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Microscopic anatomy of skeletal muscle activity

Physiology of skeletal muscles At the muscle junction, the axon is divided into a handful of branches that groove the surface of the muscle fiber. Sarcolemma is at the heart of the connection. The membrane in the basement of the muscle fibers passes the synaptic fissure and fold lines. Sarcoplasm at the base shows an accumulation of testicles, mitochondria, and ribooms known as sole plate. Each axonal branchlet forms an elongated final bouton containing thousands of synaptic vesicles loaded with acetylcholine. Synaptic transmission takes place in active zones facing the ridges of crossed folds. Follicular acetylcholine is extruded at high speed by exocytosis into the synaptic fissure. Acetylcholine is dispersed through the basement membrane to bind to acetylcholine receptors in sarcolemma. Activation of receptors leads to depolarization of sarcolemmy. Depolarization is carried out inside the muscle fiber through the tubules T. Sarcoplasmic ion triggers Ca2+ ions, which initiate the contraction of sarcomas. The enzyme acetylcholinesterase is concentrated in the basement membrane, and about 30% of the released acetylcholine is hydrolyzed without reaching the postsynap membrane. After hydrolysis, choline moiety is returned to axoplasm. The most well-known is the peptide associated with the calcitonin gene, a powerful vasodilator. Muscle spindles are up to 1 cm long and differ in number from a dozen to several hundred in different muscles. They are abundant (1) in antigravity muscles along the spine, femur and tibia; (2) in the neck muscles; and (3) in the inner muscles of the hand. All these muscles are rich in slow, oxidative muscle fibers. Spindles are rare where FG or FOG fibers dominate. Muscle spindles contain up to a dozen intra-drive muscle fibers. Larger dosed fibers emerge from the poles (ends) of the spindle and are anchored in the connective tissue (peri-cave). Smaller ones are attached to the collagen spindle capsule. At the spindle equator (center), sarcomas are replaced almost entirely by nuclei, in the form of bags (in wide fibers) or chains (in slender fibers). Muscle spindles have both an motor and a supply of sensory nerves. Motor fibers, called fusimotor, are in the Ay size range, unlike Aα fibers providing extrafusal muscle. Fusimotor axons split to deliver ribbed segments at both ends of the dotufusal muscles. One basic sensory fiber of type Ia caliber uses annulospiral compresses around the sling or chain segments of intrafusal muscle fibers. Secondary sensory tips flower spray on one or both sides of the primary are supplied by type II fibers. Muscle spindles are stretch receptors. The ion channels in the sensory terminal surface membrane are opened by stretching to form a waves that summate close to the final heminode of the parent sensory fiber. Summation produces the potential of a receptor that fires nerve impulses when it reaches the threshold. Muscle spindles can be stretched passively or actively. A passive section of muscle spindle occurs when the entire muscle abdomen is passively elongated. For example, by provoking a tendon reflex, such as a knee jerk, spindles in the abdomen of the quadriceps muscle are passively stretched when the tendon is hit. Type Ia and Type II fibres are broken into the spinal cord, where synapses on dendrites α motor neurons. (α motor neurons are so-called because they cause Acrosones with an Aα diameter.) The response to positive feedback from spindles is spasm of contraction in non-fuse muscle fibers of the quadriceps muscles. Spindles, because they lie parallel to the non-fuss muscle, are passively shortened; they are described as discharged. Tendon reflexes are monosynaptic reflexes. In addition to exciting homononic motor neurons (i.e. motor neurons delivering the same muscles), the spindles inhibit the α motor neurons that supply the antagonist's muscles, through the substrate of inhibitory internuncial (interjected) neurons. This effect is called reciprocal inhibition. The inhibitory neurons involved are called Ia internuncials. The basic spindle afferents are most active during the stretching process. The faster the episode, the more pulses they fire. Therefore, they encode the speed of muscle exsibility. Secondary spindles are more active than primaries when a position is held. The greater the degree of tensile ing, the more pulses they fire. Therefore, they encode the degree of muscle exactivity. The active segment is produced by fusimotor neurons, which provoke contraction of striated segments of intrafusal muscle fibers. Since attachments to connective tissue are relatively constant, intraarraid fibers stretch the equator of the spindle, pulling them towards the spindle columns. During all voluntary movements, the motor neurons Aα and Ay are co-activated by the cortical (pyramidal) duct. As a result, spindles are not discharged by spasm of