

Locomotor system

The muscles acting upon the shoulder girdle (sternoclavicular and acromioclavicular joints)

Muscles elevating the shoulder (muscles elevating the acromial end of clavícula and scapula): (max. 40°)

m. levator scapulae,
m. trapezius pars descendens,
mm. rhomboidei,
m. sternocleidomastoideus pars clavicularis

Muscles depressing the shoulder (muscles depressing the acromial end of clavícula and scapula): (max. 10°)

m. trapezius pars ascendens,
m. pectoralis minor,
m. pectoralis major pars abdominalis,
m. serratus anterior pars inferior,
m. latissimus dorsi,
m. subclavius.

Muscles pulling the shoulder forward (muscles moving the acromial end of the clavicle forwards and the scapula ventro-laterally): (25-30°)

m. serratus anterior,
m. pectoralis major
m. pectoralis minor,
m. trapezius pars descendens.

Muscles pulling the shoulder backwards (muscles moving the acromial end of the clavicle backward and the scapula dorso-medially): (20-25°)

m. trapezius pars transversa
mm. rhomboidei,
m. latissimus dorsi,
m. sternocleidomastoideus pars clav.

Muscles elevating the arm above the horizontal plane and rotates the clavicle backwards: (150-170°)

m. serratus anterior,
m. trapezius pars descendens.

Muscle depressing the arm up to the horizontal plane and rotates the clavicle forward:

m. pectoralis major

Shoulder joint: The muscles moving the arm

Anteflexion of the arm – up to the horizontal plane:

m. deltoideus pars clavicularis,
m. biceps brachii,
m. pectoralis major pars clavicularis,
m. coracobrachialis.

Retroflexion of the arm: (max. 40°)

m. deltoideus pars posterior,
m. teres major,
m. latissimus dorsi.

Abductor muscles of the arm – up to the horizontal plane (90°):

m. deltoideus pars acromialis,
m. supraspinatus,
m. biceps brachii caput longum.

Adductor muscle of the arm: (10-40°)

m. pectoralis major,
m. teres major,
m. latissimus dorsi,
m. triceps brachii caput longum,
m. biceps brachii caput breve,
m. infraspinatus,
m. teres minor,

m. subscapularis,
m. coracobrachialis.

Abductor muscles elevating the arm above the horizontal plane: (160-180°)

m. serratus anterior,
m. trapezius pars descendens.

Lateral rotator muscles of the arm: (max. 60°)

m. infraspinatus,
m. teres minor,
m. deltoideus pars posterior.

Medial rotator muscles of the arm: (max. 70°)

m. subscapularis,
m. pectoralis major,
m. biceps brachii,
m. teres major,
m. latissimus dorsi,
m. deltoideus pars clavicularis.

Elbow joint: The muscles moving the forearm**Flexor muscles of the elbow joint (forearm):**
(max. 150°)

m. biceps brachii,
m. brachialis,
m. brachioradialis,
 m. pronator teres,
 m. flexor carpi radialis,
 m. palmaris longus,
 m. extensor carpi radialis longus,
 m. extensor carpi radialis brevis.

Extensor muscle of the elbow joint (forearm):
(max. 10° hyperextension)

m. triceps brachii.

Supinator muscles of the radioulnar joints:
(80-90°)

m. biceps brachii,
m. supinator,
 m. abductor pollicis longus,
 m. extensor pollicis longus.

Pronator muscles of the radioulnar joints:
(80-90°)

m. pronator teres,
m. pronator quadratus,
 m. flexor carpi radialis.

m. brachioradialis brings the forearm to midposition.

Wrist joint: The movements of the hand**Palmarflexion:** (60-90°)

m. flexor digitorum superficialis
m. flexor digitorum profundus,
m. flexor carpi ulnaris,
 m. flexor carpi radialis,
 m. flexor pollicis longus,
 m. abductor pollicis longus,
 m. palmaris longus (insignificant).

Dorsalflexion: (40-90°)

m. extensor digitorum,
m. extensor carpi ulnaris,
m. extensor carpi radialis longus,
m. extensor carpi radialis brevis,
 m. extensor indicis,
 m. extensor pollicis longus.

Radial abduction:
(25-30°)

m. extensor carpi radialis longus,
 m. extensor carpi radialis brevis,
 m. abductor pollicis longus,
 m. extensor pollicis longus,
 m. extensor indicis,
 m. flexor carpi radialis.

Ulnar abduction:
(35-40°)

m. extensor carpi ulnaris,
m. flexor carpi ulnaris.

The muscles moving the thumb at the first carpometacarpal joint:**Flexor muscles of the thumb:** (max. 60°)

m. flexor pollicis longus,
m. flexor pollicis brevis,
 m. abductor pollicis brevis,
 m. adductor pollicis (oblique head),
 m. opponens pollicis.

Extensor muscles of the thumb:

m. extensor pollicis longus,
m. extensor pollicis brevis,
m. abductor pollicis longus.

