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Clinical Pearls

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USING CMMS TO REACTIVATE THE BRAIN

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Did you know that handwriting offers a complete workout for your brain? The simple strokes produced while writing engage neural pathways linked to fine motor skills, visual recognition, spatial awareness, and language encoding. This activation stimulates the intricate visual and sensory motor centers of the brain.

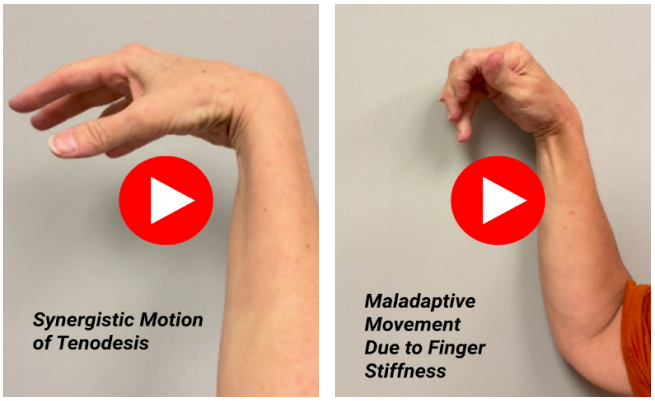
But what happens when we can't use our hands due to immobilization from surgery or injury? Without engaging these pathways, our brain begins to change. Let's explore how the treatment technique of Casting Motion to Mobilize Stiffness (CMMS) effectively reactivates the brain.

Development of Maladaptive Motion After Immobilization

After a period of immobilization, patients often experience joint and soft tissue changes due to localized trauma from surgery or injury as well as the effects of being immobilized. Restricted active motion in the wrist and hand decreases lymphatic flow, limits sensory input to the extremity, alters proprioceptive feedback, creates joint stiffness, and reduces tendon excursion. Additionally, immobilization diminishes activation of the sensorimotor cortex in the brain. Once it is time to move again, patients often forget how to coordinate their movements and instead develop maladaptive motor patterns.

Two key issues arise when these patients attempt to actively flex their fingers after immobilization:

1. They struggle to use the synergistic motion of tenodesis which supports wrist extension. *See Video 1.*
2. The force of active motion bypasses stiff joints and targets supple ones, following the "path of least resistance." Moving the loosest joints creates maladaptive movement patterns. *See Video 2.*



Videos 1 & 2: Click on image for video.

Traditional Passive Treatments vs. CMMS Active Movement

When treating patients with maladaptive movements, clinicians often waste time on localized treatments aimed at specific symptoms. Common interventions include compression for edema, passive stretching to reduce joint and tissue tightness, and physical modalities for pain relief. *See Figure 1.* However, for individuals with maladaptive movement patterns, these passive methods—including dynamic and static progressive orthoses—fall short because they fail to address the changes within the sensorimotor cortex.

Effective movement repatterning requires active motion, which provides proprioceptive feedback of joint movement to the central nervous system.

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USING CMMS TO REACTIVATE THE BRAIN
(continued)

Utilizing the correct muscle groups and anatomically appropriate movement patterns is essential to change maladaptive behaviors. Accurate active motion not only reinforces proper movement patterns but also reactivates the sensorimotor pathways in the brain.



Figure 1: Passive treatments for edema, pain and finger joint stiffness.

Active Redirection and the Brain

The primary goal of the CMMS technique is to redirect active motion. *See Figures 2 and 3*. After assessing movement patterns, a plaster of Paris cast is applied to correct the maladaptive motion. The cast positions the joints to only allow anatomically correct active movement. When repeated consistently over time, these accurate active movement patterns reinforce the brain's understanding of proper movement. This active redirection is vital, providing a workout for both the soft tissues and the brain.





Figures 2 & 3: Maladaptive movement when making a fist and use of the CMMS cast to redirect active motion stiffness.

Exploring Other Conditions for the Use of CMMS

In a **study presented at the 2025 ASHT Annual Meeting**[1], Stewart reported improvements in active range of motion, edema, pain, and functional use of the hand after CMMS treatment. These positive results stem from how the CMMS cast allows for the active redirection of movement. Given this evidence and the detrimental effects of immobility on the brain, it's essential to consider CMMS as a first-line treatment for stiffness and maladaptive movements in the injured hand.

Moreover, we should consider the use of CMMS when reactivating the brain following injuries or surgical procedures such as tendon repairs with limited glide, tenolysis, burns, and distal radius fractures that do not respond to home exercise programs. The next time you encounter a patient with maladaptive motion, consider the CMMS treatment technique as an invaluable tool for reactivating joint movement as well as the brain.

In conclusion, CMMS not only recovers a normal pattern of active motion but also revitalizes the neural pathways that are essential for optimal function. Let's make CMMS a primary strategy in our hand rehabilitation toolbox.

1 Stewart, K (2025, October 23-25) Casting Motion to Mobilize Stiffness Improves Range of Motion & Function in the Stiff Hand [Paper Presentation]. ASHT Annual Meeting 2025: Salt Lake City, UT, United States.

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