

The Concise Book of Yoga Anatomy

An Illustrated Guide to the
Science of Motion

Jo Ann Staugaard-Jones

Exam Edition

NielAsher.

Continued Education for Manual Therapists



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About this Book

This book is designed in quick-reference format to offer useful information about the main skeletal muscles that are central to yoga. It is my belief that yoga styles that include the limb of yoga called *asana*¹ (which has evolved to become a term that signifies all yoga postures) should be taught and practiced in a way that is comfortable, stable, balanced, and without pain. Understanding the science of the body and of motion will help one to achieve this.

To assist your understanding of the biomechanics of the body, each muscle section is color-coded for ease of reference. Enough detail is included regarding the muscle's origin, insertion, and action to meet the requirements of the student, practitioner, and teacher of all yoga movement. The book aims to present that information accurately, in a clear and user-friendly format, especially as anatomy and kinesiology can seem heavily laden with terminology. Technical terms are therefore explained throughout the text.

Major muscles are identified and asana illustrations help to show how they are working in relation to the particular posture. Each asana is listed in Sanskrit (phonetically, with definition) and English, with sections to describe awareness, joint actions, alignment, technique, helpful hints, and counter poses (postures that are helpful to counteract the illustrated asana). Knowledge of all this is paramount to the ability to teach or practice with no injury to oneself or to others. As mechanics are emphasized and learned, I ask that you take the time to then realize the *essence* of the pose or movement in relation to the yogic way of life, for it is necessary to focus on the spiritual element of yoga as well as the physical. Yoga is a union of the two, so where appropriate, the more profound side of the practice is mentioned as it relates to the body.

As an example, when one sits in meditation in *Sukhasana* (Easy Pose), the postural aspects can be the beginning of the process, but as breathing and subtle energies are incorporated, the fundamental nature might be the stillness of the mind in order to reach inner awareness. Explore each posture and consider more deeply what the asana means for you.

In what is termed *Hatha Yoga* (the foundational form represented in this book), the sun and the moon represent the two polar energies of the human body. The word *hatha* itself, divided into syllables of “ha” and “tha,” suggests the solar and lunar energies. *Atha* is also defined as now, *yoga* as union, balance.

When faced with the choice of what yoga style to study, I chose one with strong tradition and science interwoven. Hatha yoga provides the all-important deep breath work, support, strength, flexibility, and progression needed to lead one to a well-balanced and profound practice. Attention is given not only to the gross anatomy stated in this book, but the subtle yet powerful physical and energetic forces of the body as well.

Thus, asana can lead one to going inward, with effortless breath, stillness, and meditation, as “complete mastery over the roaming tendencies of the mind is Yoga.” (Tigunait, 2014)

In *The Concise Book of Yoga Anatomy* you will not find the asanas categorized under type, such as “Standing”, but placed under a specific muscle that is used in that posture. It is yet another way to look at the anatomy of yoga.

As students, guides, and facilitators of yoga, and as human beings looking to understand the physical, mental, and spiritual aspects, we can use yoga as a blueprint toward the study of form and the philosophy of living: “do no harm” (in Sanskrit, *ahimsa*).

People do yoga for many reasons; whatever the basis, yoga is always a path to truth. This can be blocked if there is pain. My contribution in teaching Yoga Anatomy and Kinesiology is to help people be free from injury in asanas, and to become less mechanical and more aware, open, and able to move toward their own true selves.

Jo Ann Staugaard-Jones www.move-live.com

1

The Moving Body

Guide to the Nervous System

The human nervous system controls the functions of each different system of the body by means of neurons. It has two parts:

1. Central nervous system (CNS): encompasses the brain and spinal cord. This system enables us to think, learn, reason, and maintain balance.
2. Peripheral nervous system (PNS): located outside the brain and spinal cord, in the outer parts of the body. This system helps us to carry out voluntary and involuntary actions and enables feeling through the senses.

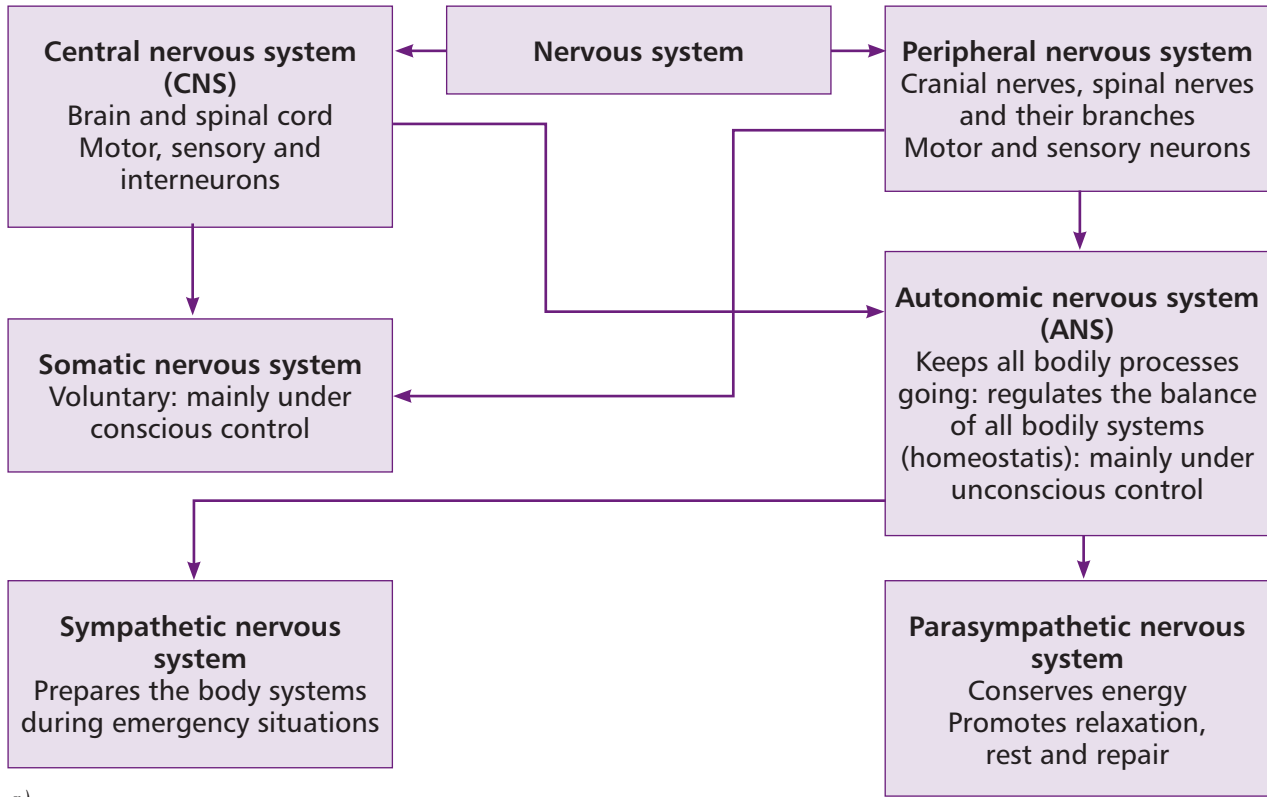
The PNS comprises the following:

