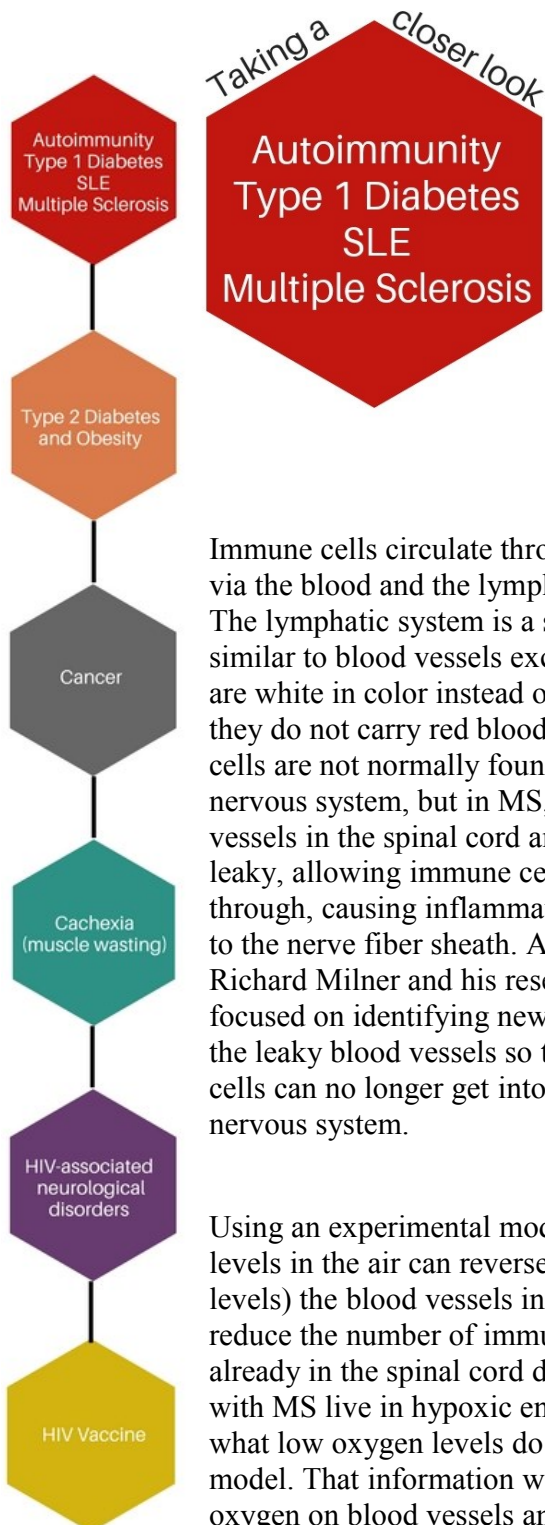
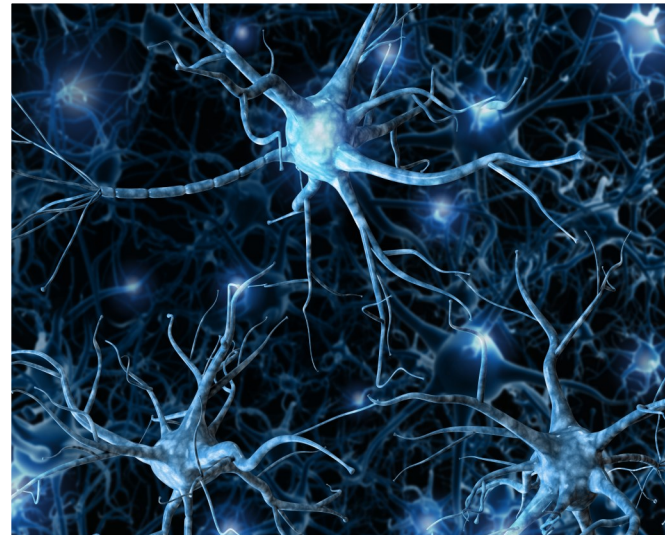


