**Multiple Sclerosis and Ongoing Treatments**

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**Abstract**

**Multiple Sclerosis is a debilitating disease that affects more than 2.3 million people worldwide. Due to the immune system attacking myelin and nerve fibers, it leads to a number of pain-inflicting symptoms that restrict many from living a normal and healthy lifestyle. Multiple Sclerosis can present itself in a progressive or relapsing form, and although there are no known treatments for the progressive form, there have been a number of therapeutic advances for the relapsing form. Recently, there have been numerous phase II and phase III studies done in the search for effective therapies. These studies, led by Dr. Afsaneh Shirani and two other doctors in a similar field of study, include hematopoietic stem cell therapy, hormone-based therapy, and supplemental use. Currently, they have yielded promising results and are being continued in their studies.**

**Introduction**

Multiple Sclerosis occurs when the immune system attacks myelin and nerve fibers within the Central Nervous System, creating scar tissue around the myelin sheaths and disrupting or distorting nerve impulses. There is roughly 2 million people living with Multiple Sclerosis today, which is a rough estimate since some symptoms may be completely invisible, and not appear until later in life. MS is a demyelinating, chronic inflammatory neurodegenerative disorder that manifests in four different forms, ranging from mild to severe. The first form, clinically isolated syndrome, is identified when inflammation due to demyelination occurs and lasts for at least 24 hours. Relapsing-remitting MS is identified when “relapses” or “attacks” occur and are followed by a partial or full recovery. Primary progressive MS is diagnosed when a gradual decline of neurological function takes place, and there is no remission. Finally, secondary progressive MS commonly occurs after relapse-remitting MS, and shows a progressive worsening in disability of neurological function (1). According to the National Multiple Sclerosis Society, although multiple forms have been identified, the reason to why the immune system attacks is still unknown, and is why it can also be categorized as “immune mediated.” There are minimal options when it comes to treatment of relapsing forms, and currently there are none that have been approved by the Food and Drug Administration to treat progressive forms. This leaves a large amount of the affected population without means of treatment. However, there have been a number of therapeutic advances including, but not limited to, hematopoietic stem cell therapy, hormone-based therapies, and nutritional supplements such as lipoic acid, green tea extract, and biotin (2). Although these therapies are still in the beginning trial phases, they could significantly influence how Multiple Sclerosis is treated in the future. These advancing therapies, among others, offer hope of treatment for those suffering from the progressive form of Multiple Sclerosis, and appear promising.

**Recent Progress**

Recently, a number of phase II and III trials to test a variety of possible therapeutic advances for Multiple Sclerosis have been completed and mentioned in particular articles by the American Society for Experimental NeuroTherapeutics. Among these trials were hematopoietic stem cell therapy, hormone-based therapies, and nutritional supplements including lipoic acid, green tea extract, and biotin.

Hematopoietic stem cell therapy has recently proved promising results. In a clinical trial done with peripheral blood stem cell transplantation, long term results showed significant improvement in the survival rate of disease progression-free patients that had acute inflammation (3). Another phase II trial mentioned in the article showed that a high-dose immunosuppressive therapy paired with homologous hematopoietic cell transplantation was effective in causing a continuous remission of relapse-remitting MS for three years (4). This treatment utilizes allogeneic or autologous stem cells collected from that person’s bone marrow, cord blood, or peripheral blood, and intravenously infuses them into the patient to reestablish hematopoietic function.

Hormone-based therapy, or more specifically Adrenocorticotrophic hormone, as mentioned in the article, is a form of treatment best known for its steroidogenic properties. It has been shown to improve brain function during infant spasms that occur in an epileptic form of encephalopathy. This aids tremendously in the treatment of young children with MS, and proves promising for older individuals as well. It has also been proven to show anti-inflammatory and neuroprotective effects, which aid in spinal cord and ischemic brain injury (5). Currently, a phase II trial is underway to see whether this form of treatment is able to improve the effects of progressive MS.

The supplemental use of lipoic acid (antioxidant with signal transduction modulatory pathways), green tea extract (neuroprotective agent), and biotin (cofactor for decarboxylase enzymes) has shown significant improvements in the treatment of MS disabilities and in secondary progressive MS. Although this treatment appears hopeful, it is one that has been less focused on. However, there are still a number of phase II and II trials underway, to add to the data already obtained from previous trials.

**Discussion**

Through the use of these different therapeutic advances, there is hope for the treatment of progressive Multiple Sclerosis. Hormone-based therapies, hematopoietic stem cell therapy, and the supplemental use of lipoic acid, green tea extract, and biotin have all proved significant results in treating some form of progressive MS, and trials are still underway to continue to see the effects of these treatments and how they can improve the lives of people suffering from multiple forms of Multiple Sclerosis.

**References**

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