

Accelerated Cure Project for MS

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Accelerating research towards a cure for multiple sclerosis

Novel Movement Rehabilitation and MS

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Rehabilitation is integral to comprehensive care for those with MS. However, based on the published studies, efforts to develop general guidelines has proven challenging. Fortunately, there are ongoing conversations amongst health care professionals as to the strength of evidence available.^{1,2} This month there were two publications from the same study, which will add greatly to this active conversation on the important contributions of rehabilitation on improving outcomes for those with MS.

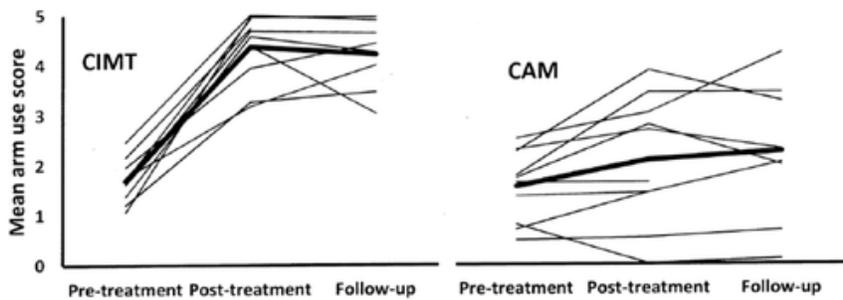
The two papers are based on results from the first randomized controlled trial (RCT) comparing constraint-induced movement therapy (CIMT) to complementary and alternative medicine (CAM) treatments in persons with MS (PwMS).^{3,4} The RCT was designed for PwMS who had differences in disability in their upper extremities, such that one arm was mild to moderately impaired while the other arm was severely impaired. CIMT is a unique intervention commonly used for those who have had a stroke or have



<http://www.uah.edu/mix/stories/hrave-initiative-helning-wounded-warriors->

other non-progressive neurological diseases. In brief, CIMT rehabilitation aims to increase use of the severely impaired arm through several hours of exercises while the less impaired arm is restrained for up to 90% of waking hours (i.e. placed in a sling, a splint, a mitt, etc., as shown in the photograph of Kenneth Lovelace, a veteran with traumatic brain injury). This RCT consisted of 3.5 hours of CIMT or CAM treatments for 10 consecutive weekdays. The CAM treatment consisted of periods of meditation and various land (i.e. yoga) and water (i.e. water tai chi) based activities. Twenty PwMS were randomly assigned to either CIMT or CAM treatments.

This first paper based on this RCT evaluated whether CIMT increased the real-world use and motor function of the severely impaired arm, and if the improvements lasted after 1 year.³ After 35 hours of rehabilitation, PwMS in both groups had improvements in use of the severely impaired arm, however the increases experienced by those in the CIMT group were significantly greater. Those in the CIMT group had fairly uniform improvements,



while the improvements in the CAM group were highly variable (see figure below). Most interesting is, the effect of CIMT (increased use of the severely impaired arm)

lasted even after a year of follow-up. As for the impact of CIMT versus CAM on motor function, both groups had similar positive impacts on motor function after 35 hours of rehabilitation, however, the CIMT group had significant additional improvements after a year, while the CAM group had declined motor function over time.

The second paper of the RCT investigated the impact of CIMT versus CAM on the integrity of white matter of the central nervous system.⁴ The central nervous system, which consists of the brain and spinal cord, is comprised of grey matter (neuron cell bodies) and white matter (myelinated axons of neurons, which connect different parts of grey matter and is where nerve impulses are transmitted). The researchers used MRIs to measure changes in the white matter of the brain in both groups, and after 35 hours of rehabilitation, only the CIMT group had significant increases in white matter integrity. This increase in integrity was not correlated with increased motor function, rather by increased real-world use of the severely impaired arm in the CIMT group. Despite the

small sample size, these results are very promising, suggesting that CIMT may result in positive changes in PwMS.

In summary, conducting rehabilitation studies is generally challenging, as they require time, active engagement, and a considerable amount of human resources – however, the potential impact of rehabilitation on improving the lives of those with MS considerably outweighs the study costs. I do hope we will see more studies, of larger sample sizes, investigating a diverse array of rehabilitation therapies that aim to promote wellness and optimize daily functioning in those with MS.

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4662703/>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5200850/>
3. <https://www.ncbi.nlm.nih.gov/pubmed/29668399>
4. <https://www.ncbi.nlm.nih.gov/pubmed/29668401>
5. <https://www.ncbi.nlm.nih.gov/pubmed/29627940>