The Bench and Beyond



Multiple Sclerosis (MS) is an autoimmune disease caused by immune cells entering the brain and spinal cord (collectively called the central nervous system) and destroying the protective coat, or myelin sheath, that surrounds the nerve fibers. Without this coat, the nerves are unable to transmit messages that instruct legs and arms when and how to move. If the nerve fibers are damaged, movement can be delayed, jerky and sometimes completely absent. Other parts of the body also receive signals from the brain via nerve fibers. A successful treatment for MS will need to replace the myelin sheath that has been destroyed, repair the damaged nerve fibers and stop the immune system from causing further damage. The picture below is an illustration of nerve cells in the human brain.

Immune cells circulate through the body via the blood and the lymphatic system. The lymphatic system is a series of tubes similar to blood vessels except that they are white in color instead of red because they do not carry red blood cells. Immune cells are not normally found in the central nervous system, but in MS, blood vessels in the spinal cord and brain become leaky, allowing immune cells to get through, causing inflammation and damage to the nerve fiber sheath. At SDBRI, Dr. Richard Milner and his research team are focused on identifying new ways to mend the leaky blood vessels so that immune cells can no longer get into the central nervous system.



Using an experimental model for MS, Dr. Milner's team has found that reducing the oxygen levels in the air can reverse the early clinical signs of MS. In hypoxic conditions (low oxygen levels) the blood vessels in the spinal cord become more resistant to breakdown and reduce the number of immune cells entering the nervous tissue. At the same time, immune cells already in the spinal cord disappear much faster. Because it is not practical to suggest that people with MS live in hypoxic environments, ongoing research is focused on understanding exactly what low oxygen levels do to the blood vessels and immune cells and how MS is reversed in this model. That information will be used to develop a treatment that mimics the effects of low oxygen on blood vessels and immune cells in people with MS.

Frequently Asked Questions!

Why is it called Multiple Sclerosis? Multiple Sclerosis was first described as a unique disease in 1868 by a French neurologist, Jean-Martin Charcot. The word “sclerosis” comes from the Greek word “skleros” which means, hard, and refers to the scar tissue (also called plaques) that develops in the brain and spinal cord of people with MS. Because there are usually multiple sites of scarring, the disease was named “Multiple Sclerosis”.



Why do some people with MS appear healthy sometimes and at other times have difficulty walking? There are at least 4 types of MS. The majority of people with MS, about 85%, have a type called Relapsing Remitting MS, or RRMS. People with RRMS can appear completely healthy, walking, driving and functioning just like people without MS. However, without notice, a relapse can cause symptoms to reappear. These symptoms can be mild or quite severe including numbness in hands and feet making walking difficult, blurred vision, and severe fatigue. Within a few days, or sometimes weeks, their symptoms can disappear again as the disease goes back into a remitting phase. In contrast, people with primary progressive MS (PPMS) experience symptoms that progressively get worse with no cycle of remissions and relapses.




What is the point in splitting MS into 4 different types? Does this benefit people with MS? The reason people with MS benefit from their disease being categorized into 1 of the 4 types is that different medications work best on different types of the disease. Knowing the type of MS allows doctors to prescribe the best medication for each patient. For instance, people with RRMS can gain benefit from a wide range of disease-modifying therapies (DMTs) including interferon beta-1a (avonex) or 1-b (betaseron), glatiramer acetate (copaxone), mitoxantrone (novantrone), natalizumab (Tysabri), fingolimod (Gilenya), teriflunomide (aubagio), dimethyl fumarate (tecfidera), and alemtuzumab (lemtrada). Many of these drugs suppress the immune response, helping to prevent relapses in RRMS patients. Until recently, no DMTs had been found to work on PPMS but recently the Food and Drug Administration (FDA) in the US approved the use of ocrelizumab (ocrevus) for this type of MS.



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