Saphenous Nerve Conduction Study

Patient Position: The patient may be positioned supine, with their legs extended.

Skin Prep: Wipe with alcohol, temperature check.
Settings: Sweep Speed: 1 ms/div.
Sensitivity/Gain: 10μV/div
Filters: 20 Hz – 2 KHz

Distal Recording:

Active: The active electrode is placed 3-4 cm proximal to the medial ankle, between the medial malleolus and tibialis anterior tendon.

Reference: The reference electrode is placed 3-4 cm distal to the active electrode.

Ground: The ground is placed in between the stimulating and recording.

Distal Stimulation:

The nerve is stimulated in the medial calf, in the groove between the tibia and the medial gastrocnemius muscles, **12 cm** proximal to the active electrode. Cathode distal.

Proximal Recording:

Active: The active electrode is placed in the medial border of the tibia, 15 cm distal on the line starting 1cm proximal to the inferior border of patella (palpate the tendons of the sartorius and gracilis muscles).

Reference: The reference electrode is placed 3-4 cm distal to the active electrode.

Ground: The ground is placed in between the stimulating and recording.

Proximal Stimulation:

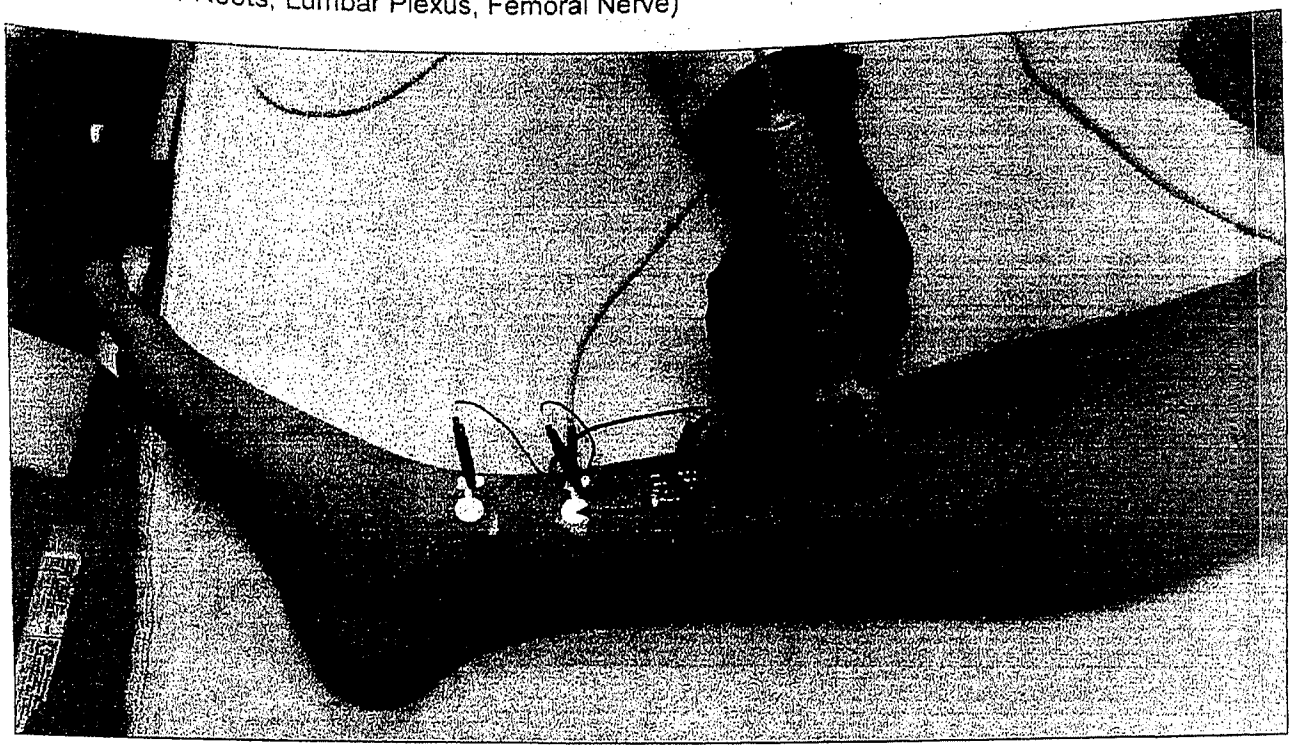
The cathode is located between the sartorius and gracilis tendons 1 cm proximal to the inferior border of the patella with the anode proximal.

