Medically Reviewed

How Close Are We to a Cure for MS?

Multiple sclerosis treatments have drastically improved in recent years—and promising new therapies are in development.

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If you or a loved one has recently been diagnosed with multiple sclerosis (MS), you may be wondering whether there's any way to erase the disease entirely. Unfortunately, there is no cure for MS at this time, and an imminent cure is unlikely, says Tyler Smith, M.D., a neurologist and clinical assistant professor at NYU Langone Health in New York City. However, there are plenty of reasons to be optimistic.

There are now more than 20 disease-modifying therapies for MS on the market, according to the National Multiple Sclerosis Society. Disease-modifying drugs are designed to change the underlying course of the disease, making relapses (attacks) less frequent and slowing damage to the central nervous system.

“Many people with MS can find one that is effective for them. And even though we don’t have a cure or perfect medication yet, scientists are always developing new remedies,” says Dr. Smith.

Here, experts share an overview of exciting recent progress in MS treatment and promising areas of study for new treatments as scientists continue to work toward a cure.

Disease-Modifying Therapies

Disease-Modifying Therapies: A Long List That Keeps Growing

Until 1993, doctors had some means of treating MS symptoms, but there was no such thing as a medication that addressed the underlying immune dysfunction driving the disease. That changed with the introduction of Betaseron (interferon beta-1b), according to a history of multiple sclerosis therapy published in the *Journal of Neurology.*

Since then, a slew of disease-modifying drugs have been introduced. Most are FDA-approved for relapse-remitting MS and/or secondary progressive MS; only one, Ocrevus (ocrelizumab), is approved for primary progressive MS, says Ben Thrower, M.D., the senior medical advisor to the Multiple Sclerosis Foundation and medical director of the Andrew C. Carlos Multiple Sclerosis Institute at Shepherd Center in Atlanta, GA

Some of the most recent disease-modifying therapies for MS to hit the market include:

- Bafiertam (monomethyl fumarate), approved in 2020
- Briumvi (ublituximab-xiiy), approved in 2022
- Kesimpta (ofatumumab), approved in 2020
- Ponvory (ponesimod), approved in 2021
- Zeposia (ozanimod), approved in 2020

Most recently, in August 2023, the FDA approved the first biosimilar for multiple sclerosis, Tyruko (natalizumab-sztn), which is is a biosimilar to Tysabri (natalizumab), according to an FDA announcement. Biosimilars are comparable to generic drugs. However, unlike generics, they are not exact copies of the reference drug, which isn't possible to do with biologics, explains the American Cancer Society. Instead, they are very close in structure and function.

Experimental Therapies

Experimental Therapies for MS

In addition to the new treatments mentioned above, there are a number of drugs that are currently in Phase 3 clinical trials for MS, according to the Multiple Sclerosis Trust. These drugs have the potential to reach the market in the next few years, pending the results of the trials as well as regulatory authority review. Here's what we can hope to see.

BTK Inhibitors: A New Class of Disease-Modifying Drugs

Several of the drugs that are now in Phase 3 clinical trials—including evobrutinib, fenebrutinib, and remibrutinib, among others—are BTK (bruton tyrosine kinase) inhibitors. "BTK inhibitors are a new class of drugs for MS that have a very different mechanism of action compared to current disease-modifying drugs," says Dr. Thrower. "If they get approval, they would truly bring something new to the table."

As explained in a recent review published in *Nature Reviews Neurology*, BTK inhibitors might act on both the innate immune system (which you're born with) as well as the adaptive immune system (which develops over your lifetime). Some patients may be able to access yet-to-be approved drugs, including BTK inhibitors, by joining a clinical trial.

Drugs That Repair Myelin

As with BTK inhibitors, remyelinating drugs aren't on the market yet but are inching closer. These therapies, which including clemastine, aim to repair the protective sheath (myelin) that protects nerve cells but gets attacked by MS.

According to results from a Phase 2 trial (called ReBUILD), published in *PNAS*, MS patients who used clemastine had improvements in the speed at which nerve impulses traveled from the eye to the visual cortex in the brain. Researchers interpreted this finding to mean that damaged myelin in the optic nerve may have been repaired.

Other research on clemastine, including the ongoing ReCOVER trial, is also underway. Click here to learn more about eligibility.

Stem Cell Transplants for MS

Autologous hematopoietic stem cell transplantation (AHSCT) isn't brand new, as this procedure is sometimes used for severe MS patients who haven't responded to disease-modifying medications. AHSCT involves harvesting a patient's own stem cells, destroying MS-related immune cells with chemotherapy, and then reinfusing the stem cells, according to the National Multiple Sclerosis Society. Some research has suggested that this complex treatment translates to a higher quality of life for some MS patients, as noted in a 2021 paper in *Biologics*.

However, there's no standard protocol for AHSCT for MS, which is where an ongoing clinical trial called BEAT-MS comes in. Participants in this trial are randomly assigned to either receive a disease-modifying medication or undergo the AHSCT procedure, says Alise Carlson, M.D., a neurologist at the Cleveland Clinic Mellen Center for MS in Ohio and one of the members of the research team for BEAT-MS.

"We're interested in patients whose disease is continuing to progress despite treatment, who have worsening disease activity over a short time, and those who have had many relapses despite being on high-efficacy therapies," she says.

Learn more about this trial and eligibility requirements here.

Promising Research

Other Promising Areas of MS Research

While some of the experimental therapies detailed above may become available in the next few years, scientists continue to pursue new avenues of treatment. Some of these areas of research include therapies that manipulate the microbiome as well as gene therapy.

Treatments That Target the Gut Microbiome

The gut microbiome is a hot topic at professional neurology conferences, says Dr. Carlson, and there is plenty of ongoing research in this area. Whether and when such research will lead to tangible treatment options is unclear. At the moment, much of the research related to MS and the gut microbiome—the collection of microorganisms, including bacteria, that inhabit the digestive tract—has to do with uncovering the causes of MS.

Research has found that irregularities in the gut microbiome of MS patients are linked to increased inflammation. How to best correct such abnormalities, and whether doing so will actually result in treating MS, isn't known yet. Dietary changes or fecal microbiota transplantation —which entails transplanting microbes from a healthy person's fecal matter into the intestines of an MS patient—might be among the options, according to a research review published in *Cell Transplant*.

Further study of these and other approaches is warranted, but it may take a while before any are ready to be applied to patients. "The gut microbiome has been talked about for a long time," says Dr. Smith. "I think it's a little further off than other developing treatment options for patients."

Gene Research

Another possible treatment in the works—one that might, eventually, lead to a cure—is gene therapy. Gene therapy is a technique that involves replacing a defective gene with a healthy one, inactivating a gene that's causing a disease, or introducing a new gene to treat a disease, according to the FDA.

According to a review in *Current Gene Therapy*, scientists have been working to determine whether gene therapy approaches could be used to treat, prevent, or reverse MS symptoms and undo damage to the central nervous system. Results from animal studies have been promising, but more research is needed before gene therapy for MS can be tested in humans.

Bottom Line

The Bottom Line on a Cure for MS

Although there is no cure for MS at the moment, patients today have a multitude of treatment options to choose from. Additionally, a number of new and emerging therapies—including new disease-modifying drugs and autologous stem cell transplants—have the potential to help even more patients in the near future.

For now, "the key is to get an accurate diagnosis as quickly as possible," says Dr. Thrower. "If you're newly-diagnosed, we have many tools in the toolbox to give you a good quality of life and

reduce the risk of disability.”

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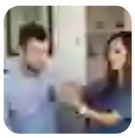

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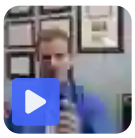

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