1. Autonomic nervous system (ANS): responsible for regulating the internal organs and glands; it controls involuntary actions. The ANS consists of three subsystems:
 - i. Sympathetic nervous system: activates what is commonly known as the “fight or flight” response.
 - ii. Parasympathetic nervous system: stimulates what are referred to as “rest and digest” activities.
 - iii. Enteric nervous system: controls the gastrointestinal system in vertebrates.
2. Somatic nervous system (SNS): carries information from nerves to the CNS and from the CNS to the muscles and sensory fibers; it is associated with voluntary muscle control.

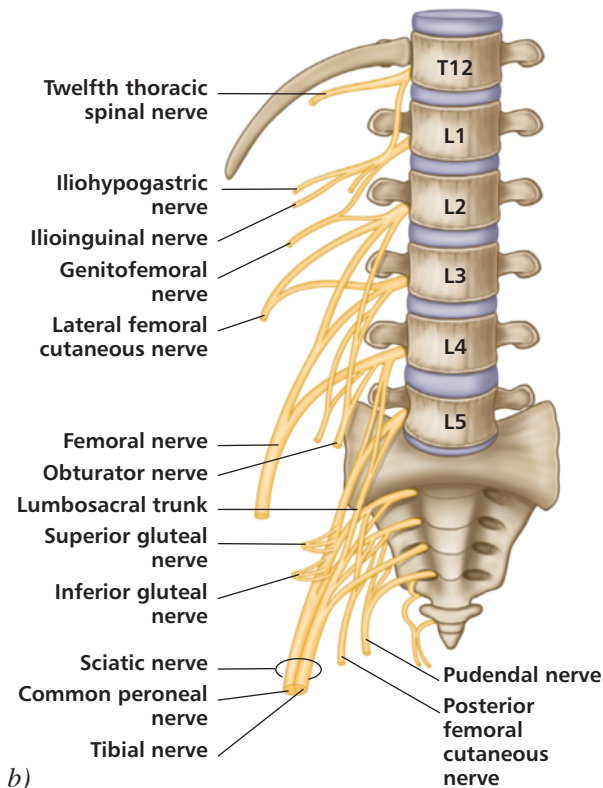
The practice of somatics is noted in this book as, quite simply, using the body’s intelligence. The integration of the mind, body, and feelings to allow the body’s non-verbal communication system to respond in a healthy way is key to wellness. Somatic healing is about getting in touch with the “sixth sense” (intuitive response) to facilitate a breakthrough in personal health. It is about listening to a language of immediate experiences. Kinesthetic awareness is part of this: being present, listening to the body, and being conscious and knowledgeable about where our bodies are in space and what is happening anatomically is paramount to yoga. A well-balanced, continual yoga practice leads to muscle memory and intelligence through nerve impulse as well. The nervous system is extremely complex. Try to follow the pathway of just one nerve, the genitofemoral. This nerve

- is part of the upper region of the lumbar plexus, one of three components of the larger lumbosacral plexus of the lower vertebral column;
- originates from L1 and L2 nerve roots;
- emerges on the anterior surface of the psoas major muscle, where the lumbar plexus is embedded and has many branches;
- divides into a femoral branch and a genital branch;
- supplies the skin anterior to the upper part of the femoral triangle;
- in males, travels through the inguinal canal, supplying the cremaster muscle (covering the testes) and scrotal skin;
- in females, ends in the skin of the mons pubis (anterior portion of the vulva) and the labia majora. The function of these branches of the genitofemoral nerve is sensory in both genders.

Relationship Between Different Parts of the Nervous Systems



a)



b)

This information is included to prove how difficult it is to deal with neurology in yoga. However, the nerve complex can be referred to if one has the knowledge to do so.

Nerve Entrapment

Nerve entrapment is compression that may become a source of pain and can be reduced if practicing the correct asanas. (The expression “pinched nerve” usually refers to carpal tunnel syndrome or sciatica, but it is applicable to any pressure on a particular nerve or group of nerves.) As an example, when a person experiences sciatica, it is usually indicated by pain along the path of the sciatic nerve from the spine into the posterior thigh. A common muscle that can trap this nerve is the piriformis (Chapter 8). A yoga practitioner can use any number of stretches or postures (such as a supine twist) to relax this muscle, thus lessening the pressure on the sciatic nerve that passes behind it.

Figure 1.1: a) Nervous system table; b) Genitofemoral nerve.

Another example of nerve impingement that might be relieved by yoga is in the brachial plexus area. This is a network of nerves that sends signals from the spine to the shoulder, arm, and hand. A brachial plexus injury occurs when these nerves are stretched, pinched, or even torn (this would require surgery). This area is compromised if the posture of the neck or shoulders (such as rounding) interferes with the path of a nerve impulse. Any yoga posture that emphasizes spine extension and shoulder placement (typically “back and down”)—for example Mountain Pose (*Tadasana*)—will help to open this area.