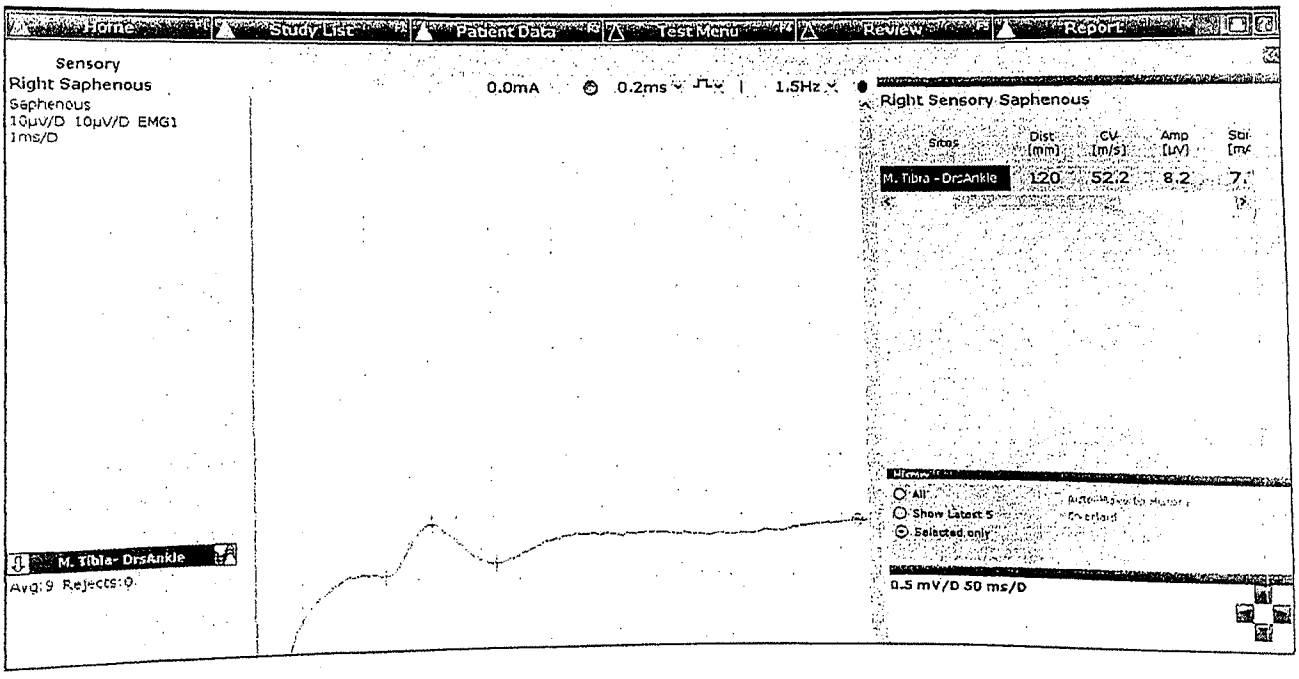
Key Points:
Often the stimulator has to be pressed firmly deep into the tissue by the tibia in order to activate the nerve with low stimulus intensity. Response is often small and may be difficult to obtain in normal controls, especially those older than age 40. To maximize the response, the recording electrodes may have to be repositioned either slightly medially or laterally to the original position. Side to side comparison is necessary before interpreting a low or absent potential as abnormal.

Reference Values:

Author	Distal distance (cm)	Recording	Amplitude (μV)	Peak Latency (ms)	Conduction Velocity (m/s)
Shapiro	14	Distal	≥ 4	≤ 4.4	≥ 40
Dumitru	14	Distal	9 ± 3.4	3.6 ± 0.4	41.7 ± 3.4
Dumitru	15	Proximal	10.2 ± 2.1	2.5 ± 0.2	58.8 ± 2.3

Saphenous Sensory - Antidromic Stimulation – Distal Recording
(Testing: L2-4 Roots, Lumbar Plexus, Femoral Nerve)





VII. Variations and Pitfalls

A. Amplitude and configuration of response may vary *greatly* depending on the placement of G1.

B. If amplitude on knee stimulation drops more than 30 percent of the ankle amplitude:

1. Check for maximal stimulation at the knee.
2. Check if peroneal muscles in the foot are being erroneously stimulated at the ankle (plantarflexion of the foot correct movement).

C. If amplitude on knee stimulation is higher than amplitude at the ankle:

1. Check for maximal stimulation at the ankle.
2. Check if peroneal muscles in the foot are being erroneously stimulated at the knee.

D. The proximal amplitude may drop by 50 percent and still be within normal limits.

E. It is not always possible to obtain a response with an initial negative deflection. If a positive dip occurs, the takeoff is to the beginning of the dip or the initial deflection from the baseline.

VIII. Normal Values (Cleveland Clinic Foundation EMG Laboratory)

AGE	AMPLITUDE mv	DISTAL LATENCY msec	CONDUCTION VELOCITY m/sec
0-9	6-18 (12)	2.5-3.4 (2.8)	41-55 (49)
10-19	10-36 (14)	2.1-5.2 (4.0)	41-56 (49)
20-29	9-38 (19)	2.9-5.4 (4.0)	41-57 (49)
30-39	8-36 (17)	3.0-5.6 (4.1)	41-58 (48)
40-49	6-30 (15)	2.8-5.8 (4.2)	41-57 (48)
50-59	4-26 (14)	2.8-5.8 (4.2)	41-56 (47)
60-69	4-25 (13)	2.6-5.9 (4.2)	41-57 (46)
70-	4-21 (11)	2.8-6.0 (4.3)	40-52 (45)

Saphenous (sensory-antidromic)/medial malleolus (19, 55, 57)

I. Position of Patient

A. Patient should be supine with lower extremity extended.

B. Lower extremity should be supported by the bed at all times.

II. Equipment

A. 2 disc electrodes (G1 active, G2 reference)

B. 1 ground (G0)

C. Bipolar stimulator (S1 cathode, S2 anode)

III. Machine Settings

A. Sweep speed (ms/div)—1 to 2

B. Gain (μv)—5 to 10

C. Filters—32(Hz), 1.6(KHz)

SAPHENOUS (sensory-antidromic) / medial malleolus

age = 40

Stimulation Site	Amp. μv	Latency msec	Dist. cm
medial leg	6	3.0	12