extra-thyscular muscles. Through ascending joints, spindle afferents on both sides of the corresponding joints are able to keep the brain informed of cramps and relaxation during a given movement. The reflex of the kneelet is provoked as follows: The tap to the ligament of the knee cap stretches the spindle in the quadriceps femoris. Spindles secrete excitatory impulses to the spinal cord. Alpha motor neurons react by causing twitching in the quadriceps muscles, with knee extension. Ia inhibitory internuncials react by inhibiting any activity in the tendons. Golgi's tendon organs are located in the Intersection. A single caliber nerve fiber Ib creates complex sprays that intertwine with bundles of tendon fibers encased in a connective tissue capsule. A dozen or more muscle fibers insert into intracellular tendon fibers that are serially made of muscle fibers. Bulbous nerve endings are activated by tension, which develops during muscle contraction. Since the rate of impulse discharge along the parent fiber is related to the applied tension, the tendination terminations signal the strength of muscle contraction. Ib afferents exert negative feedback to homonimic motor neurons as opposed to positive feedback feedback exerted by muscle spindle afferents. This effect is called autogenetic inhibition, and the reflex arc is non-noptic due to interpolation of the inhibitory neuron. If necessary, there is a mutual excitation of motor neurons that supply the antagonist's muscles. An important function of afferents of tendon organs is the suppression of the innate tendency of moving segments of the limbs to oscillate. Attenuation introduces an element known to physiologists as joint stiffness. The muscles are rich in free-ending nerve fibers, distributed to the connective tissue of the intermuscular and investing in the fessis. They are responsible for the feeling of pain caused by direct damage or accumulation of metabolites, including lactic acid. Table 1. Muscle localization (Open table in a new window) Peripheral nerve muscles of the nerve muscle roots Localization of muscle action hijacker Digiti Quinti (hand) Ulnar C8, T1 Directly at the medial side boundary, at the midpoint between further wrist crease and metacarpophalangeal crease. This is the first muscle encountered. Abduction of the number 5. Hijacker Pollicis Brevis Median C8, T1 Parallel to the first metacarpal shaft, according to the middle shaft of the extended first phalanx of the thumb, where it is the first muscle that the electrode will draw. Thumb abduction, that is, the movement of the thumb from the plane of the hand. Hijacker Pollicis Longus and Extensor Pollicis Brevis Posterior interwide branch of radial nerve C7, C8 In a distal 25% dorsal forearm, overlying the radius of abduction and extension of the proximal phalanx of the thumb Adductor Pollicis Ulnar, deep palmar branch C8, T1 Immediately proximal to the first metacarpal joint, the electrode is inserted into the groove between the metacarpal bone and the first dorsal interstitial muscles and towards the depth of the internet space. In this rather distal place, most of the first back is avoided replenishing the thumb in the plane of the hand. Anconeus Radial C7, C8 The electrode is inserted halfway between the olecranon process and the side epicondyle. No other muscle was found here. Elbow extension. Brachioradialis Radial C6 Place the index finger in the fossa cubital, indicating the proximal. Brachioradialis is the first lateral muscle to finger. Finger, with the forearm in the middle of pronation-supination. Extensors Carpi Radialis Brevis and Longus Radial C6, C7 Visualize the line connecting the epicondyle side line with the radial styloid process. In the closer half of the forearm, this line separates digitorum (communism) from the excesses of the wrist, with a groove between them. Therefore, the auxiliary are approached only lateral to this line (i.e. on the thumb side) and are superficial. If the electrode is too lateral, it will be in brachioradialis. If it is too medial, it will be in digitorum extensor (communism). Extensor Carpi Ulnaris Posterior intercrine branch of the radial nerve C7, C8 In the proximal half of the forearm, simply dorsal to the ulnar shaft, and superficial wrist extension combined with elbow deviation. Extensor Digitorum (Communis) Posterior interosseous branch of radial nerve C7, C8 Brachioradialis and radial wrist extensors compromise moving muscle mass. The only medial to this group is the groove separating it from the digitorum extensor (communism), which itself is relatively immobile. The division occurs in the proximal half of the forearm, along the line connecting the lateral epicondyle and radial styloid. The electrode is therefore inserted only medial to and parallel to this groove, in the forearm proximal, where the digitorum extensor (communism) is superficial. Extension of digits from 2 to 5. Extensor Indicis Posterior intervertical branch of the radial