

MANUAL MUSCLE TESTING PROCEDURES

For MMT8 TESTING

June 18, 2007

Muscle Groups in the MMT8 and Positions to Test:

Muscle Groups	Anti-Gravity Position	Gravity-Eliminated Position
Deltoid	Sitting	Supine
Biceps	Sitting	Sitting/Sidelying
Wrist extensors	Sitting	Neutral
Quadriceps	Sitting	Sidelying
Ankle dorsiflexors	Sitting	Sidelying
Neck flexors	Supine	Sidelying
Gluteus medius	Sidelying	Supine
Gluteus maximus	Prone	Sidelying

DELTOID

Position of Patient: With the patient sitting the elbow should be flexed to indicate the neutral position of rotation.

Position of Therapist: The therapist should stand at test side of patient. Place pressure against the dorsal surface of the distal end of the humerus.

Test: The patient is to maintain the arm in abduction against gravity.

Sample Instructions to Patient: "I am going to push down and I want you to resist me. Keep your arm up as I push down."



DELTOID: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: With patient supine the arm is abducted to 90° but is supported on table with elbow slightly flexed.

Position of Therapist: The therapist should stand at testing side of patient. Place pressure against the dorsal surface of the distal end of the humerus if the elbow is flexed, or against the forearm if the elbow is extended.

Test: Patient attempts to abduct shoulder by sliding arm on table without rotating at the shoulder.

Sample Instructions to Patient: “Move your arm out to the side.” Here, in testing shoulder abduction, the patient will be positioned in supine to perform the test in the horizontal plane. The tester will support the arm to minimize the friction between the arm and the testing surface, and provide stabilization at the upper trapezius if needed, and instruct the patient to fully abduct the arm.



BICEPS

Position of Patient: With the patient sitting the elbow is flexed at a right angle, with forearm in supination.

Position of Therapist: The therapist should stand in front of and at testing side of patient. The hand giving resistance is contoured over the flexor surface of the forearm just proximal to the wrist. The other hand is applied to the humerus to provide a counterforce.

Test: Patient flexes elbow against your applied force. If the biceps/brachialis are weak the patient will pronate the forearm before flexing the elbow.

Sample Instructions to Patient: “Bend your elbow, hold it. Don’t let me pull it down.”



BICEPS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: With patient sitting with 90° shoulder abduction or sidelying the elbow is fully extended.

Position of Therapist: The therapist should stand at test side of patient and support abducted arm under the elbow and wrist if necessary.

Test: Patient attempts to bend the elbow with the hand supinated.

Sample Instructions to Patient: “Bend your elbow...”



Seated positioning (left) and sidelying position (right). The sidelying position may be preferred for subjects with limited range at the shoulder.

WRIST EXTENSORS

Position of Patient: With the patient sitting with the elbow and forearm supported and forearm is in full pronation with the fingers flexed.

Position of Therapist: The therapist should stand or sit at a diagonal in front of the patient.

Test: Support the patients forearm under the wrist while the other hand used for resistance is placed over the dorsal surface of the metacarpals. Do not permit full extension of the fingers.

Sample Instructions to Patient: “Bring your wrist up, hold it. Don’t let me push it down.”



WRIST EXTENSORS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: With the patient sitting, the elbow and forearm are supported and the forearm is in neutral position.

Position of Therapist: The therapist should stand or sit at a diagonal in front of the patient.

Test: Support the patient's wrist. This elevates the hand from the table and removes friction. The patient extends the wrist.

Sample Instructions to Patient: "Bend your wrist back."



QUADRICEPS

Position of Patient: With the patient sitting with the trunk approximately perpendicular to the floor, the leg is extended – but not locked – in extension at the knee. Trunk extension is allowed only if significant hamstring tightness precludes assuming the recommended testing position.

Position of Therapist: The therapist stands at the side of the tested limb and the testing hand is placed over anterior surface of distal leg just above the ankle. The other hand is placed under the distal thigh.

Test: The patient extends the knee through available range of motion but do not allow knee to "lock" into extension during the test.

Sample Instructions to Patient: "Straighten your knee and hold it, don't let me bend it."



Knee extension: standard positioning options using the forearm of the tester (left) or a rolled towel (right) to provide a fulcrum during testing.

QUADRICEPS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: Sidelying with test limb superior to the supporting limb. Lower limb can be flexed for stability. Hold test limb in about 90° of knee flexion with the hip in full extension.

Position of Therapist: The therapist stands behind patient at knee level. One arm cradles test limb around thigh with hand supporting underside of knee. The other hand holds leg above the ankle.

Test: The patient extends the knee through range of motion and the therapist neither assists nor resists the patient's voluntary movement.

Sample Instructions to Patient: "Straighten your leg."



ANKLE DORSIFLEXORS

Position of Patient: With the patient sitting, the knee is flexed at 90°.

