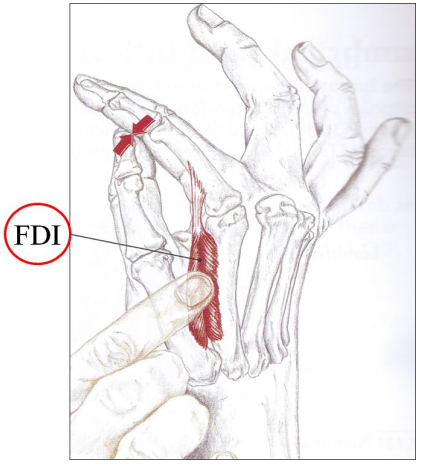
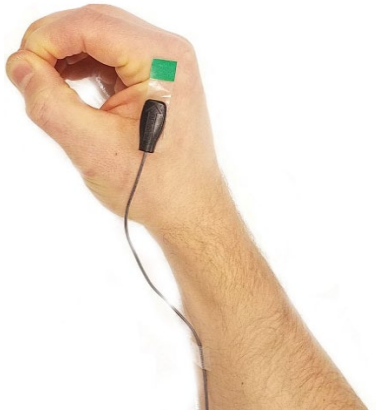
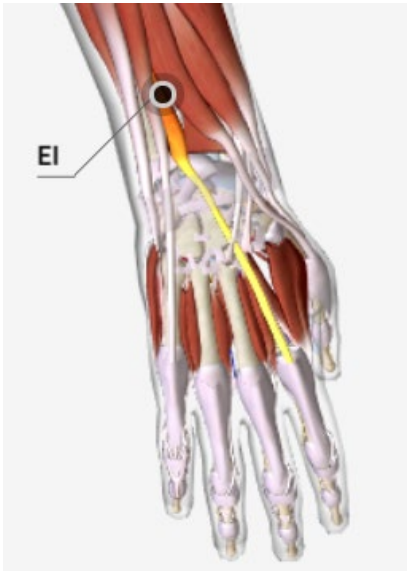
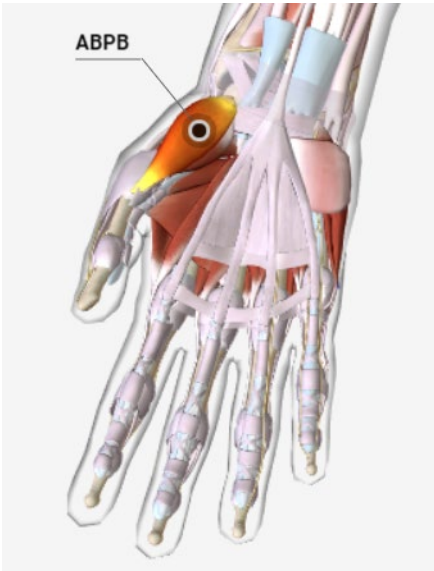
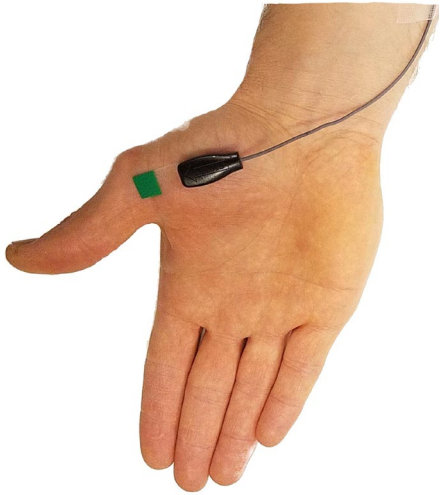
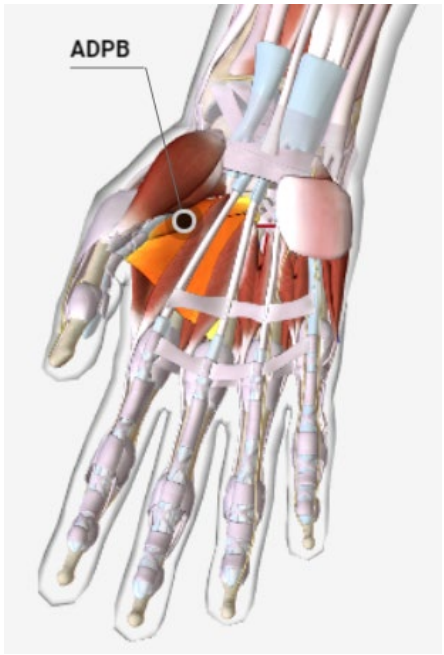
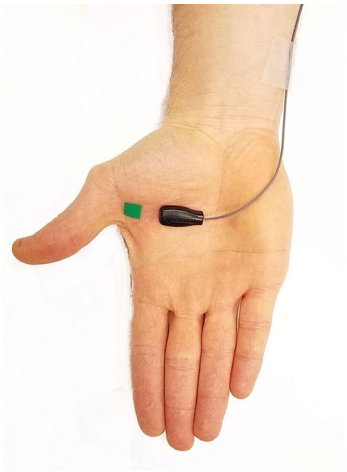
Intrinsics