nerve C7, C8 In the distal 20% of the forearm, halfway between the radius and the ulna. In this distal place, extensor indicis is the only dorsal muscle that is not primarily tendinous. Extension of digits from 2 to 5. Extensor Indicis Posterior intervertical branch of the radial nerve C7, C8 In the distal 20% of the forearm, halfway between the radius and the ulna. In this distal place, extensor indicis is the only dorsal muscle that is not primarily tendinous. Extension of the index finger. Extensor Pollicis Longus Posterior intercrifical branch of the radial nerve C7, C8 Insert the electrode at the junction of the middle and lower third parts of the dorsal forearm, halfway between the ulnar bone and the radius. At this point, the longus regrower sect lies directly under the distal bellies of the extensor digitorum muscle (communism). Extension of the distal phalanx of the thumb. First Dorsal Inter-View (manual) Ulnar, deep palmar branch C8, T1 Electrode is inserted parallel to the second shaft of the metacarpal, superficially, directly in the middle of the dorsal space. Abduction of the number 2 in the plane of the hand. Flexor Carpi Radialis Median C6, C7 Place the index finger in the cubital fossa, indicating the proximal. Flexor carpi radialis is the first medial muscle to the finger at the level of the apex cubital fossa (where brachioradialis and muscle and is superficial at this point. Wrist bend. Carpi Carpi Flexor Ulnar C8, T1 Central third forearm, superficial and directly medial. Flexor Digitorum Profundus, Ulnar (medial) Head Ulnar C8, T1 In the middle a third of the forearm, immediately ventral to the elbow shaft. Here the muscle lies just below the thin apennice of the carpi flexor of the ulna. Bending of distal patinal digits 4 and 5. Flexor Digitorum Superficials Median C7, C8, T1 Mid-forearm, halfway from the ventral midline to the medial boundary of the forearm. Here it is the first muscle achieved. Bend your finger or wrist. Pollicis Longus flexor interosseous branch of the median nerve C7, C8 In the middle of the abdominal forearm, the electrode is inserted only distally into the convergence of the muscles of the carpi radialis and brachioradialis flexors, practically in the middle of the line ie, placing the needle us simply distal to the apex of the fetal elbow. Point the needle perpendicular to the skin and deeply until the bone reaches (flat front surface of the radius). The last muscle is crossed by the pollicis longus flexor, so pull out the needle a few millimeters after reaching the bone. Bending the distal phalanx of the thumb. Opponens Pollicis Median C8, T1 Midway through the first metacarpal shaft, in the groove between the metacarpal bone and the bringer pollicis brevis. The muscle is examined, where it is attached to the medial side of the bone. If pollicis hijacker brevis is sidelined, no other muscle overlies opponents at this point. Thumb opposition in the hand. Pronator Quadratus Anterior interosseous branch of the median nerve C7, C8, T1 muscle width is the same as its length, covering a distal 20% or so of the forearm, anterior to the interosseous membrane. Insert the electrode only the front into the distal elbow shaft, perpendicular to it and point the electrode horizontally to reach the thick medial limit of the muscle. Forearm Pronation Pronator Teres Median C6, C7 With index finger in cubital fossa proximal index, pronator teres is the first medial muscle to the finger, immediately distal to the middle ulnar vein. Bending of the elbow or, if necessary, pronation of the forearm. Supinator Radial C5, C6 In the proximal 20% dorsal forearm, insert the electrode into the groove between the radial ecstasy of the wrist (movable) and the auxiliary thermorum (communism) (immobile). The electrode is directed deeply, where there is a supinator lying on the radius. Pre-memory supination. Biceps Brachii Musculocutaneous C5, C6 Middle of one third of the arm, directly to and in parallel belly muscles, approaching the biceps on the side of the elbow bend, with the forearm in supination. Brachialis Musculocutaneous C5, C6 In a distal one-third of the arm, push the biceps medially and insert the electrode into the groove between the biceps and triceps. Point it down medially, in the direction of aspect of the humerus shaft. Bending the elbow; the degree of pronation of the forearm is irrelevant. Naramed. Anteriorfrontal C5, C6 Midpoint of the line connecting the lateral one third of the clavicle and the abduction of the shoulder or shoulder bend. Shoulder, middle acepit C5, C6 One-third of the distance down the line between the aromion process and the insertion of the shoulder. Naramed is the only muscle encountered in this location. Arm abduction. Deltoid, Posterior Acetic C5, C6 Midpoint of the line connecting the distal squall spine with the deltoid abduction of the arm or arm extension. Infraspinatus Suprascapular C5, C6 Halfway between the scapular spine and the lower end of the