Causes are specific to the area of concern and can range from degenerating discs, bone spurs, arthritis, and muscle dysfunction to injury and emotional trauma causing muscle tension. It is best to have a licensed therapist, physician, or neurologist diagnose the condition.

It has been proven that nerve entrapment may be relieved through muscular release. Some asanas can do this.

A Note About Peripheral Nerve Supply

The relevant peripheral nerve supply is listed with each muscle presented in this book, for those who want to know. However, information about the spinal segment² from which the nerve fibers emanate often differs among sources. This is because it is extremely difficult for anatomists to trace the route of an individual nerve fiber through the intertwining maze of other nerve fibers as it passes through its plexus (plexus = a network of nerves: from the Latin word *plectere*, meaning “to braid”). The most applicable nerve roots for each muscle have been adopted for this book.

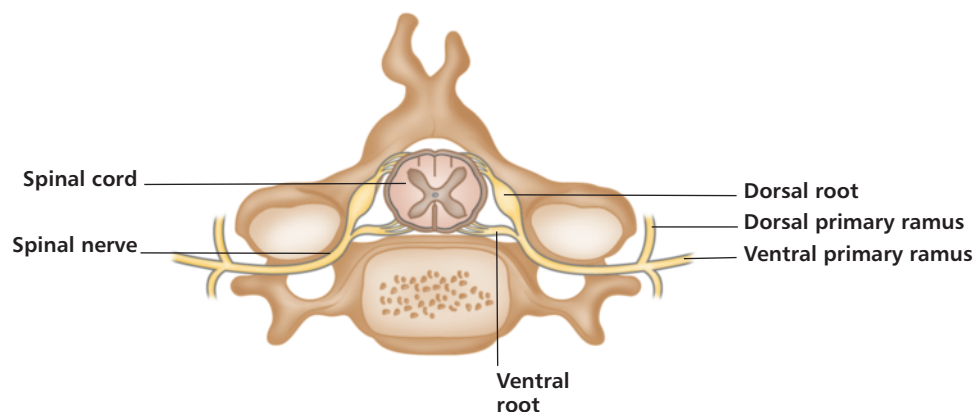


Figure 1.2: A spinal segment showing the nerve roots combining to form a spinal nerve, which then divides into ventral and dorsal rami.

² A spinal segment is the part of the spinal cord that gives rise to each pair of spinal nerves (a pair consists of one nerve for the left side of the body and one for the right side). Each spinal nerve contains motor and sensory fibers. Soon after the spinal nerve exits through the foramen (the opening between adjacent vertebrae), it divides into a dorsal primary ramus (directed posteriorly) and a ventral primary ramus (directed laterally or anteriorly). Fibers from the dorsal rami innervate the skin and extensor muscles of the neck and trunk. The ventral rami supply the limbs, in addition to the sides and front of the trunk.

Anatomical Orientation

Anatomical Directions

To describe the relative positions of body parts and their movements, it is essential to have a universally accepted reference position. The standard body position, known as the “anatomical position,” serves as this reference. Anatomical position is simply standing upright with arms hanging by the sides, palms facing forward (see Figure 1.3). Most directional terminology used refers to the body as if it were in the anatomical position, regardless of its actual position. Note also that the terms “left” and “right” refer to the sides of the object or person being viewed and not those of the reader.

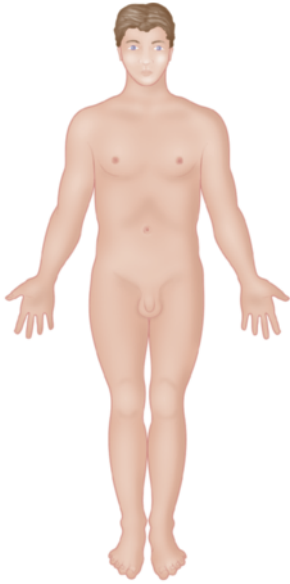


Figure 1.3: Anterior
In front of; toward or at the front of the body.

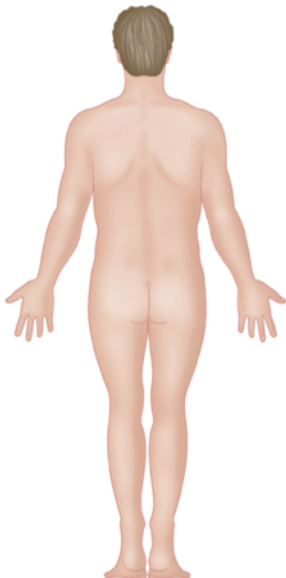


Figure 1.4: Posterior
Behind; toward or at the back of the body.

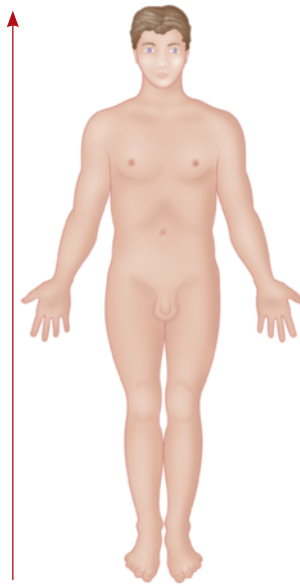


Figure 1.5: Superior
Above; toward the head or upper part of the structure or body.

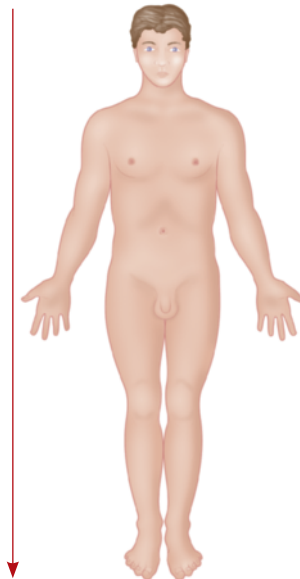


Figure 1.6: Inferior
Below; away from the head or toward the lower part of the structure or body.

