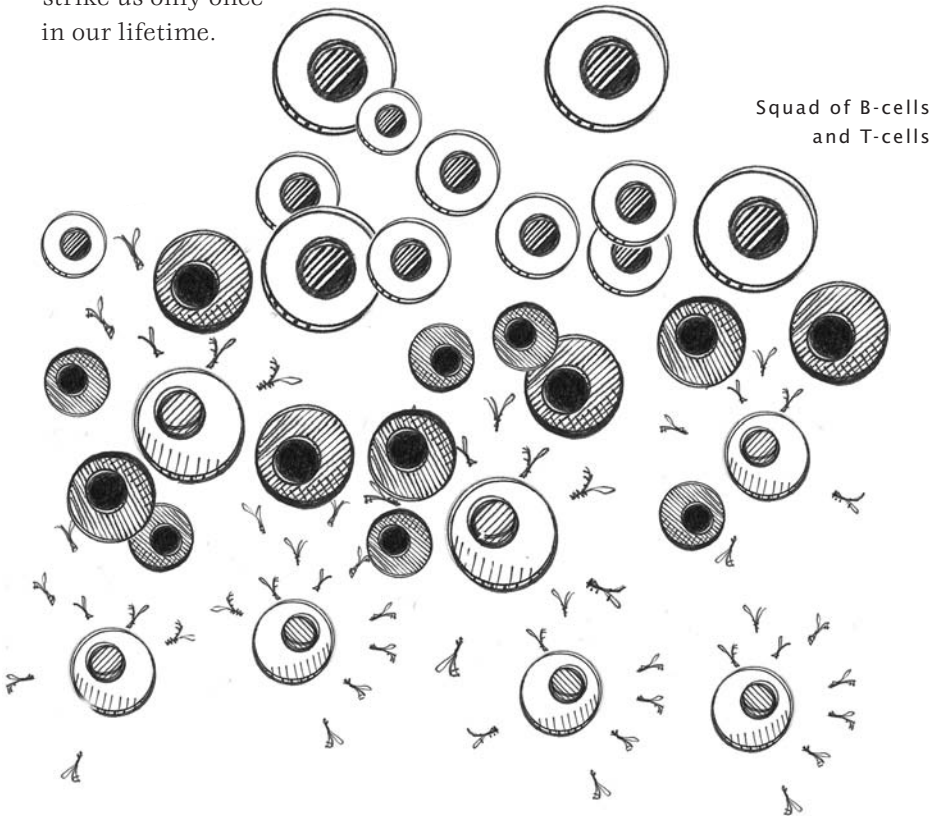
ANOTHER TYPE OF RESPONDER is the killer T-cell. It destroys body cells that display the same viral antigens on their surfaces, which means they've been infected. Like B-cells and antibodies, each killer T-cell is programmed to recognize only a small part of a single antigen.



Infected body cell with killer T-cells attacking it

WHEN THE IMMUNE BATTLE IS OVER AND THE INVADER DESTROYED, the squad of B-cells and T-cells is much bigger and stronger.

Some of these cells become *memory cells* which remain in the body for many years. If the same virus tries to infect you again, the immune system is ready with a faster, more potent response and can often kill off the invader before it even makes you sick. That's why certain diseases, like measles and mumps, strike us only once in our lifetime.



VACCINES WORK

by setting off these same kinds of immune responses, so the body is trained to recognize the antigens of disease-causing invaders even though it's never been infected with the real thing. But HIV has many tricks for evading the immune system, and is proving to be one of the toughest foes vaccine developers have ever tackled.