A New Way to Study Multiple Sclerosis

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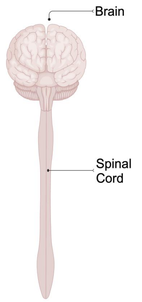
What is the problem?

There are no drugs to repair the brain in multiple sclerosis patients.

What is multiple sclerosis?

Multiple sclerosis (MS) is a disease that damages the brain and the spinal cord

This damage can cause symptoms that lower the quality of life of patients



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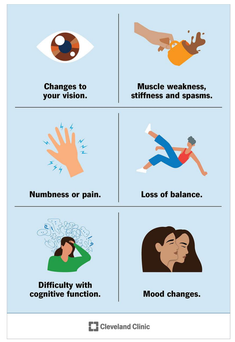


Why should we care about multiple sclerosis?

MS affects ~ 2.8 million people worldwide.

Colorado has a high rate of MS; 1 in every 175 people in CO have MS.

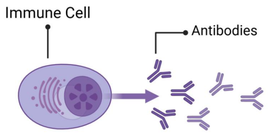
People are usually diagnosed with MS as a young adult (20-40 years old). Symptoms get worse during the patients' lifetime.

How do we study multiple sclerosis?

- We have 3 great rodent models, but none of them are a perfect replication of human MS disease.
- New MS treatments are usually tested in more than one rodent model before they are given to humans

Why do we need a new model of multiple sclerosis?

Immune cells produce antibodies, which are usually used to fight off bacteria and injections. Antibodies are the body's natural antibiotics!



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In MS, Immune cells get into the brain and produce antibodies that target our brain cells, killing them and damaging the brain.

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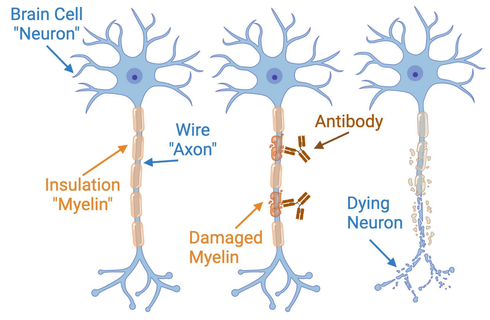
No current model replicates how these antibodies are damaging the brain in MS.

We found that some antibodies target the insulation for brain cells, called myelin.



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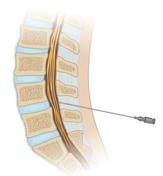
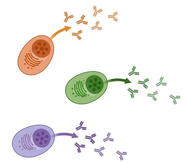
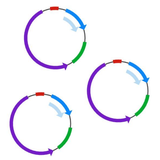
Myelin insulates and protects brain cells like plastic protects a wire. Without myelin, the cell can be damaged and die

What is the new model of multiple sclerosis?

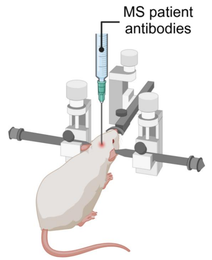
1. Retrieve fluid from MS patient spinal cord
2. Isolate antibody producing cells
3. Make many copies of the antibodies

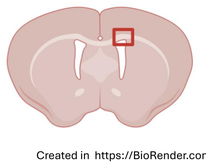






4. Inject the antibodies into the mouse brain





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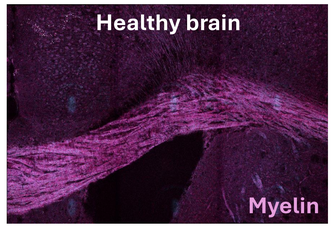
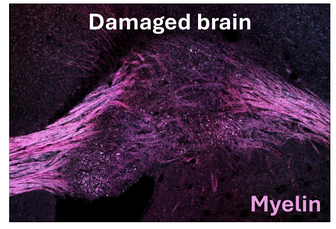
What happens when multiple sclerosis antibodies are put into the mouse brain?

After the antibodies are injected into the brain, the protective myelin is damaged, as seen here by the giant hole in the brain! We also see swelling, like how an ankle swells when it has been hurt.





Over time, the hole will heal itself, allowing us to use this model to study how the brain repairs itself.

Understanding how the brain repairs allows us to make new drugs to help MS patients!