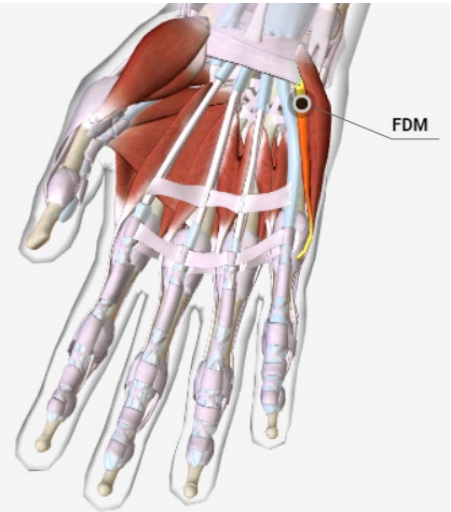
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
First dorsal interosseous (FDI)	Bilateral placement of the sensor 1cm proximal to the crease of the distal wrist.	Push thumb down on the side of the index finger, while the index finger opposes the thumb.	 	 

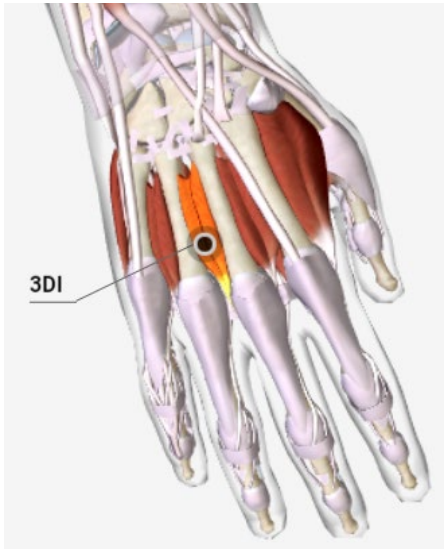
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Extensor Indicis (EI)	The center of the EI muscle is located approximately 4.8 cm proximal to the Ulnar Styloid Process (USP) level and 7.2 mm lateral to the medial border of the ulna.	Stabilize the wrist in a neutral position. Apply resistance across the dorsum of all proximal phalanges just distal to the Metacarpophalangeal (MP) joints. Apply resistance in the direction of flexion.		 