Position of Therapist: The therapist sits in front of testing limb and supports the leg just above the posterior aspect of the ankle joint.

Test: The patient dorsiflexes the ankle joint foot without extending the great toe. Pressure is applied on the dorsum of the foot (in the direction of plantar flexion and eversion).

Sample Instructions to Patient: "Pull your foot up to the ceiling."



Ankle dorsiflexion: standard positioning in the frontal plane (left) and the sagittal plane (right).

ANKLE DORSIFLEXORS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: Sidelying with test limb superior to the supporting limb. Lower limb can be flexed for stability. Hold test limb in terminal knee extension with the hip in full extension.

Position of Therapist: The therapist stands near the subject's feet. The supporting arm supports the test limb just proximal to the malleoli.

Test: The patient moves the foot from plantarflexion to dorsiflexion; the therapist neither assists nor resists the patient's voluntary movement.

Sample Instructions to Patient: "Keep your hip and knee their current position, and move your foot towards your head."

NECK FLEXORS

Position of Patient: With the patient supine and the arms at their side, the head is supported on a table.

Position of Therapist: The therapist stands next to the patient's head and the testing hand is placed on the patient's forehead.

Test: The patient lifts their head off the table by flexing the neck and tucking the chin. The tester applies resistance at the forehead in the direction of capital and cervical extension and may position a hand underneath the subject's head for protection, or offer additional stabilization across the abdomen (if needed).

Sample Instructions to Patient: "Lift your head from the table. Do not lift your shoulders and don't let me push down."



NECK FLEXORS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: With the patient in sidelying and the head supported on the table while the arms remain at their side.

Position of Therapist: The tester will support the head to prevent cervical sidebending, provide stabilization at the anterior shoulder as needed.

Test: Instruct the patient to flex their head and neck.

Sample Instructions to Patient: “Flex your head towards your chest.”



GLUTEUS MEDIUS

Position of Patient: With the patient sidelying, the test leg is superior to the supporting leg. The test limb is slightly extended beyond midline and pelvis is rotated slightly forward. The supporting leg is flexed for stability.

Position of Therapist: The therapist stands behind patient and test hand is placed on lateral surface of knee or at the ankle and the other hand is just proximal to greater trochanter of femur.

Test: The patient abducts against the applied resistance without flexing or rotating the hip in either direction. Resistance by examiner is straight and downward.

Sample Instructions to Patient: “I am going to push down on your leg and I want you to resist me.”



GLUTEUS MEDIUS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: Supine

Position of Therapist: The therapist stands on the side of the tested limb. One hand supports and lifts the limb by holding it under the ankle. No resistance or assistance is offered.

Test: The patient abducts the hip through available range of motion.

Sample Instructions to Patient: “Bring your leg out to the side. Keep your kneecap pointed at the ceiling.”



GLUTEUS MAXIMUS

Position of Patient: With the patient prone the knee is flexed to 90°.

Position of Therapist: The therapist stands on the side to be tested and the testing hand is placed over the posterior thigh just above the knee. The other hand may stabilize the pelvis at the upper buttocks.

Test: The patient extends the hip through the available range of motion maintaining knee flexion at 90°. Resistance is applied directly downward toward the floor.

Sample Instructions to Patient: “Lift your leg towards the ceiling and keep your knee bent.”



Hip extension: standard position (left), adaptation 1 (center) to accommodate for limited lumbar spine motion or hip flexor contracture, and adaptation 2 (right) in standing. Adaptation 2 may be selected if prone positioning cannot be achieved. However, it should be used rarely since people with myositis often have diminished knee and hip extensor strength and may be unstable in single limb stance.*

GLUTEUS MAXIMUS: Gravity-Eliminated Position (for weaker patients only)

Position of Patient: With the patient sidelying and the testing limb superior to the supporting limb, the knee is flexed and supported by the examiner. The supporting limb is flexed for stability.

Position of Therapist: The therapist stands behind the patient and cradles the testing limb with forearm and hand under the flexed knee. The other hand is on the pelvis to maintain alignment. (*Picture depicts therapist in front of the subject to keep the limb unobscured.)

Test: The patient extends hip with the supported knee remaining flexed.

Sample Instructions to Patient: “Move your leg toward me.”



Hip extension: standard positioning for weaker subjects – beginning phase in hip flexion (left), and terminal phase in hip extension (right). Note that the terminal hip extension phase is limited to hip motion and does not incorporate extension of the lumbar spine.