Abductor muscles of the thumb: (35-40°)

m. abductor pollicis longus,
m. abductor pollicis brevis,
m. opponens pollicis,
m. flexor pollicis brevis (superficial head),

Adductor muscles of the thumb:

m. adductor pollicis,
 m. extensor pollicis longus.

Opposition of the thumb:

m. opponens pollicis,
m. adductor pollicis,
m. flexor pollicis longus,
m. flexor pollicis brevis,
 m. abductor pollicis brevis.

Reposition of the thumb:

m. abductor pollicis longus,
m. extensor pollicis longus,
 m. extensor pollicis brevis,

The movements of the fingers

The movements of the thumb

Metacarpo-phalangeal joint of the thumb

Flexor muscles of the proximal phalanx of the thumb: (max. 70°)

m. flexor pollicis longus,
m. flexor pollicis brevis,
m. abductor pollicis brevis,
m. adductor pollicis.

Extensor muscles of the proximal phalanx of the thumb:

m. extensor pollicis longus,
m. extensor pollicis brevis.

Interphalangeal joint of the thumb

Flexor muscle of the distal phalanx of the thumb: (max. 40°)

m. flexor pollicis longus.

Extensor muscle of the distal phalanx of the thumb:

m. extensor pollicis longus.

The movements of the proximal phalanges of the II-V. fingers

Metacarpo-phalangeal joints

Flexor muscles of the proximal phalanges: (90°)

m. flexor digitorum superficialis,
m. flexor digitorum profundus,
mm. lumbricales,
mm. interossei palmares,
mm. interossei dorsales,
m. flexor digiti minimi,
m. abductor digiti minimi (little finger).

Extensor muscles of the proximal phalanges: (20° hyperextensio)

m. extensor digitorum,
m. extensor indicis (index),
m. extensor digiti minimi (little finger).

Abductor muscles of the proximal phalanges: (max. 40°)

mm. interossei dorsales,
m. abductor digiti minimi (little finger).

Adductor muscles of the proximal phalanges:

mm. interossei palmares,
m. extensor indicis (index),
m. extensor digiti minimi (little finger).

The movements of the middle phalanges of the II-V. fingers

Proximal interphalangeal joint

Flexor muscles of the middle phalanges: (max. 110°)

m. flexor digitorum superficialis,
m. flexor digitorum profundus.

Extensor muscles of the middle phalanges:

m. extensor digitorum,
mm. lumbricales,
mm. interossei,
m. extensor indicis (index),
m. extensor digiti minimi (little finger),
m. abductor digiti minimi (little finger).

The movements of the distal phalanges of the II-V. fingers

Distal interphalangeal joint

Flexor muscle of the distal phalanges: (max. 90°)

m. flexor digitorum profundus.

Extensor muscles of the distal phalanges: (max. 5°)

m. extensor digitorum,
mm. lumbricales,
mm. interossei,
m. extensor indicis (index),
m. extensor digiti minimi (little finger).

The movements of the lower limb
The muscles acting upon the hip joint

Muscles elevating the thigh (anteflexion): (with flexed knee joint max. 130-140°):

m. iliopsoas,
m. rectus femoris,
m. tensor fasciae latae,
m. sartorius,
m. pectineus,
m. adductor longus.

Retroflexion of the thigh:
 (15°, with abduction 45°)

m. gluteus maximus,
m. semimembranosus,
m. semitendinosus,
m. biceps femoris caput longum,
m. adductor magnus pars posterior,
m. gluteus medius pars posterior,
m. obturator externus.

Abductor muscle of the thigh:

(50°, in flexion 80°)
m. gluteus medius,
m. gluteus minimus,
m. tensor fasciae latae,
m. rectus femoris,
m. piriformis,
m. sartorius.

Adductor muscles of the thigh:

(10°, in flexion 30°)
m. adductor magnus,
m. pectineus,
m. adductor longus,
m. adductor brevis,
m. gracilis,
m. gluteus maximus pars caudalis,
m. iliopsoas,
m. semimembranosus,
m. obturator internus,
m. quadratus femoris.

Medial rotator muscles of the thigh:

(30°, in flexion 40°)
m. gluteus medius pars ventralis,
m. gluteus minimus pars ventralis,
m. tensor fasciae latae,
m. adductor magnus pars cranialis,
m. adductor longus.

Lateral rotator muscles of the thigh:

(15°, in flexion 60°)
m. gluteus maximus,
m. gluteus medius pars dorsalis,
m. gluteus minimus pars dorsalis,
m. obturator internus,
m. piriformis,
m. quadratus femoris,
mm. gemelli,
m. obturator externus,
m. pectineus,
m. iliopsoas,
m. sartorius.

The muscles acting upon the knee joint

Flexor muscles of the leg:

(max. 130°)
m. semimembranosus,
m. semitendinosus,
m. biceps femoris,
m. gracilis,
m. sartorius,
m. popliteus,
m. gastrocnemius.