shoulder blade, halfway between the lateral and medial boundaries of the scapine, directly in the middle of the infraspinous fossa. The electrode should first gently touch the back of the spatula, and then pull back slightly to examine the infraspinatus. Outer rotation of the arm. Activation is usually possible simply by the patient lifting his arm from the table. Latissimus Dorsi Thoracodorsal (middle subscapsule) C6, C7, C8 Posterior axious fold, directly lateral to the lower tip of the shoulder extension / addition of the humerus. Levator Scapula Cervical entiot C3, C4, C5 Midpoint of the line connecting the superior medial scapular border and nuchal line. The levee blade is located deep in the overlapped upper quadrilateral. Façade of the scapular. Let the patient shrug. Pectoralis Major Medial and Lateral Pectoral Nerves C7, C8, T1 Frontal Axietic Fold, in direct vertical line from the coracoid process adduction of the arm. Rhomboid dorsal scapular C5 At the height of the middle boundary of the medial scapular, halfway between the boundary and the high plicing processes of the chest (T1-T4). The muscle lies deep into the middle quadrangle. Complement the scapular. Let the patient lift the elbow from the table before resistance. Rhomboid Minor Dorsal scapular C5 midpoint of the line connecting the highest boundary of the medial scapular and cervical prompinosibility. Middle trapezoidal fibers excessively rhomboid fine. Complement the scapular. Let the patient bring the scapula closer together. Serratus chest C5, C6, C7 In the middle or toward the buoyous acetal line, isolate one rib, placing two fingers in adjacent interspaces, to the mass latissimus dorsi, but posterior to breast tissue in a woman. Inserting the needle electrode is directly between the fingers, as the front serratus is the only muscle between the skin and the rib. Façade and reaching forward with the arm, that is, the scapular protraction. Providing resistance is sometimes necessary. Supraspinatus Suprascapular C5, C6 Medial one third of the spine of the scapular, insert an electrode immediately higher than the spine of the scapular. Point the electrode skin (not parallel to it) deep into the supraspinous fossa, where only supraspinatus occurs. Aponeurosis of the lateral trapezoidal fibers is pierced first. Arm abduction. Teres Major Lower subcapsules C5, C6 Directly lateral to the lower one third of the lateral boundary of the scapular. Internal rotation of the arm. Teres Minor Axillary C5, C6 Directly lateral to the middle third lateral boundary of the scapular. Outer rotation of the arm. Quadrilateral, Middle Spinal accessory, cervical (subtrapezial) crater emacia XI, C3, C4 Directly medial edge of the scapular spine. Keep the superficial electrode just below the subcutaneous tissue. Complement the scapular. Quadrilateral, upper spine accessory, cervix (subtrapezial) craniocerebral emacia XI, C3, C4 Superior shoulder border, immediately medial to the shoulder-clavicle joint. The free boundary of the upper quadrilateral can be captured between the two fingers at this point, and the electrode parallel to the inclination of the arm. Shoulder elevation. Let the patient shrug. Triceps, Lateral Radial Head C7, C8 Distal one-third of the arm, directly compatible with lateral epicondyle, and superficial elbow extension. Triceps, Long Head Radial C7, C8 At the mid shaft level of the humerus, the electrode is inserted only medially into the posterior midline of the arm. Elbow extension. Hijacker Digiti Quinti (foot) Lateral sole of the branch of the squeaking nerve S1, S2 On the lateral boundary of the foot, locate the base of the fifth metatarsal bone, the outshoot, which is easily felt. The electrode is inserted immediately into and into the sole of the exposed side, parallel to the long axis of the foot. Abduction of a small toe. Ask the patient to let the fan tone. Voluntary activation of this muscle can be difficult. Hallucis Captor Medial Sole branch of the tibia nerve S1, S2 Halfway through the exposed navicular bone and the plane of the sole, where it is the most superficial muscle. Insert the electrode parallel to the long axis of the foot. It can be difficult. Ask the patient to ventl fan or curl at ned-y. Front Tibialis Deep branch of the fibula nerve L4, L5 At the intersection of the middle and upper third legs, a quarter of the distance from the tibia shaft to the lateral leg boundary. Here it is the only muscle encountered. Dorsiflexion cube. The patient will sometimes reflexively expand the dentition in the same movement, and extensor digitorum longus can replace the tibia in the production of the dorsal ankle. If necessary, keep the planting in the substrate, while the patient rigides the ankle. Extensor Digitorum Longus Deep branch of the fibula nerve L5, S1 At the intersection of the middle and upper third parts of the leg, halfway between the shaft of the piscurza and the lateral leg boundary. At this point, extensor digitorum