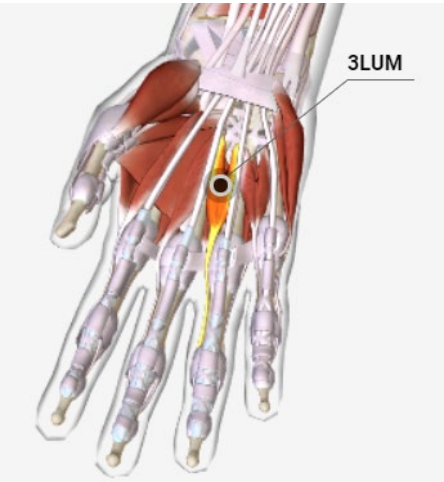
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Abductor pollicis brevis (APB) or (ABPB)	Located slightly medial of the distal portion of the 1st ossa metacarpalia. Lies parallel to the 1st ossa metacarpalia.	Abduct the thumb ventralward from the palm while applying pressure against the proximal phalanx in the direction of adduction toward the palm. • Verbal instruction: "Lift your thumb vertically until it points to the ceiling."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Adductor Pollicis Brevis (ADPB)	Located slightly medial of the distal 1/4 of the 1st ossa metacarpalia. Lies parallel to the 1st ossa metacarpalia.	Stabilize the metacarpals by placing your hand across the patient's palm, with the thumb on the dorsal surface of the patient's hand. This looks somewhat like a handshake but instead maintains the patient's wrist in neutral. Apply resistance to the lateral aspect of the proximal phalanx of the thumb in the direction of adduction. • Verbal instruction: "Press your thumb to your index finger, don't let me push it up."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Abductor digiti minimi (ADM)	Lies along the ulnar border of the palm of the hand.	Support the wrist in neutral. The fingers of the other hand are used to give resistance on the distal phalanx, on the radial side of the finger and the ulnar side of the adjacent finger (ie. They are squeezed together). • Verbal instruction: "Spread your fingers. Hold them. Don't let me push them together."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Flexor digiti minimi (FDM)	Lies lateral to the abductor digiti minimi.	Stabilize metacarpals proximal to the Metacarpophalangeal (MP) joint. Resistance is given on the palmar surface of the proximal row of phalanges in the direction of MP extension. Final position is the right angle at MP joints. • Verbal instruction: "Curl your fingers and flex your knuckles. Hold it. Don't let me straighten your knuckles."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Third Dorsal Interosseous (3DI)	Originates at the medial portion of the third metacarpal and the lateral portion of the fourth metacarpal.	• Verbal instruction: "Abduct your fingers (spread them out), pushi in, don't let me push them back out."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Third lumbrical (3LUM)	Place the sensor on the palm in between the ring finger and the middle finger.	• Verbal instruction: "Flex your ring finger, don't let me push down on it."		 

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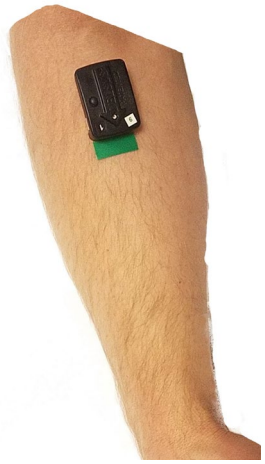
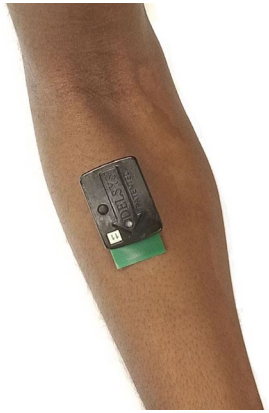
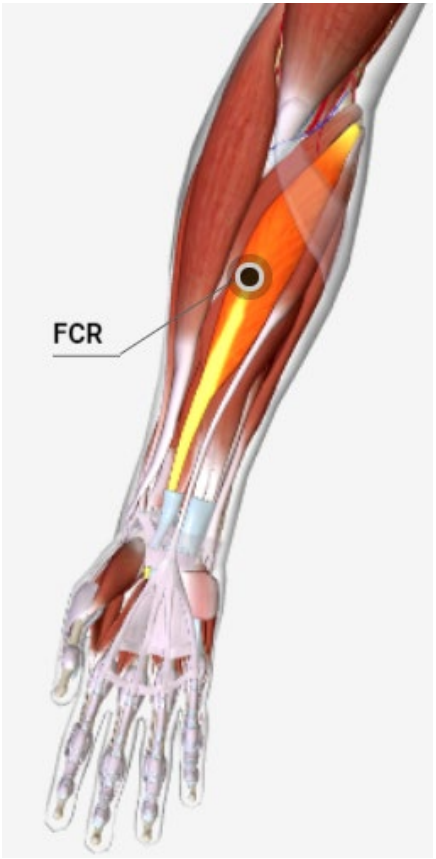
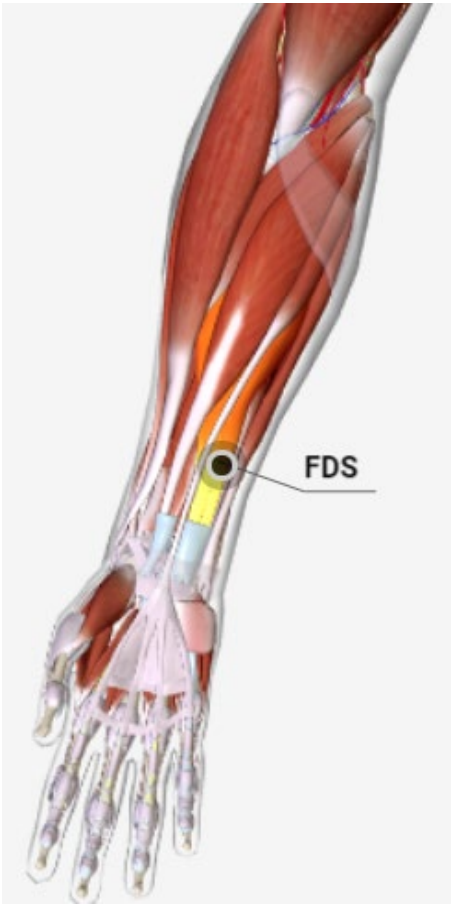
Extrinsic Flexors

