

BASIC INVESTIGATIONAL ASPECTS OF HEMISPHERIC CONTROL OVER MOTOR FUNCTION:

In this article we examine Hemisphericity, or a decrease in cortical function a brain hemisphere and its relationship to motor output. Hemispheric decreases often have a relationship to the opposite cerebellum thru a process of diachiasis. Diaschisis in neurology signifies reduction in function of a part of the brain following the interruption at a remote site of an afferent pathway which normally supplies background excitation to the neurons in that part, thus keeping them in a state of low activity. By identifying the side of hemisphericity important significance to the side of cerebellar stimulation is present.

In one case, a subject was examined with manual muscle testing pre - and post - treatment with two cerebellar excitatory modalities – joint mechano-stimulation and eye activity which are known to affect the pontomedullary activity. As anticipated, function improved as a result of stimulation of areas of the brain that are not routinely being activated in this individual. Results have important implications for manual medicine and evaluation of unilateral weakness on neurological exam.

Hemispheric control over motor function is important in the clinical practice of manual medicine. Aberrances in muscle function are likely to lead to improper joint function.

Alterations in cerebellar stimulation or inequality, fosters a cerebellar cortical dischiasis (weakness or lack of proper nerve function) to the contralateral hemisphere thru the thalamus for motor and sensory integration. The output of each individual hemisphere will fire to the pontomedullary reticular formation for activation on the ipsilateral side. This activation will drive several functions, one of which being excitation of alpha and gamma motor neurons in a distribution pattern, anterior muscles above thoracic level 6 and posterior muscles below thoracic level 6. For this purpose, the posterior muscle wrist extensor is utilized.

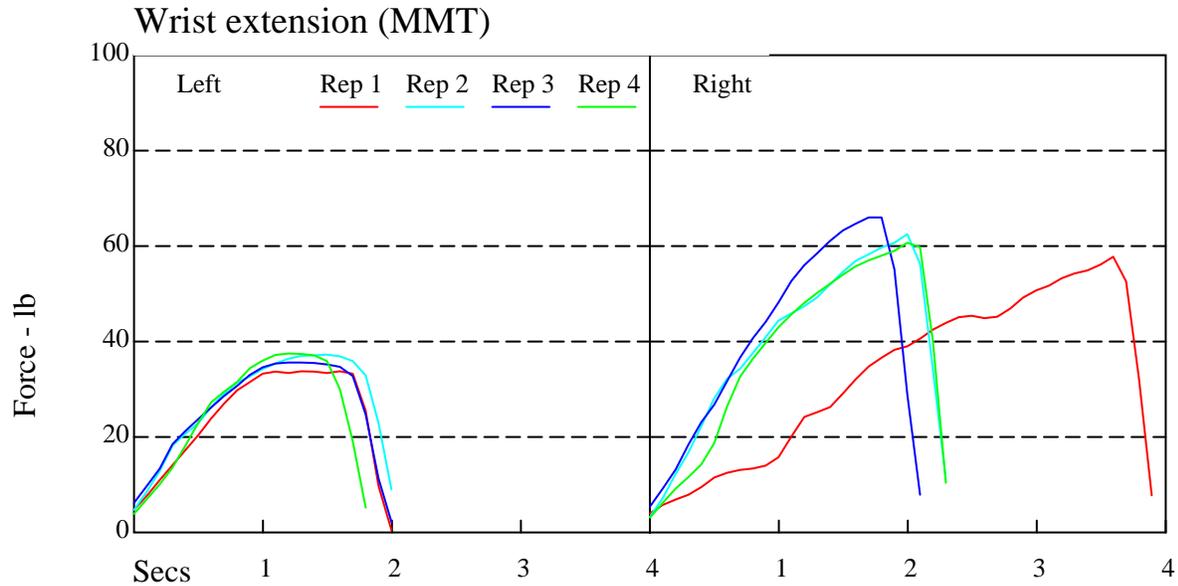
This paper demonstrates the idea that shuttling neuronal information to the deficient hemisphere with joint stimulation and eye activity will have an effect on the motor output.

Muscle Tests

The patient was tested using the JTECH Tracker system, a computerized muscle strength evaluation system. When compared to the opposite side, greater than 15% strength difference is generally recognized as an indication of motor deficit.