Planes of the Body

The term “planes” refers to two-dimensional sections through the body. They provide a view of the body or body part, as though it has been cut through by an imaginary line.

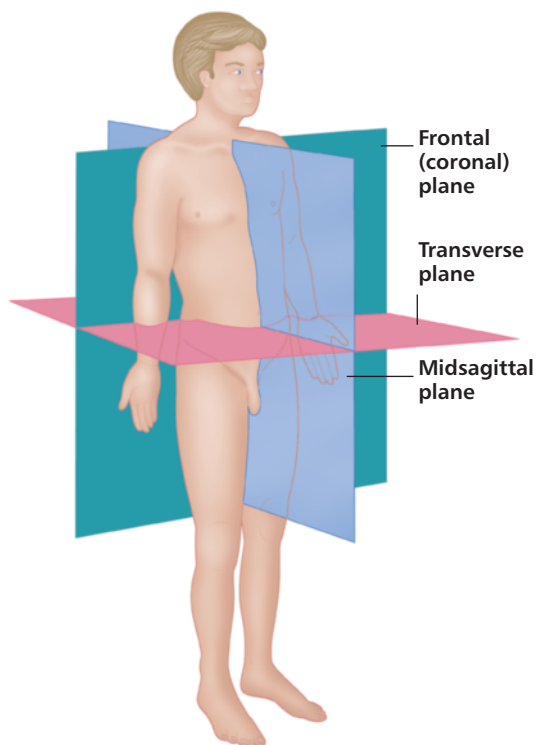


Figure 1.16: Planes of the body.

- The sagittal planes cut vertically through the body from anterior to posterior, dividing it into right and left halves. Figure 1.16 shows the midsagittal plane.
- The frontal (coronal) planes pass vertically through the body, dividing it into anterior and posterior sections, and lie at right angles to the sagittal plane.
- The transverse planes are horizontal cross-sections, dividing the body into upper (superior) and lower (inferior) sections, and lie at right angles to the other two planes. Figure 1.16 illustrates the most frequently used planes.

Use of the three major planes is important in yoga because the body is meant to work in all planes in order for it to be most efficient. When one practices yoga in a structured class, it is wise to incorporate movement in all planes by using various asanas. Examples are as follows:

SAGITTAL: Sun Salutation (*Surya Namaska*); (*surya* = sun; *namaskar* = salute)

1. Begin in **Mountain Pose**.
2. Inhale to **Crescent Stretch**: bring the arms overhead and stretch to the sky.
3. Exhale and release to **Forward Bend**.
4. Inhale, lifting the spine forward to an extended position, with hands on the shins.
5. Exhale to **Forward Bend**.
6. Inhale and take one leg back to a **lunge** position.
7. Exhale and take the other leg back to **Plank** and lower to the floor.
8. Inhale to **Cobra**.
9. Exhale to **Child’s Pose**. Rest for three full breaths.
10. Inhale to **Table** position.
11. Exhale to **Down Dog**. Rest for three long, full *Ujjayi* (Ocean Breaths).
12. Inhale, walking or jumping the feet to a position between the hands.
13. Exhale to **Forward Bend**. Inhale and do number 4, then exhale back to **Forward Bend**.
14. Inhale to roll up the spine, raising the arms to the sky (**Reverse Swan Dive**).
15. Exhale to **Mountain Pose** (hands in *Namaste*, prayer position, centering and sealing the practice).

FRONTAL: Gate Pose (*Parighasana*) or any posture that incorporates abduction or adduction of a particular joint, or lateral flexion of the spine (side bending).

HORIZONTAL: Revolved Triangle (*Parivrtta Trikonasana*) or any spinal twist or rotary movements, such as supination/pronation.

Anatomical Movements

The direction in which body parts move is described in relation to the fetal position. Moving into the fetal position results from flexion of all the limbs. Straightening out of the fetal position results from extension of all the limbs. These actions are also done in the sagittal plane.

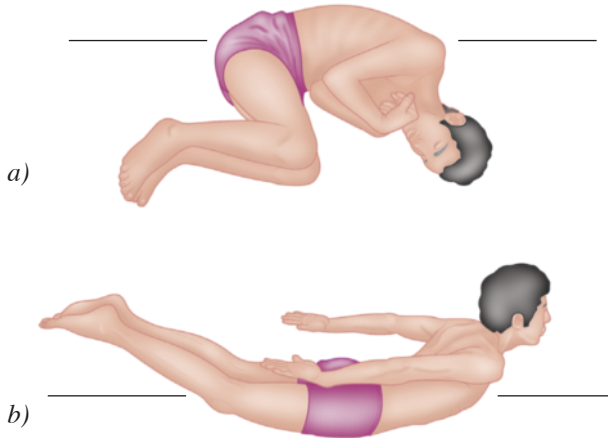


Figure 1.17: a) Flexion into the fetal position; b) Extension out of the fetal position.

Main Movements

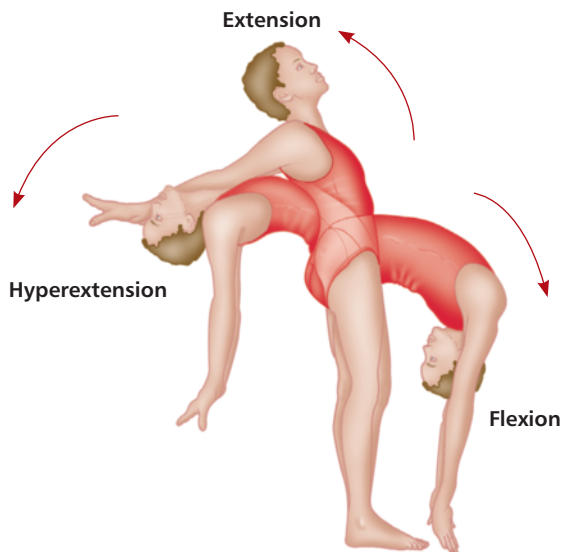


Figure 1.18: Flexion: Bending to decrease the angle between bones at a joint. From the anatomical position, flexion is usually forward, except at the knee joint, where it is backward. The way to remember this is that flexion is always toward the fetal position.

