

STUDY OF OSTEOPOROTIC FRACTURES (V2)

Reaction and Movement Time Protocol

1. Introduction:

This test measures the speed of reactions and the speed of movement of the hands and feet. These speeds might be related to the risk of falling and, in particular, the risk of fractures when a fall occurs. Testing will be performed for the hand and foot on the dominant side, or if ambidextrous, on the right side. We will measure both **response time** (time to release key after stimulus is presented) and **total movement time** (time to hit second key after stimulus is presented).

2. Equipment:

A two-clock response and movement time device (Manufacturer: Lafayette Instrument Co.) modified with 2 1/2" x 3 1/2" switch pads for hand and foot targets and an enlarged light stimulus. The device measures response and movement times of the hand and foot. The unit allows a variable 1-10 second delay period between the ready cue and initiation of the stimulus light.

The switch pads (and metal plates) can be mounted side by side on a flat piece of plywood or plexiglass. The inside edges of the switch pads should be exactly 8 1/2 inches apart. Connect the pads to the control box so that when the start selector is on "right", depressing the left pad activates the "ready" light on the control box, and vice versa. When testing the right side, the subject starts with the hand or foot on the left pad and moves it to hit the right pad. When testing the left side, this is reversed.

The response time is the time from when stimulus light comes on until the subject lifts her hand from the first pad. The total movement time is the time from when the stimulus light comes on until the subject presses down on the second pad. Total movement time is always greater than the response time since it includes response time plus the time to reach over and press the other pad.

The stimulus light unit should be placed on the table top 10 inches from the front edge of the table. For hand testing, the mounted switch pads should be placed on the table top in front of the light unit, with the stimulus light centered between the switch pads. For foot testing, the switch pads should be placed on the floor and the stimulus light (still on the table) similarly centered. Be sure the floor area is well-lighted. The back edge of the pads (not the mounting plate) should be about 4 inches from the edge of the table.

3. Subject Preparation:

For hand testing, the participant should be seated comfortably at a table, positioned so that her shoulder is centered between the two switch pads. Loose sleeves and loose pants cuffs which might interfere with the measurement should be rolled up. For foot testing, the participant should scoot back from the table, sitting so that she can easily reach both pads with her foot. The knee of the foot being tested should be centered between the two pads. Foot testing is done in stocking feet or padded hospital slippers.

"Now we are going to test the speed of your reactions. We do this by testing how quickly you can lift your hand from one pad (*point to pads*) after the light goes on (*point to light*), and move the hand to press down the other pad."

4. Measurement procedure:

A. DETERMINE WHICH SIDE TO TEST

a) Test on the dominant side, unless:

i) subject is ambidextrous, then test the right side;

ii) subject has had a mastectomy, stroke, or injury that has left one hand or leg weaker or clumsier than the other, then test less affected side;

iii) subject has had a limb amputated, or limb is in a cast or otherwise can't be tested, then test the other side.

b) Test the hand and foot on the same side, unless the subject has had a stroke, injuries, cast, or amputation affecting opposing hands and feet, then test the unaffected hand and the opposing unaffected foot.

c) Select the side to test with the "Start" selector. Record which side is tested.

d) The limb movement should always be from the "inside to the outside". For example, when testing the right limb the left pad is depressed at the beginning of the trial and the limb is moved to the right pad to end the trial.

B TEST THE HAND

a) Have the participant sit with both hands resting on the table top and elbow bent. Ask her to touch each of the switch pads with all four fingers.

"First let's test your hand. Put your [*right/left*] hand on this pad (*point to pad*) and press down and hold it down. After I say 'Ready!', a few seconds will pass and then the light here (*point to light*) will go on. Keep your eyes on the light. As soon as it goes on, lift your hand and then hit the other pad. Do it as quickly as possible. Let me show you how it is done."

b) Set the cue delay to 3 seconds. Demonstrate one time.

"Now I would like you to practice this one time."

Repeat the practice trial until the participant does it correctly once. If necessary, hold her hand and move it from pad to pad.

c) Test the hand.

"Now we are going to do the test. We will do it ten times."

Set the cue delay as indicated on the form. When the participant is settled and looking at the light box, say:

"OK, press the pedal and hold it down. Watch the light. Ready! "

When the subject is correctly pressing down on the first pad, the green "ready" light on the console will be lit. When the participant is ready, press the "Initiate" switch. Repeat this ten times, saying "Ready!" each time. Record all the measurements of response and total movement time to 1/1000 of a second. Reset the cue delay before each trial, as indicated on the form.

B. TEST THE FOOT:

a) Have the subject sit with the foot to be tested resting between the two switch pads, making sure that she can easily touch each pad and that her line of vision to the pads is not obscured by her knee or clothing

"Now let's test your foot. Put your [*right/left*] foot on the pad and press down and hold it down. We will measure how quickly you can lift your foot after this light goes on, and how quickly you can then move your foot to press the other pad (*point to the pad*)."

"Just as for the hand tests, keep your eyes on the light. As soon as it goes on, lift your foot and then hit the other pad. Do it as quickly as possible."

b) Have the participant practice one time. Repeat the practice trial until the participant does it correctly once.

c) Test the foot.

"Now we'll do the test ten times."

Set the delay. When the participant is settled and looking at the light, say:

"OK, Watch the light. Ready!"

When the participant is ready, press the "Initiate" switch. Repeat this ten times, saying "Ready!" each time. Record the measurements of response and total movement times to 1/1000 of a second. Be sure to reset the cue delay before each trial, as indicated on the form.

C. SPECIAL CIRCUMSTANCES

- a) Subjects with painful arthritis of the hand may use their fist to depress the pads.
- b) Subjects who cannot comprehend the procedure are scored as "Unable".
- c) It may sometimes help to move the subject's hand when demonstrating.
- d) If the subject misses the switch pad entirely on a trial, repeat the trial.

5. Settings for Cue Delay

	<u>Trial #</u>	<u>Set delay to:</u>
HAND	1	5 seconds
	2	3 seconds
	3	3 seconds
	4	4 seconds
	5	2 seconds
	6	5 seconds
	7	2 seconds
	8	1 second
	9	1 second
	10	4 seconds
FOOT	1	5 seconds
	2	4 seconds
	3	2 seconds
	4	2 seconds
	5	1 second
	6	4 seconds
	7	1 second
	8	3 seconds
	9	5 seconds
	10	3 seconds