Operation Manual

Touch Test™ Sensory Evaluators

Semmes Weinstein Von Frey Aesthesiometers

Catalog Number 58011

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STOELTING CO.
620 Wheat Lane, Wood Dale, IL 60191
Phone: (630) 860-9700 FAX: (630) 860-9775
E-Mail: Physiology@stoeltingco.com
URL: http://www.stoeltingco.com/physio

The Touch- Test™ Sensory Evaluators (Semmes-Weinstein Monofilaments) provide a non-invasive evaluation of cutaneous sensation levels throughout the body with results that are objective and repeatable. Using Touch-Test™ Sensory Evaluators is indicated in diagnoses including nerve compression syndromes, peripheral neuropathy, thermal injuries and postoperative nerve repair. Each Touch-Test™ Sensory Evaluator is individually calibrated to deliver its targeted force within a 5% standard deviation.

INSTRUCTIONS: These instructions are written for threshold testing with individual Touch-Test™ Sensory Evaluators, and for comparative testing and color mapping with the Touch-Test™ 20 Piece Kit. Color mapping enables progression or regression of sensory neuropathies to be documented. When worsened sensibility is detected, proper intervention can be implanted. Conversely, improved sensibility would indicate effective treatment intervention.

I. Rest the patient's extremity on a stable, padded surface. Testing should be done in a quiet area to help the patient fully attend to the testing procedure. Occlude the patient's vision by using a shield or by having the patient look away.

II. Explain the testing procedure to the patient and instruct the patient to respond when the stimulus is felt by saying, "touch" or "yes". Nonverbal patients may tap the table lightly when the stimulus is felt.

III. Note any areas of callus, abrasion, scarring or other blemishes by drawing on the recording form (Hand Screening Form NC12750-1 or Foot Screening Form NC12749). While testing, proceed from distal to proximal and from small to large monofilaments.

IV. It is not necessary to test every area of the skin when performing an evaluation. Checks can be done over areas innervated by different nerves. **For the hand**, test the palmar surface of the index finger and thumb to evaluate median nerve function: test the little finger and hypothenar eminence to evaluate the ulnar nerve; and test the dorsum of the hand to evaluate the radial nerve. **For the foot**, test the sites indicated in Figure 2.

V. Press the filament at a 90º angle against the skin until it bows. Hold in place for 1.5 seconds and then remove. For monofilaments from 1.65 to 4.08 apply the stimulus in the same location up to three times to elicit a response. A single response indicates a positive response. For filaments 4.17 through 6.65, apply the stimulus one time only.

VI. To test with the Touch-Test™ 20 Piece Full Kit (58011), begin with the 2.83 filament. If the patient responds to the stimulus in all sites, normal cutaneous sensation can be documented and the examination is complete. If the patient does not respond to the stimulus, choose the next largest monofilament and repeat the process.

VII. When the patient indicates a response, record the result using a colored pencil that corresponds to the color on the handle of the Touch-Test™ Sensory Evaluator. When representing monofilaments of the same color, notate which monofilament size was used. Threshold levels indicated in Figure 5 can be used to interpret test results.

*If testing with the 5.07 only, follow instructions #1-#5. Then apply 5.07 to the test sites shown in Figure 2. Record results using a Y to indicate each site with sensation and **x** for lack of sensation.

Note: Touch-Test™ Sensory Evaluators are precision instruments. Care should be taken at all times to protect the integrity of the nylon filament. The filament may be cleaned with a mild instrument disinfectant. Substantially bent or kinked monofilament must not be used for testing and should be discarded.

Use of Touch Test™ Sensory Evaluator Kit for Animal Research

The enabling principle of the Von Frey hair methodology for assessing skin sensitivity to crude touch is that a hair (or a plastic monofilament) will exert an increasing pressure on the skin as it is pressed harder and harder, up to the point where it begins to bend. Pressure on the skin will then remain constant over a considerable range of bending. This physical fact allows applications of a reproducible force level, even though an imprecise hand manually applies the probes.

The force at which a monofilament bends is proportional to its diameter, and inversely proportional to its length.

The Semmes Weinstein series is a standardized set of hairs, all of constant length but varying in diameter. They are selected and labeled so as to give a linear scale of perceived intensity (a logarithmic scale of applied force).

The standard procedure for the Semmes Weinstein filaments as used in humans is to ask the subject to report if he has been touched, and to try filaments with forces below and leading up to the threshold of perception. Animals will not verbalize whether they have been lightly touched.