Extension: Straightening or bending backward away from the fetal position.

Hyperextension: Extending the limb beyond its normal range of motion.



Figure 1.19: **Lateral Flexion:** Bending the torso or head laterally (sideways) in the frontal (coronal) plane.

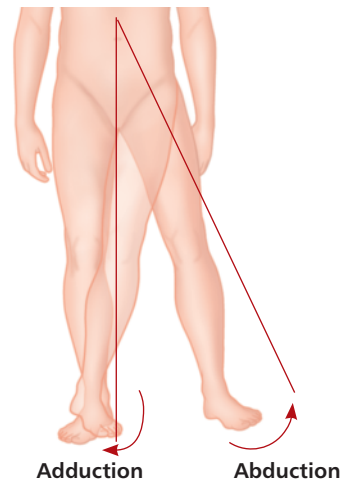
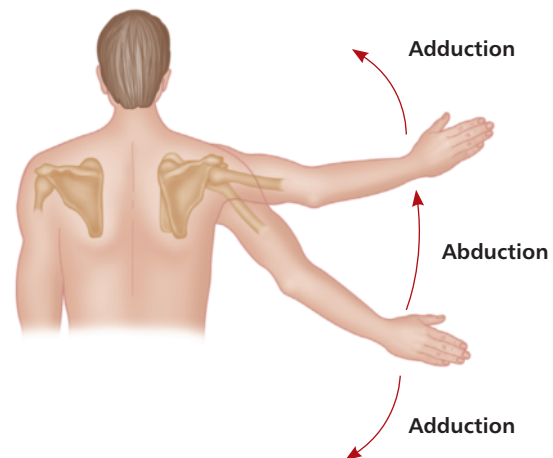


Figure 20: **Abduction:** Movement of a bone away from the midline of the body or the midline of a limb. **Adduction:** Movement of a bone toward the midline of the body or the midline of a limb.



Note: For abduction of the arm to continue above the height of the shoulder (elevation through abduction, see p. 16), the scapula must rotate on its axis to turn the glenoid cavity upward (see Figure 1.28b).

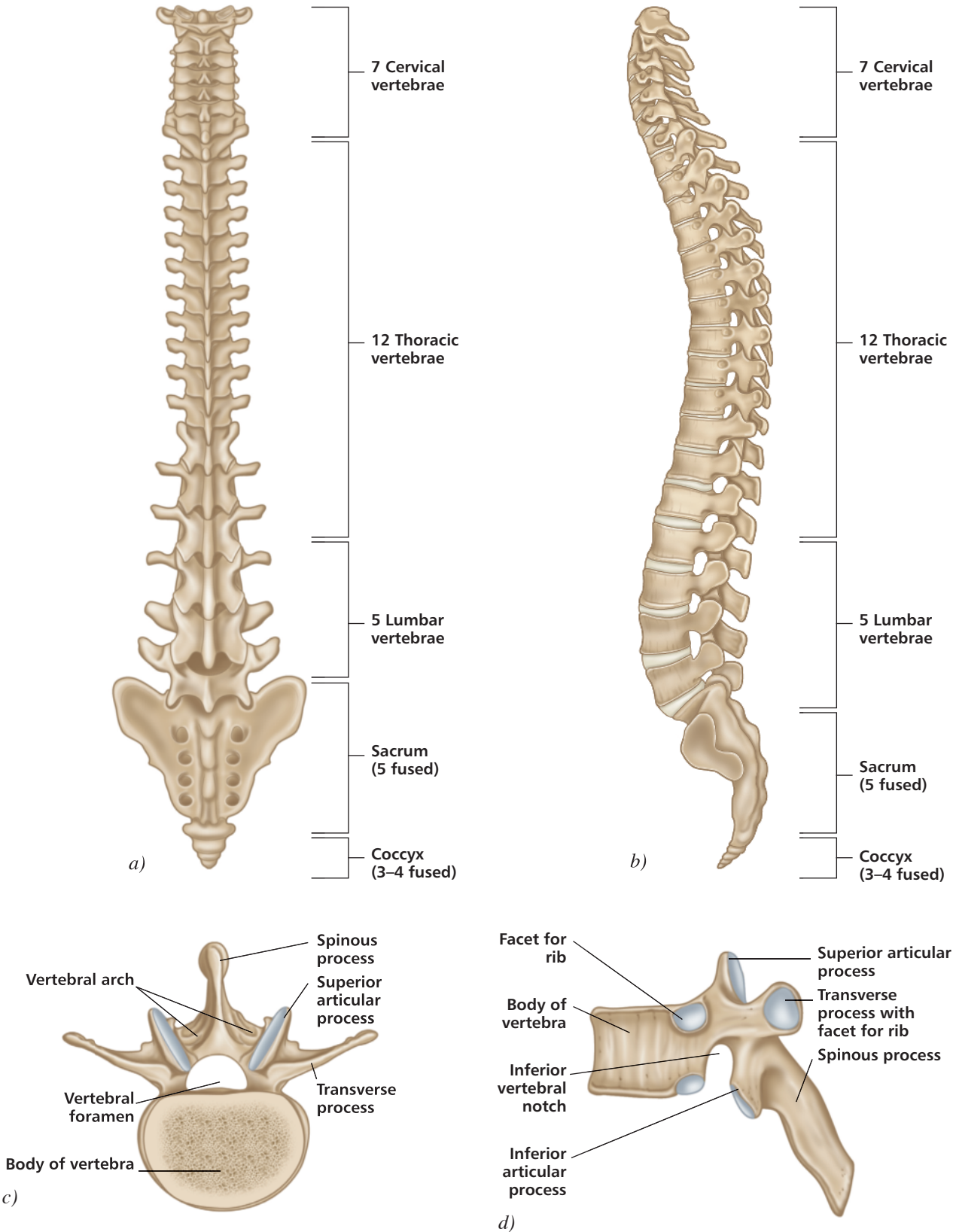


Figure 1.31: a) Spine: Posterior view; b) Spine: Lateral view; c) Vertebrae—lumbar (superior view) and d) Thoracic (lateral view).

