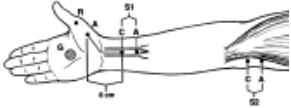
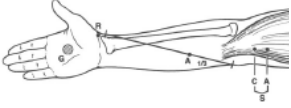
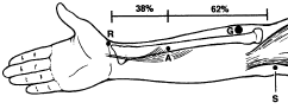
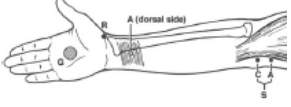
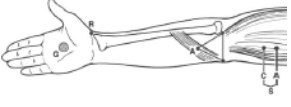
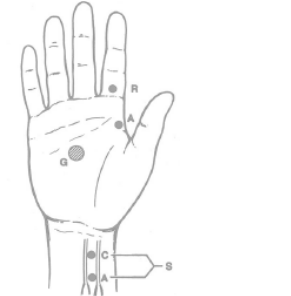
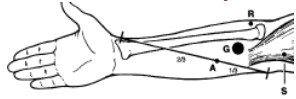


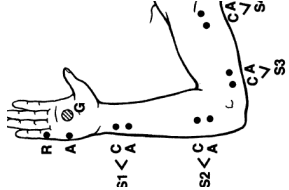
Upper limb motor NCS

Nerve	Origin	Active	Reference	Ground	Stimulation	Lat. (Max)	Amp. (Min)	NCV (Min)	F Lat. (Max)
Median to Abd Pol 	C8,T1	halfway between the midpoint of the distal wrist crease and the first MCP joint	slightly distal to the first MCP joint	Between active electrode and the cathode.	A- The cathode is placed 8 cm proximal to the active electrode, slightly medial to the tendon of the flexor carpi radialis. B- medial to the tendon of the biceps at the elbow, slightly proximal to the antecubital crease	4.5	4	50	32
Median to Flex Carp Rad 	C6,7,8	Over the belly of the flexor carpi radialis, one third of the distance from the medial epicondyle to the radial styloid.	over the radial styloid	on the dorsum of the hand.	medial to the tendon of the biceps at the elbow, slightly proximal to the antecubital crease	3.6	2.3		
Median to Flex Pol Long (ant interosseous) 	C7,8,T1	On the lateral forearm, 10.2 cm from the distal wrist crease	over the distal tendon of the flexor pollicis longus	Between the stimulating and recording electrodes.	medial to the tendon of the biceps at the elbow, slightly proximal to the antecubital crease	4	2.5		
Median to Pron Quadrat (ant interosseous) 	C7,8,T1	Midpoint between the radius and ulna on the dorsal forearm, 3 cm proximal to ulnar styloid	over the radial styloid	on the dorsum of the hand.	medial to the tendon of the biceps at the elbow, slightly proximal to the antecubital crease	5	1.5		
Median to Pron Teres 	C6,7	An equilateral triangle is imagined, with the medial epicondyle and the biceps tendon (at the level of the epicondyle) as two of its points. The active electrode is placed at the third point, on the proximal forearm	over the radial styloid	on the dorsum of the hand.	medial to the tendon of the biceps at the elbow, slightly proximal to the antecubital crease, 10 cm above active electrode.	3.5	3		
Median to 1st Lumbrical 	C8,T1	Placement is on the palm, slightly radial to the long flexor tendon of the index finger (localized by flexion of the index finger) and 1 cm proximal to the midpalmar crease	at the base of the index finger	Between active electrode and the cathode.	The cathode is placed 8 cm proximal to the active electrode, slightly ulnar to the tendon of the flexor carpi radialis	4.5	0.8		

