

Muscle Testing

Muscle testing usually refers to testing muscle strength as opposed to muscle length (i.e., shortened or overfacilitated muscles). Muscle testing is primarily performed to evaluate the possibility of significant pathology such as nerve damage or rupture of a muscle or tendon. Some chiropractic techniques (e.g., applied kinesiology) purport that muscle testing may be used to indicate the location of spinal subluxations and visceral or allergic problems. This type of muscle testing is very controversial and beyond the scope of this document.

Grading a Muscle Examination¹

5	Normal	Complete range of motion (ROM) against gravity with full resistance.
4	Good*	Complete ROM against gravity with some resistance (reduced fine movements and motor control). ²
3	Fair*	Complete ROM against gravity but with no resistance.
2	Poor*	Complete ROM with gravity eliminated.
1	Trace	Evidence of slight contractility. No joint motion or inability to achieve complete ROM with gravity eliminated.
0	Zero	No evidence of contractility.

*Muscle spasm or contracture may limit range of motion. Place a question mark after grading a movement that is incomplete from this cause.

Interpreting Grades

Muscles grades should be recorded as follows: 0/5, 1/5, 2/5, 3/5, 4/5, or 5/5. The only firm convention is that 0/5 signifies complete paralysis and 5/5 is interpreted as being within normal limits.

- Generally, **5/5** indicates normal muscle function. The muscle feels as if it “locks” into place with essentially no give.
- A **4/5** indicates that the muscle resists but has some “give,” similar to pushing

a beach ball into the water. This score suggests mild paresis which may or may not be of clinical significance. It would be of clinical significance in a patient with radicular symptoms and would not be in a patient with little likelihood of nerve or muscle damage.

- A score **3/5** is considered moderate paresis and is considered to be a pathological grade.
- A score of **2/5** indicates moderate to severe paresis (e.g., foot drop).
- A score of **1/5** signifies severe paresis (just a twitch of movement).³

- A score of **0/5** signifies complete paralysis.

Muscles that test weak—3/5 or below—without pain suggest either neurological damage or a complete rupture of the muscle or tendon. If muscle testing produces both weakness and pain, consider either a strained muscle or tendon or the possibility that your testing procedure is stretching an irritated nerve or compressing an inflamed joint. Occasionally, muscle weakness may be associated with sensory impairment, loss of position sense, cerebellar deficits, or simple disuse atrophy.

If the weakness is due to neurological involvement, decide if there is a pattern suggesting peripheral nerve, nerve root, or CNS lesion.

Note: Muscles may be inhibited, resulting in a slow contraction speed, and still test 5/5 with manual muscle testing.

Procedure

For screening purposes, the muscle is usually tested in its mid-range position. Specific muscle testing is performed with the muscle in a shortened position, approximating origin and insertion as closely as possible.

If possible, position and test the patient in a way that does not cause joint pain or nerve stretch. For example, when testing the ankle muscles on a patient with sciatica, it may be necessary to have the knee slightly flexed on the symptomatic side to reduce traction pain.

It is very important to adequately test the patient's strength. Without injuring the patient, exert a slowly increasing amount of force. Do this only to the point at which you begin to defeat the patient's effort; then hold for about 1 second.

Origin and insertion should be properly aligned with the resistance or vector of force applied in a straight line with the muscle fibers. Without attention to these details, the results will be erroneous. Common errors are to use too little testing force (especially in the lower extremities), testing the muscle too rapidly, lack of proper stabilization, or allowing the patient to recruit other muscles

Don't do more than one or two muscles on one side before comparing them with the opposite side so that the feeling of that strength is fresh in your mind.

The upper extremities can be evaluated for "drift." With eyes closed, the patient raises both arms to the front, palms up. Pronation and lateral (outward) drifting of one extremity may indicate a unilateral lesion of an upper motor neuron. In cerebellar disease, the ipsilateral extremity drifts laterally.

Although less commonly done, there is evidence that the following method may increase the inter-examiner reliability of muscle testing. The patient initiates the contraction by pushing against the clinician as hard as possible. The tester then applies additional force, rather than the patient merely resisting.⁴

Reliability and Validity

In one study the inter-examiner reliability on exact grade ranged from 48-75%; intra-examiner reliability was 54-65%. Allowing for a difference of one grade, inter-examiner reliability was 90-95% and intra-examiner reliability was 96-98%.⁵ However, accuracy of the muscle tests when compared to mechanized isokinetic testing has been generally disappointing with poor validity. Even discriminating a 25% difference in strength comparing left to right is very difficult.⁶

Strategies

1. In cases with a high index of suspicion for nerve damage, if key muscles test strong, try sustained (5 seconds) or repetitive (X10) muscle testing. Be sure to record findings properly (e.g, "3/5 at 3 secs or 2/5 at 7X").

2. Remember that it is critical to monitor for progressive muscle weakness in neurologic cases.

3. In cases with a high index of suspicion for muscle or tendon damage, if the key muscle tests strong, consider the following options:

- a) sustained testing (5 seconds),
- b) repetitive testing (X10),
- c) testing isometrically at multi-angles throughout the range,
- d) continuously during a full range concentric or eccentric contraction
- e) throughout a range of motion that mimics an activity that the patient associates with their problem (this may be a diagonal range).

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