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Brachioradialis (BD)	Located midway between the biceps tendon and lateral epicondyle along the flexor crease.	Stand in front of the patient, on the test side. The hand applying resistance is contoured over the volar (flexor) surface of the forearm proximal to the wrist. The other forearm is placed over the anterior surface of the upper arm and applies counterforce by resisting any upper arm movement. • Verbal instruction: "Bend your elbow. Hold it. Don't let me pull it down."		 

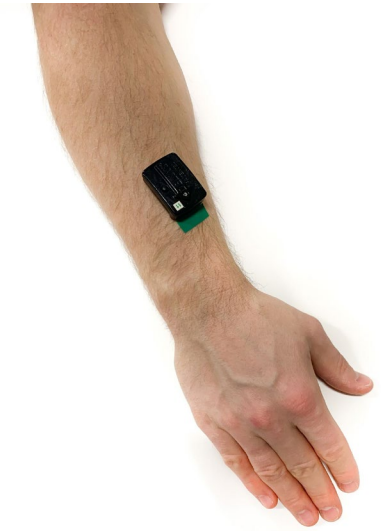
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Flexor carpi radialis (FCR)	Located three to four fingerbreadths distal to the midpoint of the line connecting the medial epicondyle and biceps tendon.	One hand supports the patient's forearm under the wrist. • Verbal instruction: "Bend your wrist. Hold it. Don't let me pull it down. Keep your fingers relaxed."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Flexor carpi ulnaris (FCU)	Lies two fingerbreadths volar to the ulna at the junction of the upper and middle thirds of the forearm.	One hand supports the patient's forearm under the wrist. Place the wrist in ulnar deviation and slightly extend it. Resistance is applied over the fifth metacarpal in the direction of extension and radial deviation. • Verbal instruction: "Bend your wrist. Hold it. Don't let me pull it down. Keep your fingers relaxed."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Flexor Digitorum superficialis (FDS)	Located as close to the longitudinal midline of the muscle as possible. The sensor needs to be positioned slightly more lateral and inferior.	Angle the wrist slightly upwards, with no movement. Have the patient flex the finger and apply resistance.		 

Extrinsic Extensors

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Extensor Pollicis Brevis (EPB)	Located in the pronated forearm, midway between the styloid process and the lateral epicondyle. Lies just lateral to the ulna bone and deep to the extensor indicis communis.	Have the patient extend the thumb. ● Verbal instruction: “Straighten the end of your thumb. Hold it. Don’t let me push down.”		

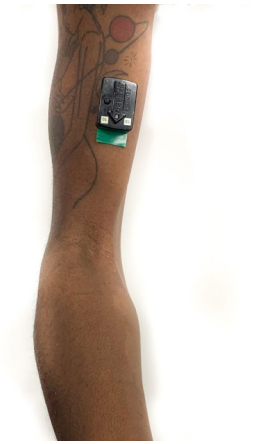
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Abductor pollicis longus (APL)	The junction of the upper and middle thirds of a line joining the medial epicondyle and the middle volar surface of the wrist.	Stabilize the metacarpals of the four fingers and the wrist. Resistance is given on the distal end of the 1st metacarpal in the direction of adduction. • Verbal instruction: "Lift your thumb straight up."		 