longus is the first muscle Extension of digits from 2 to 5. Extensor Hallucis Longus Deep branch of the fibula nerve L5, S1 At the intersection of the middle and lower third of the leg, a third of the distance from the squeaky shaft to the lateral leg boundary. The electrode is directed deeply and medially. Great toe extension; make sure that the needle is pulled back into the subcutaneous tissue before the patient shrinks to this muscle. First Dorsal Interosseous (foot) Lateral subsea branch of the squeague nerve S1, S2 Place the index finger in the dorsal space between the first and second finger, pointing distally. Pull the proximal finger until the wedges between the first two metatarsal heads. Insert the electrode immediately into your finger and point it slightly towards the other finger. The muscle is at the depth of the metatarsal; there are no other muscles. Let the patient curl or fan in ned y. Many cannot voluntarily activate the first dorsal interosseous. Gastrocnemius, S1 side squeak head, S2 Midway between the fibula head and the rear middle leg and superficial ankle pod. Gastrocnemius, Medial Head Tibial L5, S1, S2 Medial leg boundary, upper and middle third intersection, and superficial. The sole of the ankle joint. Fibularis Longus Superficial branch of the fibula nerve L5, S1 Straddle fibula head with index and middle fingers, indicating proximal. Pull straight down to the intersection of the upper and middle third parts of the leg; your fingers will be surrounding the longus fibularis, which is the first muscle encountered. Eversion/ankle soles. Posterior Tibialis Tibial L5, S1 There are two acceptable approaches: 1. At the intersection of the middle and lower third legs, insert the electrode under the medial tibia shaft and point it along the bone and deeply, where the muscle lies on the interchocral membrane. The full width of the digitorum longus flexor is traversed before the introduction of the posterior tibia. The illustration shows this approach. 2. Through the tibia, directly at the lateral boundary of the tibia shaft, at the intersection of the middle and lower third parts of the leg. The electrode crosses the entire front width of the front tibia relative to the periostial tibia until the ossial membrane is reached and pierced. Outside the membrane is the posterior tibia. At the intersection of the middle and lower third parts of the leg, the needle electrode is inserted directly in the vicinity (medial or lateral) into the rear midline. Sole/ankle reversal. Soleus Tibial S1, S2 At the intersection of the middle and lower third parts of the leg, the needle electrode is inserted directly in the vicinity (medial or lateral) into the posterior midline. The sole of the ankle joint. If the examiner keeps the patient's knee in the bend during activation, gastrocnemius ankle joint insertion Adductor Longus Obturator L2, L3, L4 In closer to 20% of the thigh, a quarter of the distance from the medial boundary to the posterior thigh boundary. Addition to the thigh. Adductor Magnus Obturator and rwatic L2, L3, L4 Upper one third of the thigh, immediately posterior to the medial thigh boundary. Addition to the thigh. Gluteus Maximus Inferior buttocks L5, S1, S2 Midpoint of the line connecting the posterior lower spine and the larger trochur. Gluteus maximus is the first muscle underlying subcutaneous tissue. Hip extension. Bend the knee up to 90° to minimize the ingesting effect of the hip tenth, then remove the knee from the table. As an alternative, hip abduction. Gluteus Medius Superior buttocks L4, L5, S1 The boundary of gluteus medius is determined by the line connecting the upper spine iliac (ASIS) and the larger trochuper. The electrode is inserted parallel to this line, at the midpoint and simply posterior to it. The muscle is the first achieved. Internal thigh rotation. Inserting the needle, as described above, places it in the front fibers of gluteus medius, allowing internal rotation to be activated. This movement can be carried out smoothly, as opposed to thigh abduction, which has a more austere movement and which less easily allows for the smooth recruitment of motor units. Gracilis Obturator L2, L3, L4 At the intersection of the upper and middle third parts of the thigh, directly medial. At this point, gracilis can usually be surrounded by two fingers, making it easier to locate. Addition to the thigh. External hamstring, Biceps Femoris Long Head Tibial part of the sciatic nerve L5, S1, S2 Halfway through, is a palpable groove with iliotibial syndrome between vastus lateralis and external tendons. The needle electrode is inserted only posterior to (i.e. above in the prone position) groove and parallel to the femur. At this point, the long head is the first muscle achieved. Knee bend; ensure that the electrode is first pulled back into the subcutaneous tissue. A highly shrinking muscle can easily bend an embedded EMG electrode. External tendon. Biceps Femoris Short Head Fibular part