Meet...
Brian Cobb IMMUNOLOGIST and GLYCOBIOLOGIST, Cleveland, Ohio

What He’s Doing
A prevailing theory in adaptive immunology holds that the molecules involved in the adaptive immune response—when the body creates antibodies and cells that recognize parts of infectious agents—are mainly proteins. Although scientists thought that carbohydrates had no substantial role in the body’s learned patterns of fighting infections, new research on glycans, or sugars on the surface of cells, provides a sweet surprise.

Brian Cobb brings a biochemist’s eye to the field of immunology, observing our bodies’ way of fighting infections at the molecular level. He recognizes that the same building blocks comprise all living things—and that some have more functions than most people think.

Fascinated with chemistry since high school, Cobb knew he wanted to apply his chemical knowledge to the field of immunology. He didn’t know that being randomly placed in a glycobiology lab the summer after his second college year would open his eyes to a completely new paradigm, one in which complex sugars—not just proteins—at the surface of cells are critical for the ability to respond to components of bacteria broken down during the adaptive immune response.

His Findings
Unlike the body’s hard-wired innate immune response, adaptive immunity relies on types of white blood cells that identify foreign infectious agents, learn their properties and create antibodies and cells to attack them. Within adaptive immunity, Cobb’s lab is concerned with the Class II Major Histocompatibility Complex, which is required to respond to pathogens like bacteria which strike from outside the cell.

In one recent experiment, Cobb found that the glycocalyx—or the glycans presented at the cell surface—can affect the adaptive immune response. To determine this, Cobb gave a drug to mice that eliminated certain types of glycans from their cells. He then observed that, while mice with the normal glycans showed a favorable immune response, the treated mice were less able to produce the appropriate response to common gut bacteria.

These findings might pave the way for carbohydrate-based vaccines and drugs to address bacterial infections. In addition to its therapeutic potential, Cobb’s research demonstrates the rewards of thinking outside the box.

“I believe that one of the advantages that I’ve had is that I came to immunology without having a background in immunology, thus liberating me from conventional thinking,” he says. “We should always be looking at data with fresh eyes.”

“I think the evolution of science comes from re-evaluating old conclusions through the lens of new discovery, which often shows that our previous understanding was much more limited than we realized.”