

**OptiHealth Institute**  
**Med-Fit Tech Assistant Course**  
**Learning Module #3**

## The Neuro-Muscular System

### Part C: The Muscular System

Skeletal muscles are attached to bones by **connective tissue**, either **directly** (usually at its origin) or through a **tendon** (usually at its insertion).

- **Origin** – where the muscle starts
- **Insertion** – where the muscle ends

Each muscle spans one or more **joints**. The contraction of a muscle generally moves the site of insertion toward the site of origin. The **function** of a muscle is described by the direction of the body part that moves.

**Each table below describes the Muscles involved in the body movements at a major joint.**

Hint: Search Google Images for each muscle by Name to view it in different orientations.

<b>NECK</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Body Location</b>	<b>Bone Origin</b>	<b>Bone Insertion</b>
Rotation C1-C2 Joint	<b>Sterno-Cliedo-Mastoidius</b>	Anterior Neck unilateral contraction	Sternum and Clavicle	Mastoid of Occipital
Flexion C2-C7 Joints	<b>Sterno-Cliedo-Mastoidius</b>	Anterior Neck bilateral contraction	Sternum and Clavicle	Mastoid of Occipital
Extension C2-C7 Joints	<b>Trapezius</b>	Posterior Upper Trunk	Vertebrae C7-T12	Protuberance of Occipital
Lateral Flexion C2-C7 Joints	<b>Scalenes</b>	Lateral Neck	Vertebrae C2-C7	Vertebrae C2-C7
The neck, with its stack of intervertebral disks and joints, allows circumduction and rotation movements of the head and neck by coordinated contractions of these muscles.				

<b>TRUNK</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Body Location</b>	<b>Bone Origin</b>	<b>Bone Insertion</b>
Flexion	<b>Rectus Abdominus</b>	Lower Anterior Trunk	Pubis of Pelvis	Ribs 5-7
Extension	<b>Erector Spinae</b>	Posterior Trunk	Vertebrae T1--L5	Vertebrae T1--L5
Lateral Flexion	<b>Quadratus Lumborum</b>	Lower Posterior Trunk	Ileum	Vertebrae L1--L5
The trunk, with its stack of intervertebral disks and joints, allows circumduction and rotation movements of itself by coordinated contractions of these muscles.				

<b>SHOULDER</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Flexion	<b>Pectoralis Major</b>	Anterior Upper Trunk	Sternum and Ribs 1-6	Humerus
Extension	<b>Latissimus Dorsi</b>	Posterior Upper Trunk	Scapula	Humerus
Abduction	<b>Deltoid</b>	Shoulder	Clavicle and Scapula	Humerus
Adduction	<b>Pectoralis Major, Latissimus Dorsi</b>	Upper Trunk	Sternum, Ribs, and Scapula	Humerus
The shoulder, as a ball-and-socket joint, allows circumduction and rotation movements of the arm by coordinated contractions of these muscles.				

<b>ELBOW</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Strong Flexion	<b>Biceps Brachii</b>	Anterior Arm	Upper Humerus	Proximal Radius
Weak Flexion	<b>Brachioradialis</b>	Lateral Forearm	Lower Humerus	Distal Radius
Strong Extension	<b>Triceps Brachii</b>	Posterior Arm	Humerus	Olecranon of Ulna
Pronation	<b>Pronator Teres</b>	Anterior Forearm	Proximal Ulna	Radius
Pronation	<b>Pronator Quadratus</b>	Anterior Forearm	Distal Ulna	Radius
Supination	<b>Supinator</b>	Posterior Forearm	Humerus And Ulna	Radius
The elbow, as a hinge joint, allows only flexion and extension movements. Pronation and supination movements occur distal to the elbow in the forearm.				

<b>WRIST</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Flexion and Abduction	<b>Flexor Carpi Radialis</b>	Lateral Anterior Forearm	Radius	Carpals
Flexion and Adduction	<b>Flexor Carpi Ulnaris</b>	Medial Anterior Forearm	Ulna	Carpals
Extension and Abduction	<b>Extensor Carpi Radialis</b>	Lateral Posterior Forearm	Radius	Carpals
Extension and Adduction	<b>Extensor Carpi Ulnaris</b>	Medial Anterior Forearm	Ulna	Carpals

The wrist, with its multiple joints, allows circumduction movement of the hand by coordinated contractions of these muscles.

<b>FINGERS</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Flexion Proximal	<b>Flexor Digitorum Superficialis</b>	Superficial Anterior Forearm	Radius and Ulna	Proximal Phalanges
Flexion Distal	<b>Flexor Digitorum Profundis</b>	Deep Anterior Forearm	Radius and Ulna	Distal Phalanges
Extension	<b>Extensor Digitorum</b>	Posterior Forearm	Radius and Ulna	Phalanges

The thumb has its own set of muscles for independent flexion, extension, and ab/ad-duction. Flexor pollicis longus & brevis, Extensor pollicis longus & brevis, Abductor pollicis longus & brevis.

<b>HIP</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Flexion	<b>Psoas Major</b>	Internal Lower Trunk	Lumbar Vertebrae	Femur
Flexion	<b>Iliacus</b>	Internal Pelvis	Ilium	Femur
Extension	<b>Gluteus Maximus</b>	Posterior Pelvis	Ilium and Sacrum	Femur
Abduction	<b>Gluteus Medius and Minimus</b>	Lateral Pelvis	Ilium	Femur
Adduction	<b>Adductor Magnus, Longus, &amp; Brevis</b>	Medial Upper Thigh	Pubis of Pelvis	Femur

The hip, as a ball-and-socket joint, allows circumduction and rotation movements of the thigh by coordinated contractions of these muscles.

<b>KNEE</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Extension	Quadriceps	Anterior Thigh	Femur	Tibia
Flexion	Biceps Femoris	Posterior Thigh	Ischium of Pelvis	Tibia and Fibula
<p>The Quadriceps include: Rectus Femoris and the Vastus Lateralis, Intermedius, and Medialis.  The Hamstrings include: Biceps Femoris, Semimembranosus, and Semitendinosus.  The Patella (kneecap) is a sesamoid bone embedded in the Quadricep tendon.</p>				

<b>ANKLE</b>				
<b>Movement</b>	<b>Muscle</b>	<b>Location</b>	<b>Origin</b>	<b>Insertion</b>
Dorsiflexion and Inversion	<b>Tibialis Anterior</b>	Antero-Lateral Leg	Tibia	Tarsals
Plantar Flexion	<b>Gastrocnemius</b>	Upper Posterior Leg	Distal Femur	Calcaneus
Plantar Flexion	<b>Soleus</b>	Lower Posterior Leg	Tibia and Fibula	Calcaneus
<p>The ankle, with its multiple joints, allows circumduction movement of the foot by coordinated contractions of these muscles. The Calcaneus is the large “heel” tarsal bone.</p>				

### **Module 3: LAB**

In front of a full-length mirror, locate each major joint region or structure of your body (neck, shoulder, elbow, etc.) and practice reciting the movements at each joint and the muscles that cause each movement.

For extra credit, name the bones where each muscle attaches and inserts.

Muscles to know for the Certification Exam include:

- Sterno-Cleido-Mastoidius (SCM)
- Deltoid
- Pectoralis Major
- Latissimus Dorsi
- Biceps Brachii
- Triceps Brachii
- Flexor Carpi Ulnaris
- Pronator Teres
- Quadratus Lumborum
- Rectus Abdominus
- Psoas Major
- Gluteus Maximus
- Adductor Magnus
- Quadriceps
- Hamstrings
- Gastrocnemius