Extensor muscles of the leg:

(max. 180°)
m. quadriceps femoris,
m. tensor fasciae latae.

Medial rotator muscles of the leg:

(10°)
m. semimembranosus,
m. semitendinosus,
m. gracilis,
m. sartorius.

Lateral rotator muscles of the leg:

(40°)
m. biceps femoris,
m. tensor fasciae latae.

The muscles acting upon the foot**Talotarsal joint (upper ankle joint)****Dorsalflexion of the foot:**

(25-45°)

m. tibialis anterior,
m. extensor digitorum longus,
m. extensor hallucis longus.

Plantarflexion of the foot:

(30-60°)

m. triceps surae,
m. flexor hallucis longus,
m. peroneus longus,
m. tibialis posterior,
m. flexor digitorum longus,
m. peroneus brevis.

Lower ankle joint**Supinator muscles of the foot (adductor, plantarflexor and medial rotator muscles as well): (30°) - Inversion**

m. triceps surae,
m. tibialis posterior,
m. flexor hallucis longus,
m. flexor digitorum longus,
m. tibialis anterior,
m. extensor hallucis longus.

Pronator muscles of the foot (abductor, dorsalflexor and lateral rotator muscles as well): (30°) - Eversion

m. peroneus longus,
m. peroneus brevis,
m. extensor digitorum longus,
m. peroneus tertius.

The muscles acting upon the toes**Plantarflexion of the hallux (big toe): (40°)**

m. flexor hallucis longus,
m. flexor hallucis brevis,
m. abductor hallucis,
m. adductor hallucis.

Dorsalflexion of the hallux (big toe): (55°)

m. extensor hallucis longus,
m. extensor hallucis brevis.

Abductor muscle of the big toe:

m. abductor hallucis.

Adductor muscle of the big toe:

m. adductor hallucis.

Plantarflexion of the II-V. toes:

(40°)

m. flexor digitorum longus,
m. flexor digitorum brevis,
mm. interossei,
mm. lumbricales,
m. flexor digiti minimi brevis,
m. abductor digiti minimi.

Dorsalflexion of the II-V. toes:

(55°)

m. extensor digitorum longus,
m. extensor digitorum brevis.

Abductor muscles of the II-V. toes:

mm. interossei dorsales,
m. abductor digiti minimi.

Adductor muscles of the II-V. toes:

mm. interossei plantares,
m. opponens digiti minimi.

The movements of the spine

Dorsalflexion of the spine:

m. erector spinae.

Ventralflexion of the spine:

m. rectus abdominis (bilat.),
m. obliquus externus abdominis (bilat.),
m. obliquus internus abdominis (bilat.),
m. psoas major (bilat., at fixed lower limb).

Lateralflexion of the spine:

m. erector spinae,

m. quadratus lumborum,
m. rectus abdominis,
m. obliquus externus abdominis,
m. obliquus internus abdominis.

Rotatory muscles of the spine:

m. erector spinae (transversospinal and spinotransversal muscles:
mm. rotatores,
mm. multifidus,
m. semispinalis,
m. splenius);
unilat. m. obliquus externus abdominis and
contralat. m. obliquus internus abdominis together.

The movements of the head

Atlanto-occipital joint

Dorsalflexion of the head:

m. semispinalis capitis (bilat.),
m. longissimus capitis (bilat.),
m. splenius capitis (bilat.),
m. sternocleidomastoideus (bilat.),
m. rectus capitis posterior major (bilat.),
m. rectus capitis posterior minor (bilat.),
m. obliquus capitis superior (bilat.)
m. trapezius.

Ventralflexion of the head:

m. rectus capitis anterior (bilat.),
supra- and infrahyoid muscles (bilat.),
m. sternocleidomastoideus (bilat., if the
flexion is in process).

Lateralflexion of the head:

m. sternocleidomastoideus,
m. splenius capitis,
m. longissimus capitis,
m. rectus capitis lateralis,

Atlanto-axial joint:

Rotatory muscles of the head:

m. longissimus capitis,
m. splenius capitis,
m. sternocleidomastoideus (contralat.),
m. rectus capitis posterior major,
m. obliquus capitis inferior,
m. trapezius (contralat.).

The movements of the lower jaw

Temporo-mandibular joint

Muscles elevating the mandible:

m. masseter,
m. pterygoideus medialis,
m. temporalis.

Muscles depressing the mandible:

m. pterygoideus lateralis,
the supra- and infrahyoid muscles and the
gravity together

Muscle protruding the mandible:

m. pterygoideus lateralis,

Muscle retracting the mandible:

lower third of the m. temporalis.

Grinding movements

Muscles pulling the head of the mandible obliquely forward on one side:

m. pterygoideus lateralis,
m. masseter,
m. pterygoideus medialis,

Muscle retracting the head of the mandible on the other side:

lower third of the m. temporalis and the
muscles assuring the proper pressure during mastication:
m. masseter,
m. pterygoideus medialis,
m. temporalis.