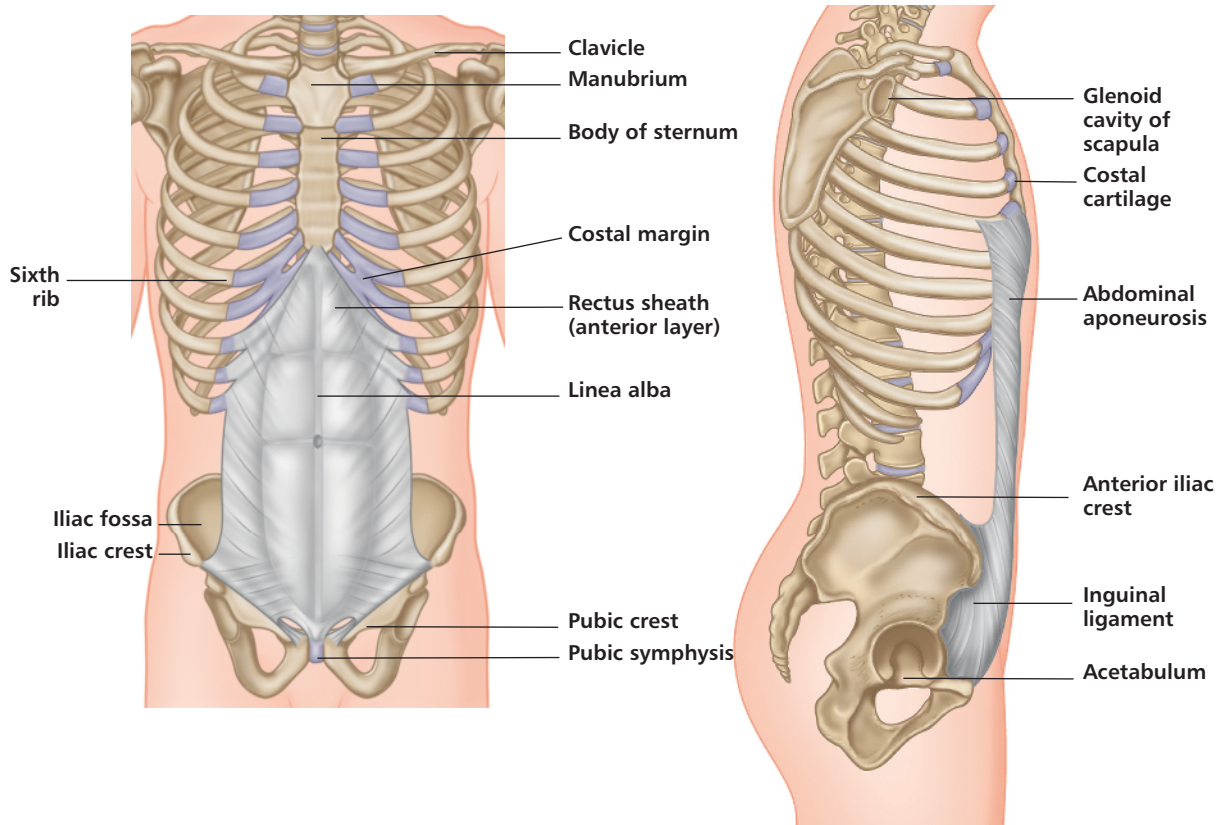


Figure 1.32: a) Anterior view; b) Lateral view.

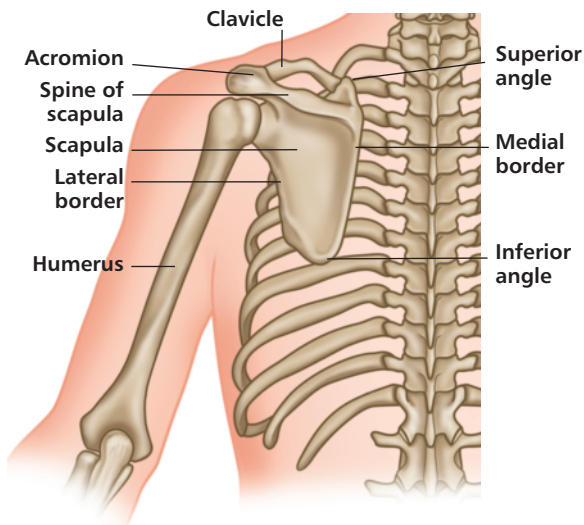


Figure 1.33: Scapula (posterior view).

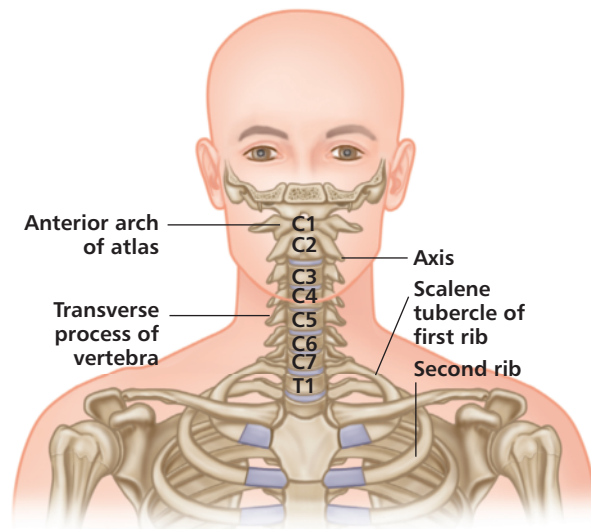


Figure 1.34: Skull to sternum (anterior view—the mandible and maxilla are removed).