KEY

MMT- 8 is a set of 8 designated muscles tested unilaterally (potential score 0-70) or bilaterally (potential score 0-140). Axial (neck flexors) testing is included, so that potential MMT8 score = 80 or 150

Muscle Groups	Right (0 – 10)	Left (0 – 10)	Axial (0 – 10)
<i>Axial Muscles (0 – 10)</i>			
Neck flexors	X	X	0-10
<i>Proximal Muscles (0 – 100)</i>			
Deltoid	0-10	0-10	X
Biceps	0-10	0-10	X
Gluteus maximus	0-10	0-10	X
Gluteus medius	0-10	0-10	X
Quadriceps	0-10	0-10	X
<i>Distal Muscles (0 – 40)</i>			
Wrist extensors	0-10	0-10	X
Ankle dorsiflexors	0-10	0-10	X
MMT- 8 score (0 – 150)	0-70	0-70	0-10
Muscle Groups	Right (0 – 10)	Left (0 – 10)	Axial (0 – 10)

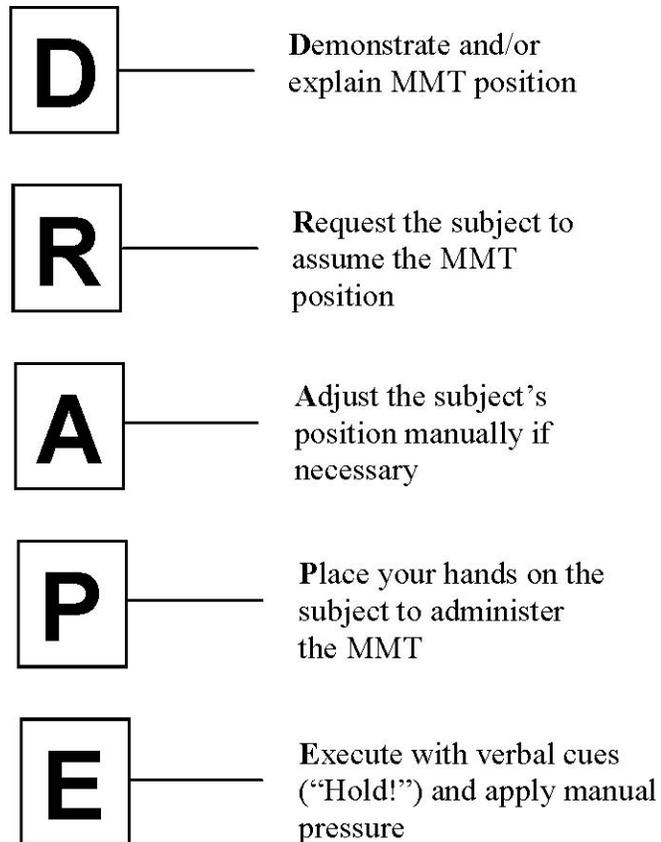
Key to Muscle Grading

	Function of the Muscle	Grade		
No Movement	No contractions felt in the muscle	0	0	Zero
	Tendon becomes prominent or feeble contraction felt in the muscle, but no visible movement of the part	T	1	Trace
Test Movement	MOVEMENT IN HORIZONTAL PLANE			
	Moves through partial range of motion	1	2-	Poor-
	Moves through complete range of motion	2	2	Poor
	ANTIGRAVITY POSITION			
	Moves through partial range of motion	3	2+	
Test Position	<i>Gradual</i> release from test position	4	3-	Fair-
	Holds test position (no added pressure)	5	3	Fair
	Holds test position against slight pressure	6	3+	Fair+
	Holds test position against slight to moderate pressure	7	4-	Good-
	Holds test position against moderate pressure	8	4	Good
	Holds test position against moderate to strong pressure	9	4+	Good+
	Holds test position against strong pressure	10	5	Normal

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**ADULT POLYMYOSITIS AND DERMATOMYOSITIS:
STANDARDIZATION OF MMT8 COMMANDS AND PROCEDURE.**

The following mnemonic device may be used to help standardize the procedure and commands for manual muscle testing in adult patients:



JUVENILE MYOSITIS: STANDARDIZATION OF MMT8 COMMANDS.

The following are suggested commands for manual muscle testing in pediatric patients. Variation in the text is acceptable, but the concepts are intended to be uniform between patients. The instructions would be different for gravity-eliminated testing: I'm going to see how strong you are. When I tell you hold and don't let me push you, you try really, really hard not to let me move you. You need to be strong like a tree or a power ranger (use these examples to motivate the child).

- 1. Deltoid middle:** Hold your arm up in the air like this (demonstrate), and I'm going to push down here and you hold it. Don't let me push it down, hold it up there as hard as you can.
- 2. Biceps brachii:** Bend your elbow, now don't let me pull your arm down. Hold it hard and don't let me pull it out.
- 3. Wrist extensors:** Bring your hand back like this (demonstrate) and hold it while I try to straighten it out. Don't let me straighten your hand. Be strong.
- 4. Quadriceps:** (Sitting) Kick your leg out so it is straight. Now hold it straight while I try to bend your knee. Be strong and keep it straight.
- 5. Ankle dorsiflexors:** Bring your foot up like this (demonstrate), now hold it while I try to push it down. Don't let me push it down.
- 6. Neck flexors:** (Supine) Bring your head up off the table, now hold it up there. Now hold it up there while I try to push it down and don't let me push it. Hold it as hard as you can.
- 7. Gluteus medius:** Can you lie on your side? Now can you lift your leg up in the air? Make sure you keep your knee straight. Now hold it up there while I try to push your leg. Hold it hard and be strong.
- 8. Gluteus maximus:** Lie on your belly, and bend your knee. Now try to lift your whole leg up in the air (demonstrate passively). Hold it there, while I try to push down and don't let me push it down. Hold it hard.