However, rodents and small animals have certain reflex reactions that can be used in place of a verbal report of sensation. The "**Paw Withdrawal Reflex**" is a useful one. If one of a rodent's limbs is suspended in air, and a filament of detectable presence is applied to the bottom of the foot, the paw will immediately withdraw. Inflammation of the paw will increase sensitivity, so that thinner diameter probes will elicit the withdrawal response.

Press some of the intermediate probes on the surface you would like to test, using control and experimental subjects. Observe if there is any consistent reflex response to this stimulation in either group. You will need a reliable animal response to light touch to use Von Frey probes in animals.

* Forces presented in Table below are derived from tests performed by manufacturer.

Figure 5--Touch -Test™ Sensory Evaluator						
Catalog Number	Evaluator Size	Target Force* gms	Target Force* milliNewtons	Color	Hand & Dorsal Foot Thresholds	Plantar Thresholds
58021	1.65	0.008	0.078	Green	Normal	Normal
58022	2.36	0.02	0.196			
58023	2.44	0.04	0.392			
58024	**2.83**	0.07	0.686			
58025	3.22	0.16	1.569	Blue	Diminished Light Touch	
58026	**3.61**	0.4	3.922			
58027	3.84	0.6	5.882	Purple	Diminished Protective Sensation	Diminished Light Touch
58028	4.08	1	9.804			
58029	4.17	1.4	13.725			
58030	**4.31**	2	19.608			
58031	**4.56**	4	39.216	Red	Loss of Protective Sensation	Diminished Protective Sensation
58032	4.74	6	58.824			
58033	4.93	8	78.431			
58034	**5.07**	10	98.039			Loss of Protective Sensation
58035	5.18	15	147.059			
58036	5.46	26	254.902			
58037	5.88	60	588.235			
58038	6.1	100	980.392			
58039	6.45	180	1764.706			
58040	**6.65**	300	2941.176		Deep Pressure Sensation Only	Deep Pressure Sensation Only
*Individually calibrated within a 5% standard deviation.						

Replacement filaments
(Stoelting numbers in the last column refer to individual filaments, in case you bend a filament and need to obtain a replacement filament).

Handle Marking	Force (g)	Hair diameter (mm)	Stoelting number
1.65	0.0045	0.064	58021
2.36	0.023	0.072	58022
2.44	0.0275	0.102	58023
2.83	0.068	0.127	58024
3.22	0.166	0.158	58025
3.61	0.407	0.178	58026
3.84	0.692	0.203	58027
4.08	1.202	0.229	58028
4.17	1.479	0.254	58029
4.31	2.041	0.305	58030
4.56	3.63	0.356	58031
4.74	5.495	0.381	58032
4.93	8.511	0.406	58033
5.07	11.749	0.432	58034
5.18	15.136	0.483	58035
5.46	28.84	0.559	58036
5.88	75.858	0.711	58037
6.1	125.892	0.813	58038
6.45	281.838	1.016	58039
6.65	446.683	1.143	58040

Handle markings in fact used to have “meaning”, where handle marking = Log_{10} of (10 x force in milligrams)

-OR-

Force in mg = [AntiLog_{10} 10 (marking)] / 10

And also, a rough estimate of force (usually given in milliNewtons):
A good approximation of conversion is 1 Newton /102 grams

(Traditionally, the Semmes Weinstein set has been used for many years, with results and clinical practice based on the numbers on the handles, which are a theoretical log scale of actual force; linear scale of perceived force. This works. The filaments detect neurological damage. However, for many reasons, the calculated and actual forces do not always agree. The filaments are not precise instruments for applying exact forces. They are not intended as such. Some researchers have insisted on publishing in Newtons of force applied (calculated or measured?). This gives a false impression of precision. If you need accuracy, measure each fiber with a force transducer and a peak capture multimeter. The calculated values do not reflect the actual force very accurately. The published values in the manual are based on average actual measurements, rather than on calculated values.)

Warranty

Stoelting warrants its products against defects in materials and workmanship according to the following schedule:

	WARRANTY PERIOD	
ITEM	**Materials**	**Labor**
ELECTRONIC CIRCUITRY (microprocessors, resistors transistors, integrated circuits, etc.)	1 YEAR	1 YEAR
MECHANICAL AND ELECTROMECHANICAL PARTS (meters, switches, etc.)	1 YEAR	1 YEAR
ELECTRODES, FILAMENTS, CABLES, AND ALL OTHER ACCESSORIES	30 DAYS	30 DAYS

Stoelting will, at its option, repair or replace defective items within the specified warranty period. Modifying or tampering with the instrument or non-factory authorized service during the warranty period will invalidate the warranty. Shipping costs both to and from the Stoelting Repair Department will be borne by the customer.

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