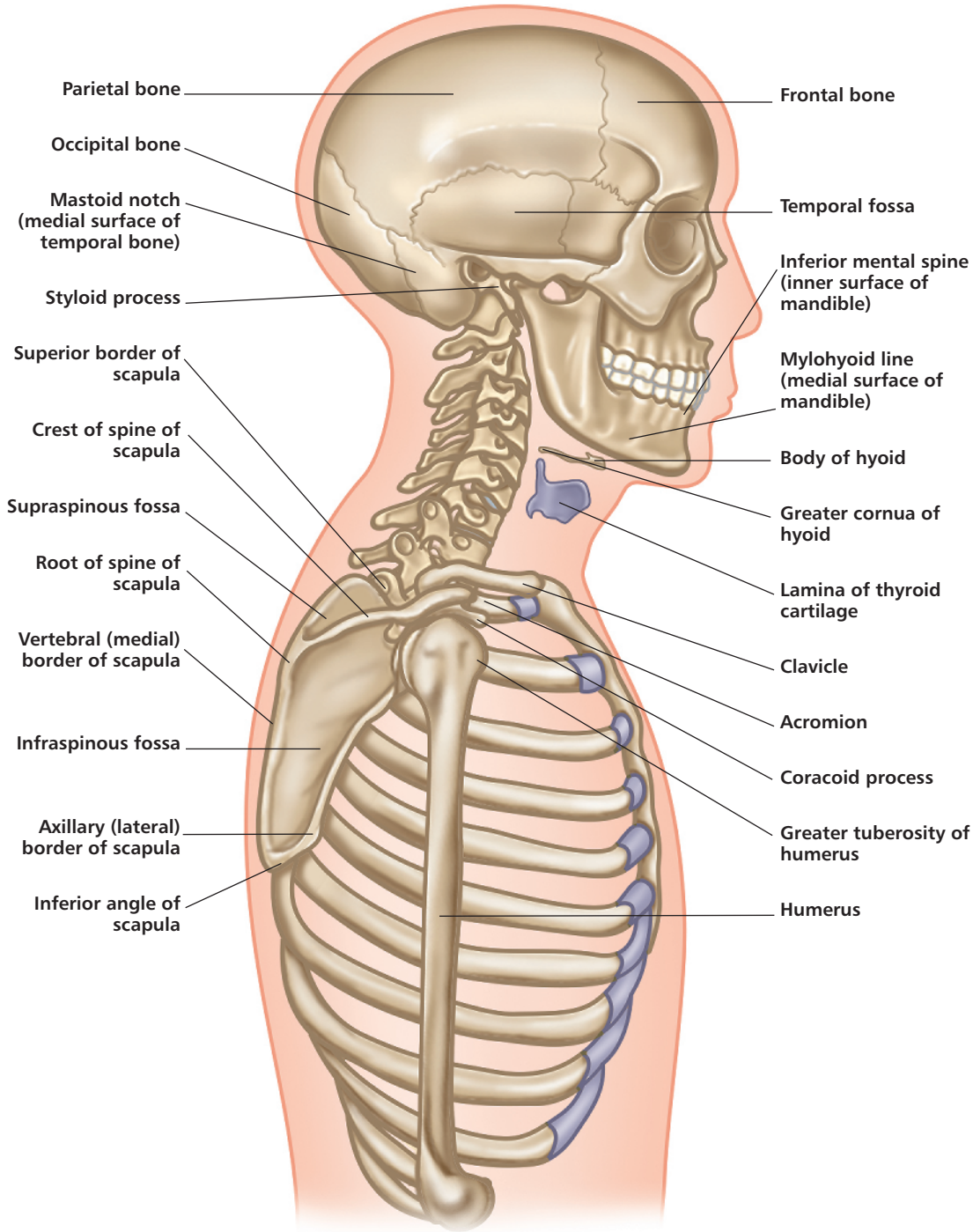


Figure 1.35: Skull to humerus (lateral view).

Synovial Joints

Joints, or articulations, have two functions: they provide stability and give the rigid skeleton mobility. Immovable (synarthrotic) and slightly movable (amphiarthrotic) joints are found mainly in the axial skeleton, where joint stability is important to protect the internal organs. Synovial joints are freely movable (diarthrotic), and so are found predominately in the limbs, where a greater range of movement is required. These joints have a number of distinguishing features:

- Articular (hyaline) cartilage covering the ends of the bones that form the joint
- A joint cavity filled with lubricating synovial fluid (a slippery fluid which provides a film that reduces friction)
- Collateral or accessory ligaments that provide reinforcement and strength
- Bursae (fluid-filled sacs) that provide cushioning
- Tendon sheaths which wrap themselves around tendons that are subject to friction, in order to protect them

Articular discs (menisci) are present in some synovial joints (e.g., the knee) and act as shock absorbers. There are six types of synovial joint: plane (or gliding), hinge, pivot, ball-and-socket, condyloid, and saddle.

Plane or Gliding

Movement occurs when two generally flat or slightly curved surfaces glide across one another. Examples include the acromioclavicular and sacroiliac joints.

Hinge

Movement occurs around only one axis, a transverse one, as in the hinge of the lid of a box. A protrusion of one bone fits into a concave or cylindrical articular surface of another, permitting flexion and extension. Examples include the interphalangeal joints, the elbow, and the knee.

Pivot

Movement takes place around a vertical axis, like the hinge of a gate. A more or less cylindrical articular surface of bone protrudes into and rotates within a ring formed by bone or ligament. An example is the joint between the radius and the ulna at the elbow.

Ball-and-Socket

This joint consists of a “ball” formed by the spherical or hemispherical head of one bone that rotates within the concave “socket” of another, allowing flexion, extension, adduction, abduction, circumduction, and rotation. Thus these joints are multiaxial and allow the greatest range of movement of all the joints. Examples are the shoulder and hip joints.