of the sciatic nerve L5, S1 At the level of the highest knee crease fossa, immediately medial or lateral to the biceps tendon femoris long head. The electrode is directed down and under the tendon. At this level of distal long head is beheading, and the short head is muscular. The tendon of the long head is shown in an intermittent outline. Knee bend. Internal tendons, Semimembranosus and Semitendinosus Tibial part of the sciatic nerve L4, L5, S1, S2 Mid-thigh, in or simply medial to the midline and immediately subcutaneous. Knee bend. Iliopsoas Femoral L2, L3, L4 Immediately distal to the inhaled ligament, halfway between the heart rate of the femoral artery and the anterior superior spine iliac. The electrode is guided away from the neurovascular bundle. Hip bend. Quadriceps, Rectus Femoris Femoral L2, L3, L4 At the midpoint of the line connecting the upper spine iliac (ASIS) and the better pole of the nape. This places the electrode cartridge slightly lateral to the geographical center of the front thighs. Knee extension. Quadriceps, Vastus Lateralis Femoral L2, L3, L4 Mid-thigh, directly lateral. In most patients, there is a visible and perceptible groove between the outer group of the femoral tendon and vastus lateralis, caused by iliotibial syndrome. The needle is therefore inserted only upwards into (i.e. above the breastplate position) of the groove. Knee extension. Let the patient push the back of the knee to the table or hand. Alternatively, let the patient lift the entire leg from the table with a straight knee. Quadriceps, Vastus Medialis Femoral L2, L3, L4 L4 Distal 20% medial thigh. At this level, the oblique vastus medialis fibers are positioned at an angle of almost 45° towards the knee cap, and the electrode should parallel them. Knee extension. Let the patient push the back of the knee to the table or hand. If necessary, let the patient lift his leg from the table with a straight knee and thigh in the outer rotation. External rectal sphincter Inferior rectal nerve pudendal S2, S3, S4 With a gloved finger in the rectum, insert the electrode at the junction of the mucosa, and angle it towards the finger. Ask the patient to tighten the sphincter around the finger. Relaxation is best achieved by straining the patient, simulating pushing for bowel movements. Diaphragm Phrenic C3, C4, C5 Front acetic line, eighth or ninth interspace rib. Intersilite muscles encountered first, and then the diaphragm, identified by cyclic spasms with breathing. If there are no voluntary contractions coming from the diaphragm, the correct location is based on the recognition that the first audible insertion activity comes from the inter rib muscles, followed by an electrically quiet gap, followed by the insertion activity from the target muscle. Breathing. Orbicularis Oculi Temporal and yoke branches of the facial nerve. Skull nerve VII. Two-thirds of the distance from the anterior boundary of the ear to the lateral edge of the orbit. From that point the electrode towards the lateral edge of the eye and superficially. Closing or squeezing the eyelids. Orbicularis Oris Buccal branches the facial nerve of the craepenian nerve VII. Two-thirds of the distance from the angle of the jaw to the corner of the mouth. From that point the electrode towards the corner of the mouth and superficially. Whistling lip movement. Paraspinals, Cervical (Erector Spinae) Posterior primary rami C1 to T1 Adjacent to the cervical spine, in a vertical line with the midpoint of the nuchal back. The electrode is perpendicular to the skin and must travel through the quadrilateral before reaching the paraspinals. This transition is the tessular plane separating the two. The insertion point shown concerns intracerealar paraspinal muscles. Gentle extension of the isometric neck, with an electrode in the subcutaneous tissue. Paraspinals, Lumbosacral (Erector Spinae) The posterior primary rami L1 though S1, (S2) the midway point between the posterior upper spine and the midline corresponds to the low paraspinal lumbar muscles. Inserting a needle electrode for closer or more distal levels is through the same point and along a line parallel to the spine. The electrode is directed perpendicular to the skin and slightly medial, towards the deeper paraspinal layers. Hip extension. This will secondarily cause the paraspinal muscles to contract. Sternocleidomastoid Spinal accessories, weave the carotid crater nerve XI, C2, C3 Midway between vastes and clavicle muscle attachments. Enter it from the side and parallel to its course. Let the patient turn his head to the other side, on his hand. Tongue (Genioglossus) Hypoglossal crater nerve XII Midpoint between the tip of the chin and the angle of the jaw, medial to the lower jaw. The tongue is located deep here, after the electrode passes through the mylohyoid and geniohyoid muscles. Protraction language. Ask the patient to make his or her tongue. Language.

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