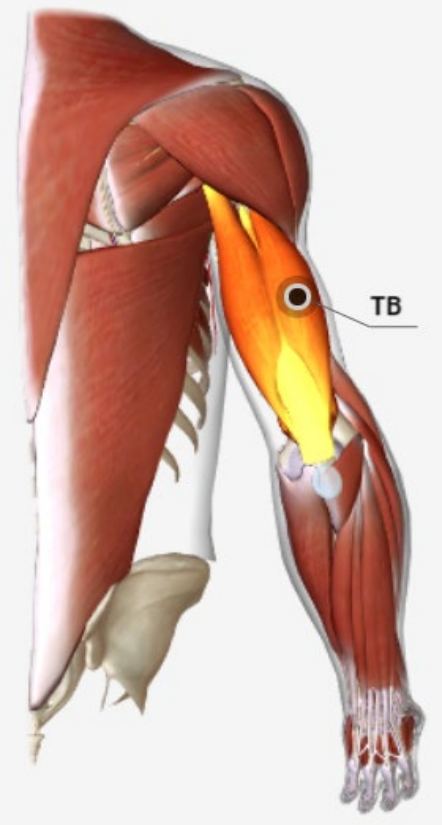
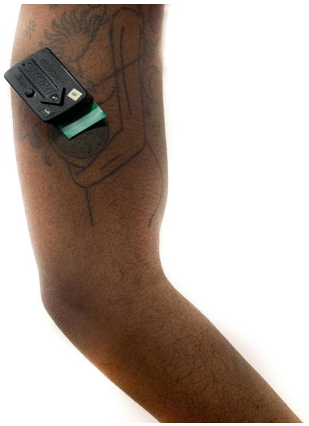
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Extensor carpi radialis brevis (ECRB)	With the elbow at approximately 90 degrees and the forearm in a mid-pronated position, the sensor is placed on the lateral and dorsal aspect of the forearm.	Sitting or standing at a diagonal in front of the patient, support the patient's forearm. Place the hand used for resistance over the dorsal (extensor) surface of the metacarpals. • Verbal instruction: "Push wrist towards left shoulder."		

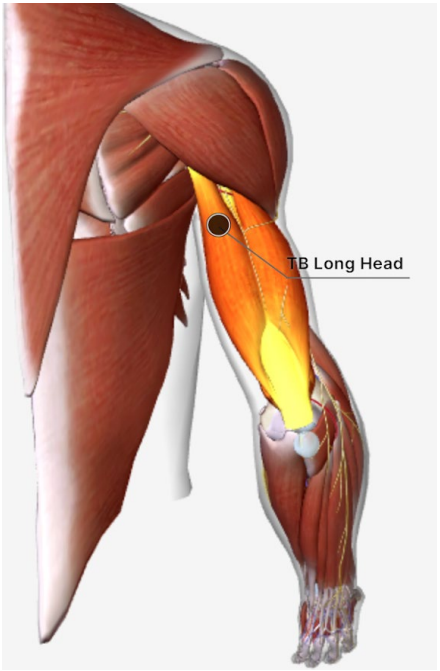
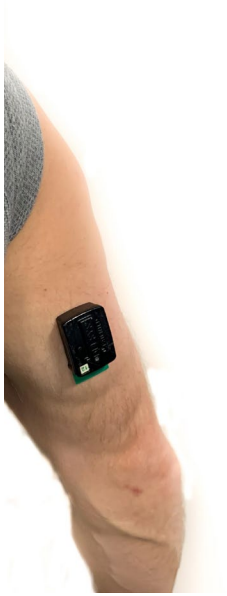
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Extensor carpi radialis longus (ECRL)	Located approximately two fingerbreadths distal to the lateral epicondyle.	Sitting or standing at a diagonal in front of the patient, support their forearm and place the hand used for resistance over the dorsal (extensor) surface of the metacarpals. • Verbal instruction: "Bring your wrist up. Hold it. Don't let me push it down."		 

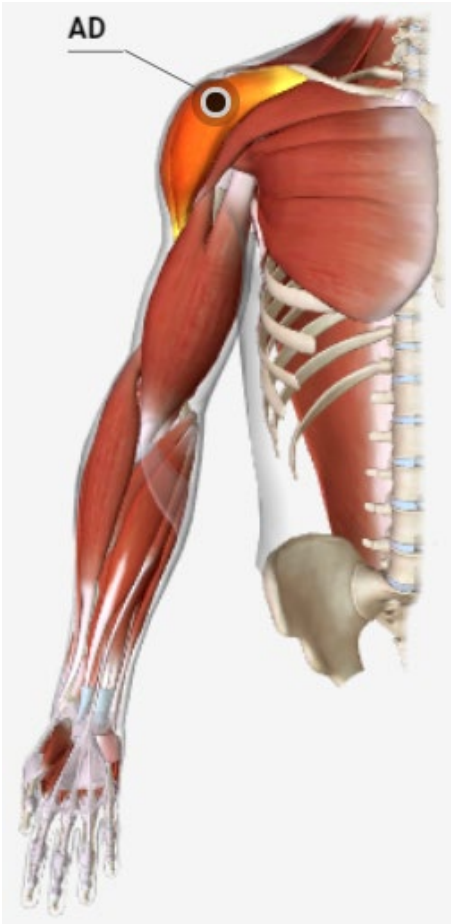
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Extensor carpi ulnaris (ECU)	Located just above the shaft of the ulna.	Sitting or standing at a diagonal in front of the patient, support their forearm and place the hand used for resistance over the dorsal (extensor) surface of metacarpals. Support the patient's wrist in extension. • Verbal instruction: "Bring your wrist up. Hold it. Don't let me push it down."		