H Reflex to Flex Carp Rad



Ulnar to Abd Dig Minimi



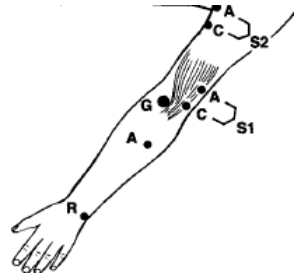
Ulnar to palmer interosseous



Ulnar to 1st dorsal interosseous

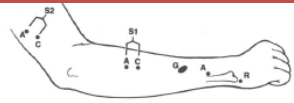


Radial to Ext Dig Communis



Radial to Ext Indicis

C6,7,8	Placement is over the belly of the flexor carpi radialis, one third of the distance from the medial epicondyle to the radial styloid.	over the brachioradialis 3 cm below elbow	between the stimulating and recording electrodes	Medial to the tendon of the biceps at the elbow, slightly proximal to the antecubital crease, 10 cm above active electrode, frequency not more than 0.5 Hz, minimal stimulus to avoid M response and F wave. Cathode is proximal, and anode is distal	19	0.8		
C8,T1	on the ulnar surface of the hypothenar eminence, halfway between the level of the pisiform bone and the 5th metacarpophalangeal joint	Slightly distal to the 5 th metacarpophalangeal joint.	between the stimulating and recording electrodes	A- 8 cm proximal to the active electrode, in a line measured slightly radial to the tendon of the flexor carpi ulnaris. B- 4 cm distal to the medial epicondyle. C- 10 cm proximal to stimulation point B D- Axilla, 10 cm proximal to stimulation point C	3.7	6	50	32
C8,T1	On the palm, slightly radial to the midpoint of the third metacarpal.	slightly distal to third MCP joint	dorsum of the hand	8 cm proximal to the active electrode, slightly radial to the tendon of the flexor carpi ulnaris.	4	3		
C8,T1	On the dorsum of the first web space, in the center of the triangle formed	Slightly distal to the fifth MCP joint.	dorsum of the hand	8 cm proximal to the active electrode, slightly radial to the tendon of the flexor carpi ulnaris.	4.7	5		
C7,8	by grasping the radius and ulna of the subject's pronated forearm with the thumb and middle finger at the junction of the upper third and middle third of the forearm. The index finger is placed halfway between these two points to identify the extensor digitorum communis	ulnar styloid process	between the stimulating and recording electrodes	A- Lateral to the tendon of the biceps at the elbow, as it crosses the flexor crease. B- Axilla	3.5	4.5		
C7,8	4 cm proximal to the ulnar	ulnar styloid		A- 8 cm proximal to the active electrode.	2.5	1.7		23



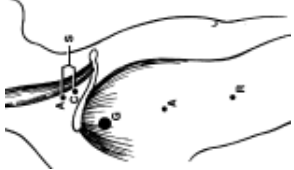
Suprascapular to Supra & Infraspinatus



Thoracodorsal to Latissimus



Axillary



Long Thoracic



Musculocutaneous to Biceps



Phrenic to Diaphragm

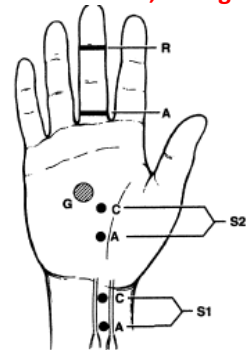
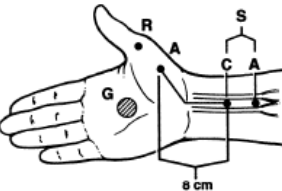
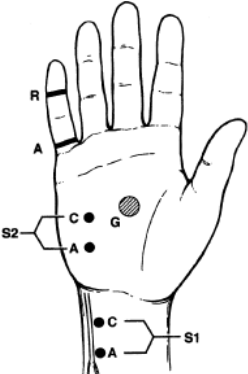
styloid, over the motor point of the extensor indicis

process

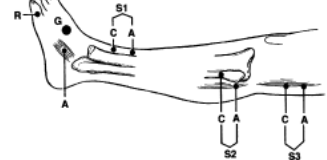
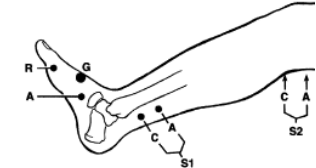
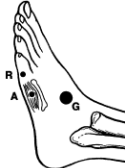
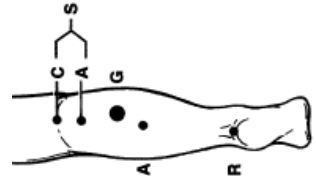
B- 8 cm proximal to the lateral epicondyle, over the radial groove.

C5,6	Supraspinatus, 2 cm above the midpoint of the spine of the scapula. Infraspinatus, 2 cm inferior to the midpoint of the spine of the scapula	On the midline thoracic spine at the same level.	on the acromion	Erb's point	4.3 4.8	1.5
C6,7,8	On the posterior axillary line at the level of the inferior pole of the scapula.	On the ipsilateral flank.	On the ipsilateral lateral chest wall.	Axilla with arm abducted 90°	2.7	1.5
C5,6	most prominent portion of the middle deltoid	junction of the deltoid muscle and its tendon	on the acromion	Erb's point—the cathode is placed slightly above the upper margin of the clavicle lateral to the clavicular head of the sternocleidomastoid muscle. The anode is superomedial.	5.4	4.6
C5,6,7	A concentric needle electrode (R) is placed at the digitation of the serratus anterior along the midaxillary line over the 5th rib		Anterior axillary line over the 12th rib level	Erb's point	4.8	
C5,6	just distal to the midportion of the biceps brachii muscle	Proximal to the antecubital fossa, at junction of the muscle fibers and the biceps tendon	on the acromion	Erb's point	5.5	4
C3,4,5	5 cm superior to the tip of the xiphoid process.	over the upper chest		Stimulation is applied at the posterior border of the sternocleidomastoid muscle in the supraclavicular fossa, with the cathode approximately 3 cm superior to the clavicle.	8	300μ

