

# Meet a Scientist Who Changed How We Think About Brain Cells

Whether or not you realize it, the cells in your body are constantly performing a range of tasks that help you live: transporting oxygen, allowing muscles to contract, fighting infection, carrying messages to and from the brain. All cells in your body need glucose to release energy, but not all cells do the same things with that energy. Different body systems have specialized cells that use the energy produced from cellular respiration to perform specific functions. There are more than 200 types of specialized cells in your body!

Neurons and glial cells are two very important types of specialized cells. These two types of cells make up your brain, spinal cord, and nerves—the parts of the nervous system. Your nervous system allows you to take in, process, and react to information from your environment. It also allows you to form and store memories. The nervous system carries electrical impulses across networks of nerves that go to every part of the body. These electrical impulses allow you to sense and respond to the world around you. For example, if you touch a hot stove, your nerves will send an electrical impulse to your brain, which processes that information and then quickly communicates with your muscles to tell you to pull your hand away. It takes a lot of energy for the neurons and glial cells in your brain to do their jobs. In fact, your brain cells use half of all the glucose in your body!



**Ben Barres was a neurobiologist who studied specialized brain cells called glial cells.**

When neurons in your brain are damaged or die, they can no longer perform their functions. This can lead to nervous system diseases that affect a person's ability to move and think. We still don't know exactly what is happening with a person's cells when they get some of these diseases, but many scientists are studying diseases of the nervous system to try to find cures. Dr. Ben Barres (1954–2017) was one of those scientists. He became a neurobiologist—a scientist who studies the nervous system—to figure out what causes nervous system diseases and how they can be cured. At the time, most neurobiologists were focusing on neurons, but Barres was interested in the role of the second type of brain cell—glial cells.

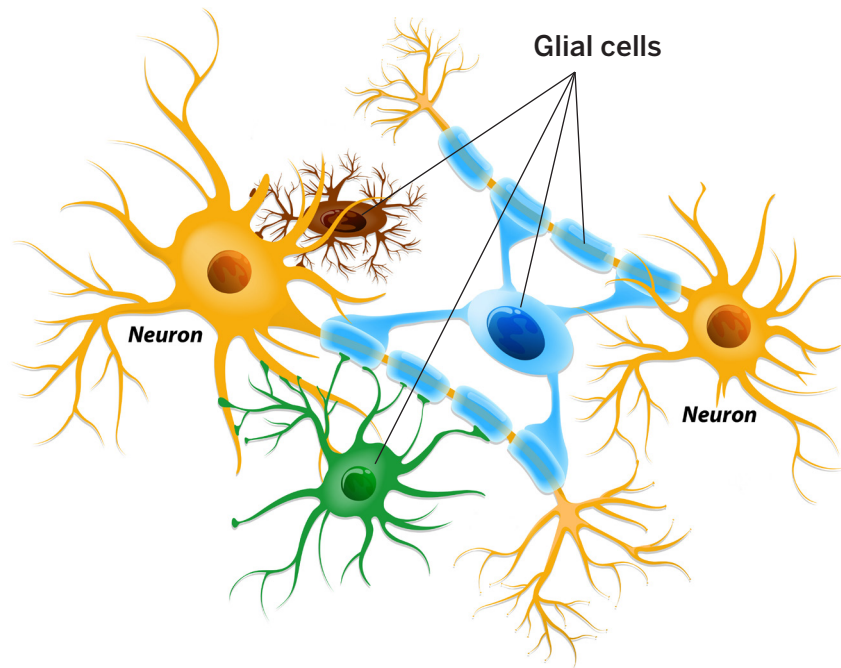
When Barres started studying glial cells in the 1980s, most scientists thought that these cells did not have a very important role in the nervous system. People assumed that glial cells just filled the space between neurons and helped to clean up waste in the brain. Barres, however, dramatically changed the scientific community's

understanding. Over multiple decades, he and his team of students discovered that glial cells, like neurons, can send their own electrical impulses and help to create connections between neurons by guiding neuron cells to come together. These connections (or places where neurons come together) are necessary for sending electrical impulses around the body. Glial cells also get rid of the spaces between neurons that are preventing signals from passing from one neuron to another.

Even more importantly, Barres and his team gathered evidence that glial cells can start destroying neurons in the brain. This discovery was huge! Barres and his team concluded that these bad glial cells might cause some diseases of the nervous system. In addition to his research, Barres co-founded a company that uses his findings to create drugs that might help cure nervous system diseases. The company is currently working on a drug that prevents glial cells from destroying neurons. Barres made a big impact on the field of neurobiology—he was the leading expert on

the role of glial cells in the nervous system. Dr. Martin Raff, a scientist who once worked with Barres, described the importance of Barres's findings: "If you took the Barres lab out of the field of glial studies, there would be no field."

Barres was a pioneer for advancing our understanding of glial cells, and he was also a pioneer for gender equity in the sciences. Barres was a transgender man. He transitioned to male midway through his career, so he experienced being viewed by the world as a female scientist and also as a male scientist. Barres wrote and talked at length about his experiences before and after his transition. He explained, "As a result of being transgender, I've lived life as the same person in two different genders." He said that made him aware of "how differently men and women are treated, just based on their gender." Throughout his career, Barres aimed to help make science more supportive of the research and experiences of people of all genders and backgrounds.



**This diagram shows different types of brain cells. The yellow shapes are neurons. All the other colored shapes are glial cells.**