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Extensor Digitorum Communis (EDC)	Located a third of the way down the forearm, at the midpoint between the radius and ulna.	Stabilize the wrist in a neutral position. Place the index finger of the resistance hand across the dorsum of all proximal phalanges just distal to the MP joints. Exert resistance in the direction of flexion. • Verbal instruction: "Bend your knuckles back as far as they will go."		

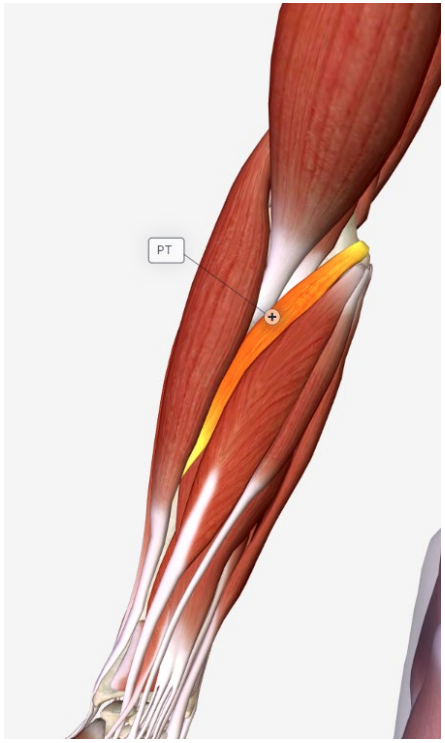
Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Biceps Brachii Long head (BB) or (BIC)	Electrodes need to be placed on, and in the direction of, the line between the medial acromion and the fossa cubit at 1/3 from the fossa cubit.	Have the patient flex the elbow with the hand supinated. • Verbal instruction: "Bring your elbow up into a bicep curl position."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Triceps Brachii lateral/short head (TB) or (TRI)	Electrodes need to be placed at 50% on, and in the direction of, the line between the posterior crista of the acromion and the olecranon at 2 finger-widths lateral to this line.	Have the patient extend the elbow while applying grip force (hand in fist).		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Triceps Brachii long head	Electrodes need to be placed in the direction of the line between the posterior crista of the acromion and the olecranon, medial and superior to the TB short head.	Have the patient extend the elbow while applying grip force.		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Anterior deltoid (AD) or (ADELT)	Placed at one finger width distal and anterior to the acromion. Should be oriented in the direction of the line between the acromion and the thumb.	Stand at the test side. The hand applying resistance is contoured over the distal humerus just above the elbow. The other hand may stabilize the shoulder. • Verbal instruction: "Raise your arm forward to shoulder height. Hold it. Don't let me push it down."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Posterior deltoid (PD)	The deltoid is located in the upper arms and shoulders. The posterior deltoid subdivision attaches to the spine of the scapula. The elctrode should be placed on the belly of this muscle in the direction of the thumb.	Stand at the side being tested. The hand applying resistance is contoured over the posterior arm just above the elbow. • Verbal instruction: "Lift your arm as high as you can. Hold it. Don't let me push it down."		 

Muscle	Sensor placement	Manual testing	Images (R UE)	Subject images
Pronator Teres (PT)	The pronator teres is located on the anterior forearm. The electrode should be placed between the midline and medial condyle, two finger widths below the cubital fossa.	Have the patient pronate their palm while maintaining grip strength (hand in a fist).		 

R UE = Right Upper Extremity
Anterior view = view from the front when the body is in standard anatomical position
Posterior view = view from behind when the body is in standard anatomical position

Images from: https://human.biodigital.com/index.html
MMT videos: https://ptedsolutions.com/manual-muscle-test-videos/

Sources

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