Preferred Testing Order of MMT8 Muscle Groups.

This table provides a preferred order to the testing of muscle groups for manual muscle testing. Generally, for bilateral muscle testing, each muscle group is first tested on the right and then the left, prior to proceeding to the next muscle group in the list. Some muscle groups are listed here with anti-gravity testing, but for a weaker patient, these would be tested in a sidelying or supine position, per the table below (Testing Positions); the re-test for a weaker patient is indicated in gray scale.

Abbreviations: G.E., gravity eliminated.

POSITION	ORDER OF TESTING
SITTING	
Deltoid middle (shoulder abductors)	1
Biceps brachii (elbow flexors)	2
Wrist extensors (extensor carpi ulnaris/radialis)	3
Quadriceps femoris (knee extensors)	4
Ankle dorsiflexors (tibialis anterior)	5
SUPINE	
Neck flexors (scalenes, sternocleidomastoid)	6
Deltoid middle (<i>G.E. test if needed</i>)	-
Gluteus medius (<i>G.E. test if needed</i>)	-
SIDELYING (lying on left side-right muscles tested)	
Gluteus medius (hip abductors)	7
Gluteus maximus (<i>G.E. test if needed</i>)	-
Biceps brachii (<i>G.E. test if needed</i>)	-
Neck flexors (<i>G.E. test if needed</i>)	-
PRONE	
Gluteus maximus (hip extensors)	8

TESTING POSITIONS

Muscle Groups	Anti-Gravity	Gravity Eliminated
Deltoid middle (shoulder abductors)	Sitting	Supine
Biceps brachii (elbow flexors)	Sitting	Sidelying
Wrist extensors	Sitting (pronation)	Sitting (neutral)
Quadriceps femoris (knee extensors)	Sitting	Sidelying
Ankle dorsiflexors	Sitting	Sidelying
Neck flexors	Supine	Sidelying
Gluteus medius (hip abductors)	Sidelying	Supine
Gluteus maximus (hip extensors)	Prone	Sidelying

MMT Considerations to Promote Reliability

POSITION	ORDER OF TESTING
SITTING	
Deltoid middle (shoulder abductors)	1
Biceps brachii (elbow flexors)	2
Wrist extensors (extensor carpi ulnaris/radialis)	3
Quadriceps femoris (knee extensors)	4
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Neck flexors (scalenes, sternocleidomastoid)	6
Deltoid middle (<i>G.E. test if needed</i>)	-
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Gluteus medius (hip abductors)	7
Gluteus maximus (<i>G.E. test if needed</i>)	-
Biceps brachii (<i>G.E. test if needed</i>)	-
Neck flexors (<i>G.E. test if needed</i>)	-
PRONE	
Gluteus maximus (hip extensors)	8

	Comments
MMT Grades (0 – 10 scale)	
0 – T	Palpation skill may confound the distinction between the “0” and “T” grades for some clinicians.
1 – 2	Adjust range of motion criterion to accommodate for muscle strength differences.
3	This grade can only be assigned to muscles tested in the standing position.

MMT8 Scoring Sheet

Subject name/ID _____

Assessor _____

Date of assessment (mm/dd/yy) _____

Assessment number _____

POSITION	ORDER OF TESTING
SITTING	
Deltoid middle (shoulder abductors)	1
Biceps brachii (elbow flexors)	2
Wrist extensors (extensor carpi ulnaris/radialis)	3
Quadriceps femoris (knee extensors)	4
Ankle dorsiflexors (tibialis anterior)	5
SUPINE	
Neck flexors (scalenes, sternocleidomastoid)	6
Deltoid middle (<i>G.E. test if needed</i>)	-
Gluteus medius (<i>G.E. test if needed</i>)	-
SIDELYING (lying on left side-right muscles tested)	
Gluteus medius (hip abductors)	7
Gluteus maximus (<i>G.E. test if needed</i>)	-
Biceps brachii (<i>G.E. test if needed</i>)	-
Neck flexors (<i>G.E. test if needed</i>)	-
PRONE	
Gluteus maximus (hip extensors)	8

****MMT8** is a set of 8 designated muscles tested unilaterally (potential score 0 – 80); test on right side (use left side if right side cannot be tested).