Manual Muscle Test (Extremity)	Left Max	Right Max	% Diff
Wrist extension	38 lb	66 lb	42 %

A Coefficient of Variation (CV) and/or difference between successive reps of 14% or less indicates validity, reproducibility, and consistency of effort (Chaffin, 1976). 4 of 4 tests performed met the validity criteria.



Pre-testing evaluation revealed a left “hemisphericity” or an overall decrease in integration on the left side as compared to the right hemisphere.

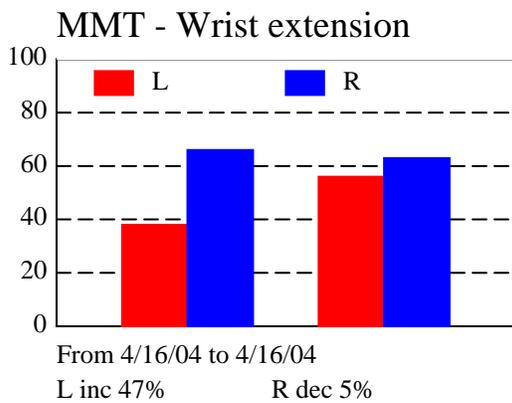
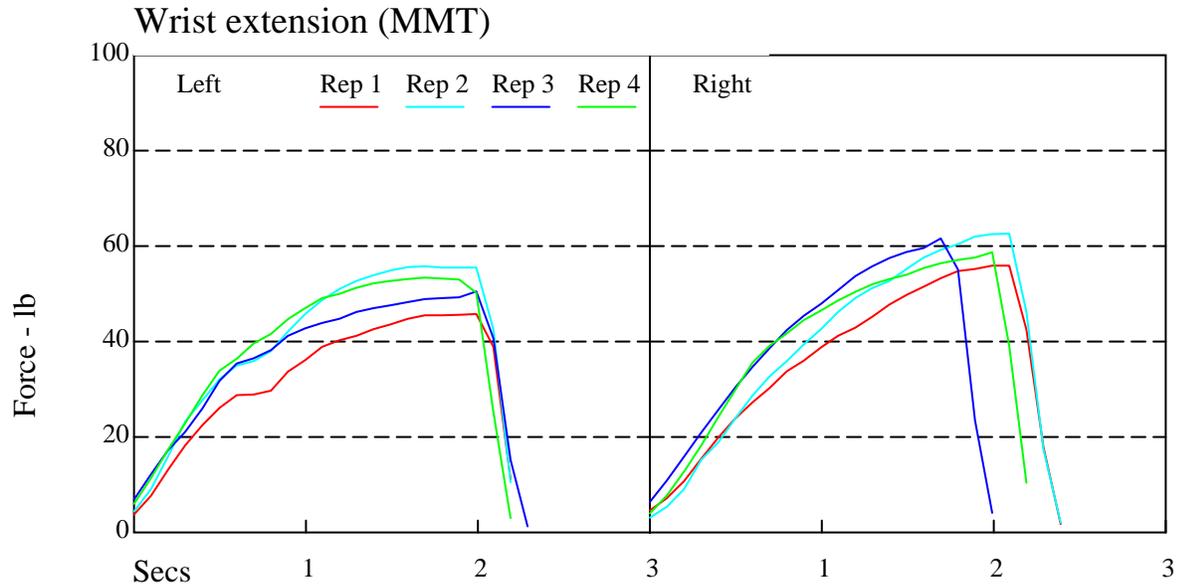
Interventional methods:

1. Optikokinetic activity in a leftward direction 10 passes revealed a depression of the re-fixation saccades.
2. Axial ballistic distraction of the upper extremity digits first thru fifth.

Immediate post testing results following:

Manual Muscle Test (Extremity)	Left Max	Right Max	% Diff
Wrist extension	56 lb	63 lb	11 %

A Coefficient of Variation (CV) and/or difference between successive reps of 14% or less indicates validity, reproducibility, and consistency of effort (Chaffin, 1976). 4 of 4 tests performed met the validity criteria.



Summary

The difference between pre-treatment testing 42% and post testing 11% difference is considered significant in comparison to routine testing without treatment. This speaks to the importance of the hemispheric approach in evaluating muscle weakness in individuals with presumed radicular or neuromuscular deficits. Treatment guidelines or modalities being applied should take into account the cortical influence on motor output.