Upper limb Sensory NCS

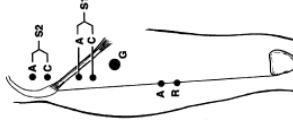
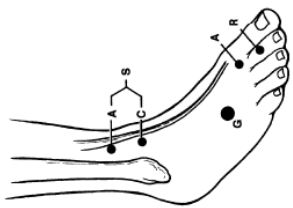
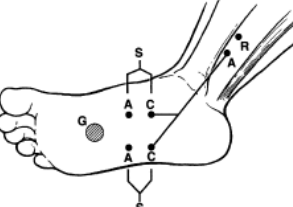
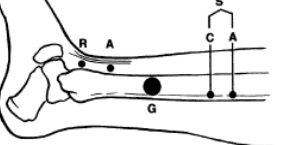
Nerve	Origin	Active	Reference	Ground	Stimulation	Lat Max (Onset)	Amp. (Min)	NCV (Min)	F Lat. (Max)
Median to 2nd, 3rd digits 	C6,7	A ring electrode is placed in the digit being tested, slightly distal to the base of the digit.	4 cm distal to active electrode	Between active & reference electrode	A- 14 cm proximal to the active electrode, slightly medial to the tendon of the flexor carpi radialis. B- Cathode is placed at the midpoint of the line from the active electrode to stimulation point A	A:3.2 B:1.8	10		
Median Palmer Cut. 	C6	Halfway between the midpoint of the distal wrist crease and the 1 st MCP joint.	slightly distal to the 1 st MCP joint	Between active & reference electrode	8 cm proximal to the active electrode, slightly medial to the tendon of the flexor carpi radialis.	1.7	10		
Ulnar to 5th digit 	C8	A ring electrode is placed in the digit being tested, slightly distal to the base of the digit.	4 cm distal to active electrode	Between active & reference electrode	A- 14 cm proximal to the active electrode, slightly radial to the tendon of the flexor carpi ulnaris. B- Cathode is placed at the midpoint of the line from the active electrode to stimulation point A	A:3.2 B:1.8	6		
Radial to thumb 	C6	over the radial sensory nerve as the nerve passes over the extensor pollicis longus tendon	4 cm distal to active electrode	Between active & reference electrode	10 cm proximal to the active electrode on the radial side of the forearm	2.2	6		

Lower limb Motor NCS

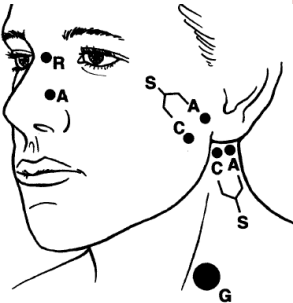
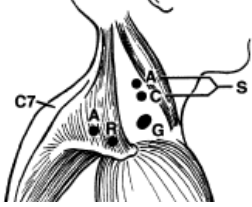
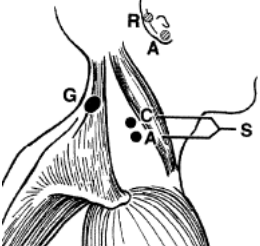
Nerve	Origin	Active	Reference	Ground	Stimulation	Lat. (Max)	Amp. (Min)	NCV (Min)	F Lat. (Max)
Femoral to Quadriceps 	L2,3,4	Center of vastus medialis	Quadriceps tendon near the patella	Between active & reference electrode	Needle electrode is used. A- Superior to the inguinal ligament just lateral to the femoral artery. B- Inferior to the inguinal ligament and lateral to the femoral artery.	8.5 7.5	0.5		
Peroneal to Ext Dig Brevis 	L5,S1	On extensor digitorum brevis muscle on the dorsum of the foot.	5 th MCP	Between active & reference electrode	A- 8 cm proximal to the active electrode, slightly lateral to the tibialis anterior tendon B- Posterior and inferior to the fibular head.	6.5	1.2	40	60
Tibial to Abductor Hallucis 	S1,S2	Medial foot, slightly anterior and inferior to the navicular tubercle (at the most superior point of the arch	1 st MCP	Between active & reference electrode	A- posterior to the medial malleolus B- Mid-popliteal fossa	6	4	40	60
Tibial to Flex Dig Min Brevis 	S1,S2	Midpoint of inferolateral edge of 5 th metatarsal.	5 th MCP	Between active & reference electrode	Posterior to the medial malleolus	8	1.2		
H reflex to Calf muscle 	S1	On the back of leg, Midpoint between popliteal crease and posterior calcaneus.	Posterior calcaneus	Between active & reference electrode	Mid-popliteal crease with the anode distal	35			

