Rebooting immune system provides long term relief for aggressive relapsing MS in Canadian study

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Canadian researchers have published long-term follow-up results from a group of 24 people with aggressive relapsing remitting MS who were treated using Autologous Haematopoietic Stem Cell Treatment (AHSCT) to reboot their immune systems.

The results of the study show that brain inflammation was halted in all participants who completed the treatment, and in some cases led to long-term recovery of certain MS-related disabilities.

The results of the study, led by Dr Harold Atkins and Dr Mark Freedman of The Ottawa Hospital and the University of Ottawa, Canada, have been published in the prestigious medical journal, *The Lancet*. The study was funded by the MS Society of Canada's Multiple Sclerosis Scientific Research Foundation (MSSRF) in 2000.
The trial was a multi-centre, single-arm (no randomisation and no comparison treatment), phase II clinical trial that involved 24 individuals who presented with highly inflammatory MS with frequent relapses that did not respond to available disease modifying therapies.

The procedure used in this study involved the complete destruction of the immune system (known as immunoablation) using intensive chemotherapy with busulphan and cyclophosphamide. This was followed by reinfusion of the patients own immune stem cells (haematopoietic stem cells) that were collected prior to the chemotherapy. View infographic for a summary of the procedure.

Participants were carefully assessed prior to and following treatment using a range of measurements including the Expanded Disability Status Score (EDSS) and the number and size of inflammatory brain lesions seen on MRI scans, as well as overall changes in brain volume over time. Each participant was also monitored for any adverse events. The key outcome measure that was analysed was the MS disease activity-free status (the absence of relapses, brain lesions or disability progression) over 3 years. Participants were also followed up over a longer period ranging from 4 to 13 years post-treatment.

The procedure resulted in the complete elimination of relapses and no new brain lesions during the entire follow-up period for all of the 23 surviving participants. Although the rate of brain volume loss initially increased for the first 6 months after the procedure, the rate of loss then slowed and stabilized in all participants to a rate comparable with normal ageing.

70% of participants also showed no evidence of disability progression over long-term follow-up. Approximately 40% of participants experienced improvements in disability, such as recovered vision, strength and improved movement coordination.

One participant died of complications from liver failure approximately 2 months after undergoing the AHSCT procedure. Another participant required intensive care as a result of chemotherapy-related toxicity, but ultimately recovered. Some participants also experienced the expected post-transplant viral infections and subsequently recovered.

This is the longest follow up of people with MS treated by this procedure, and it is extremely encouraging to see that it has provided such long term control of the disease with the participants having experienced no further relapses or MRI lesions.

The neurological recovery experienced by many of the patients in the study is also very encouraging. This is likely to be natural repair of the insulating myelin layer surrounding the nerve fibres and remodelling of nerve connections, that has been made possible by the suppression of the inflammatory attack. However, as the authors of the study note, this treatment is unlikely to provide benefit for people with MS who have had significant disability for a long time and this has also been observed in a number of other studies and case series of people with MS treated by AHSCT. In these studies, people with long-standing disability, secondary progressive or primary progressive MS have not shown the same beneficial response to the treatment.

The Canadian researchers also note that this study involved a higher chemotherapy dose, compared to some other studies, and they suggest that this contributed to the robust, long-term benefits seen in this study.

The AHSCT procedure is available at a limited number of Australian hospitals with expertise in this area. Due to the higher risks associated with this form of treatment it is generally only recommended for patients who are referred by their neurologists and who have very active disease that has not responded to the currently available MS medications.

MS Research Australia has comprehensive information available on its website for those wishing to learn more about this form of treatment. The information includes its position statement, information on what has been found in other studies of AHSCT, and information about the availability of the treatment in Australia – www.msra.org.au/AHSCT

More information on this study is also available via the MS Society of Canada.