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Complex made Simple…Clinically relevant education

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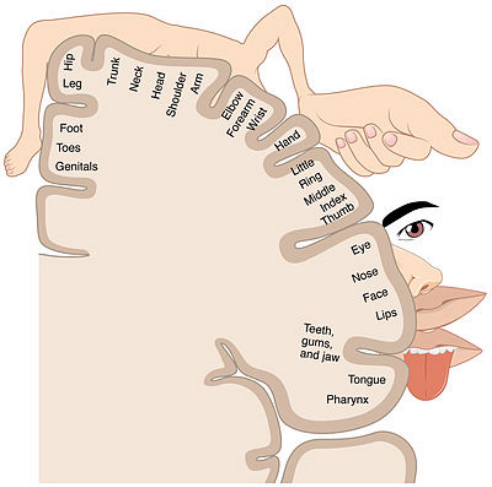
ClinicalPearls

TIPS FOR KEEPING THE HAND-MIND CONNECTION

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Have you ever had patients who will not use their finger although they have functional motion? They can move the finger while performing specific exercises in therapy, but as they leave the clinic they resort to compensatory techniques and avoid using the finger to pick up car keys or an appointment card.

In addition to immobilization of the hand having negative effects on muscles, soft tissues, and joints, we must also consider how this immobilization has an adverse impact on the brain. A large portion of the brain is dedicated to the hand for both sensory and motor function. See image 1. When the hand is not used these areas of the brain begin to change. Just twenty-four hours of disuse or immobilization decreases motor cortex excitability and reduces activation in the somatosensory cortex. Over time this is likely to lead to difficulty with motor planning, altered sensibility, and pain (1,2).



1. Homunculus of the human brain

(wikipedia.org)

The good news is when we engage the patient's brain we decrease their pain, improve their sensibility, and increase their motor recovery. Here are some suggestions for engaging the brain to reverse the negative effects of immobilization.

START EARLY AND POSITIVELY

Early active motion is not only helpful to maintain the glide of soft tissues, muscles, and tendons, it is also good for the brain. Patients who require a period of immobilization for adequate healing can still start early by using guided imagery with imagined motions, working on laterality training by identifying images of their right and left extremities, and training with mirror therapy to keep the brain engaged (3,4).

Include tactile stimulation early by exposing the extremity to a variety of textures with the eyes open and then closed. Keep an encouraging emphasis on therapy by using the term "discomfort" instead of pain and positively focus on even the smallest gains made in therapy (5).

MAKE IT FUNCTIONAL

As soon as possible, use functional task training. Performing meaningful activities that include both sensory and motor components improves functional outcomes (1,6). Be sure to break tasks down into simple steps.

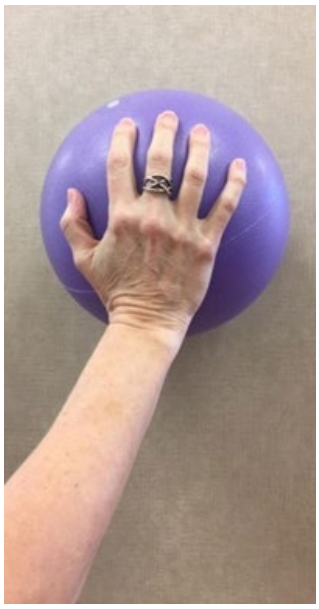
Studies show that exercising the contralateral side of the brain will also stimulate the sensorimotor cortex of the involved extremity (7). Therefore, it is important to encourage use of both extremities while performing

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routine activities of daily living such as folding laundry and reading a magazine.

INCLUDE PROPRIOCEPTION

Activities that provide significant proprioceptive input stimulate both the peripheral nervous system and the central nervous system (the brain). Examples of activities that challenge awareness of joint position and joint motion are closed chain exercises, weight bearing, scapular stabilization, perturbations (a small change in the regular movement), and isometrics (8). See Images 2 and 3.



2. Closed chain exercise using a ball



3. This semi-flexible roll, when moved quickly, creates perturbations that provide proprioceptive input to the wrist

1. *Lissek S, Wilimzig C, Stude P, Pleger B, Kalisch T, Maier C, Peters SA, Nicolas V, Tegenthoff M, Dinse H. Immobilization impairs tactile perception and shrinks somatosensory cortical maps Current Biology. 2009; 19: 837–842, doi 10.1016/j.cub.2009.03.065.*
2. *Burianová H, Sowman PF, Marstaller L, Rich AN, Williams MA, Savage G, Al-Janabi, de Lissa P, Johnson BW. Adaptive motor imagery: A multimodal study of immobilization-induced brain plasticity. Cerebral Cortex. 2016; 26: 1072–1080.*
3. *Gandolaa M, Zapparolib L, Saettac G, De Santisb A, Zerbib A, Banfib G, Sansoneb V, Brunob M, Paulesub E. Thumbs up: Imagined hand movements counteract the adverse effects of post-surgical hand immobilization. Clinical, behavioral, and fMRI longitudinal observations. NeuroImage: Clinical. 2019; 23: 101838. doi: 10.1016/j.nicl.2019.101838*
4. *Bassolino M, Campanella M, Bove M, Pozzo T, Fadiga L. Training the motor cortex by observing the actions of others during immobilization. Cereb Cortex. 2014; 24(12): 3268–3276.*
5. *Fredrickson B. Positivity. 2009. Crown: New York.*
6. *Che Daud AZ, Yau MK, Barnett F, Judd J, Jones RE, Muhammad Nawawi RF. Integration of occupation based intervention in hand injury rehabilitation: A randomized controlled trial. J Hand Ther. 2016; 29(1): 30-40.*
7. *Lee M, Gandevia SC, Carroll TJ. Unilateral strength training increases voluntary activation of the opposite untrained limb. Clin Neurophysiol. 2009; 120: 802-808.*
8. *Karagiannopoulos C, Michlovitz S. Rehabilitation strategies for wrist sensorimotor control impairment: From theory to practice. J Hand Ther. 2016; 29: 154-165.*

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