An accessory peroneal nerve is commonly present (20–25% incidence). The accessory peroneal nerve passes behind the lateral malleolus to innervate the extensor digitorum brevis. Its presence should be suspected if the amplitude to proximal stimulation is greater than on ankle stimulation. Its presence can be confirmed by stimulating behind the lateral malleolus. If a response is recorded from the extensor digitorum brevis, an accessory peroneal nerve is present

Lower limb Sensory NCS

Nerve	Origin	Active	Reference	Ground	Stimulation	Lat Max (Onset)	Amp. (Min)	NCV (Min)	F Lat. (Max)
Lateral Cutaneous n. 	L2, 3	Along a line connecting the ASIS to the lateral border of the patella with the active electrode (A) 17–20 cm distal to the ASIS	3 cm distal to the active electrode	Between active & reference electrode	A- below the inguinal ligament, 1 cm medial to the line between the ASIS and the lateral border of the patella B- above the inguinal ligament 1 cm medial to the ASIS	3 3.6	6 μ v		
Deep Peroneal 	L5	interspace between the 1st and 2nd metatarsal heads	3 cm distal to the active electrode on the 2nd digit	Between active & reference electrode	12 cm proximal to active electrode and just lateral to the extensor hallucis longus tendon	3.7	3.4		
Tibial 		over the tibial nerve just proximal to the flexor retinaculum	3 cm distal to the active electrode	Between active & reference electrode	14 cm distal to the active recording electrode	3			
Saphenous nerve 	L3,4	proximal and slightly medial to the tibialis anterior tendon	Slightly anterior to the highest prominence of the medial malleolus	Between active & reference electrode	14 cm proximal to the active electrode deep to the medial border of the tibia.	3.8	2		
Sural nerve 	S1,2	behind the lateral malleolus	3 cm distal to the active electrode	Between active & reference electrode	14 cm proximal to the active electrode in the midline or slightly lateral to the midline of the posterior lower leg.	3.6	4		

Cranial nerves NCS

Nerve	Active	Reference	Ground	Stimulation	Lat Max (Onset)	Amp. (Min)
Facial nerve 	Nasalis, on the lateral mid-nose. The subject may “wrinkle the nose” and the electrode is placed on the most prominent bulge of the muscle. Orbicularis oculi under the eye in line with the pupil. An alternate position is at the lateral border of the eye. Orbicularis oris lateral to the angle of the mouth	on the tip or bridge of the nose	over the base of the neck or on the cheek	Preauricular stimulation is performed with the cathode just anterior to the lower ear over the substance of the parotid gland and several centimeters superior to the angle of the mandible. Postauricular stimulation is performed by placing the cathode just behind the lower ear, below the mastoid process and behind the neck of the mandible. The anode is posterior	3.5 3.8	>50% difference is significant >90% indicate surgery
Cranial accessory 	Over the upper trapezius, about 9 cm lateral to the 7th spinous process.	3 cm lateral to the active electrode.	between the stimulating and recording electrodes	In the posterior triangle of the neck, 1–2 cm posterior to the posterior border sternocleidomastoid muscle and slightly above the midpoint of this muscle. This is a point halfway between the mastoid process and the suprasternal notch. The anode is superior	3	3
Great auricular nerve 	On the back of the ear lobe	2 cm above the active electrode	On the back of the neck.	8 cm from the active electrode along the lateral border of the sternocleidomastoid muscle, with the cathode superior	1.6	
Blink reflex 	Over the lower lateral orbicularis oculi muscle bilaterally	Over the temple or the lateral surface of the nose above the nasalis muscle	Under the chin or on the forehead or cheek	Cathode (C) over the supraorbital nerve at the supraorbital notch. The anode is superolateral. A ratio of R1 latency (R) to the direct response latency (D) can be calculated. This R/D ratio should not fall outside the range of 2.6 to 4.6. A larger ratio, with a normal D, is indicative of slowing of the trigeminal portion. If the R/D ratio is low, it is indicative of slowing of the facial nerve. A glabellar tap with a special hammer can be used instead of electrical stimulation	Direct latency: 4 Ipsilateral R1: 13 Ipsilateral R2: 40 Contralat R2: 41	Several blink responses should be tested and the shortest latencies chosen. Latency should be measured to the first deflection from the baseline