Condyloid

These joints have a spherical articular surface that fits into a matching concavity. They permit flexion, extension, abduction, and adduction; a combination of these is called “circumduction.” Examples are the wrist and the metacarpophalangeal joints of the fingers (but not the thumb).

Saddle

In a saddle joint the two articulating surfaces respectively have convex and concave areas, which fit together like a saddle and a horse’s back. Saddle joints permit even more movement than condyloid joints. An example is the carpometacarpal joint of the thumb, which allows opposition of the thumb to the fingers.

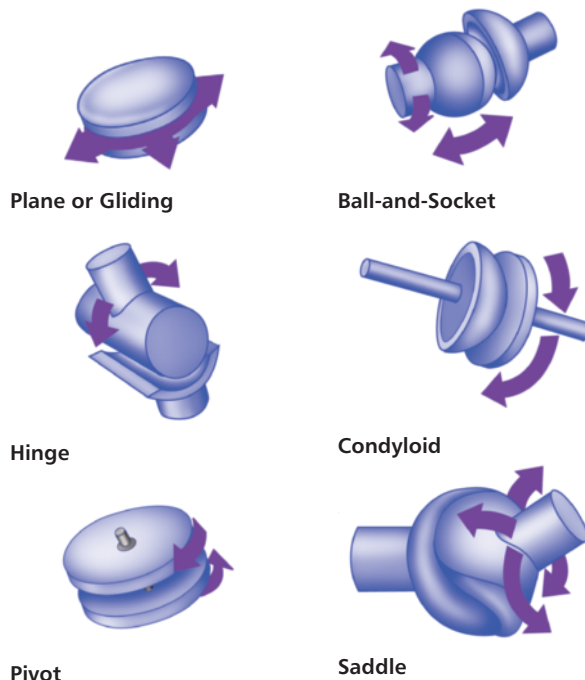


Figure 1.36: The synovial joints.

Guide to the Muscular System

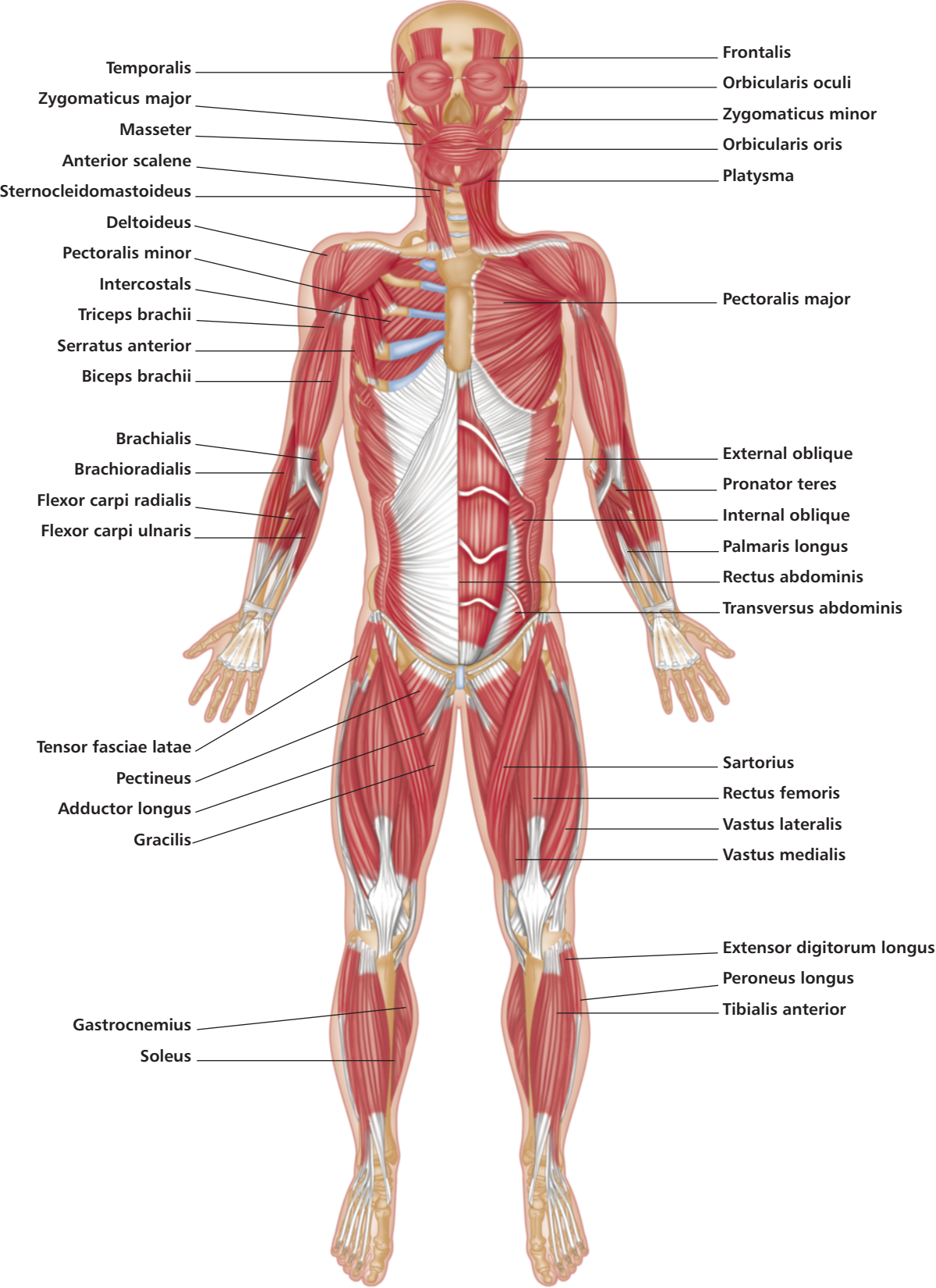


Figure 1.37: a) The major skeletal muscles (anterior view).

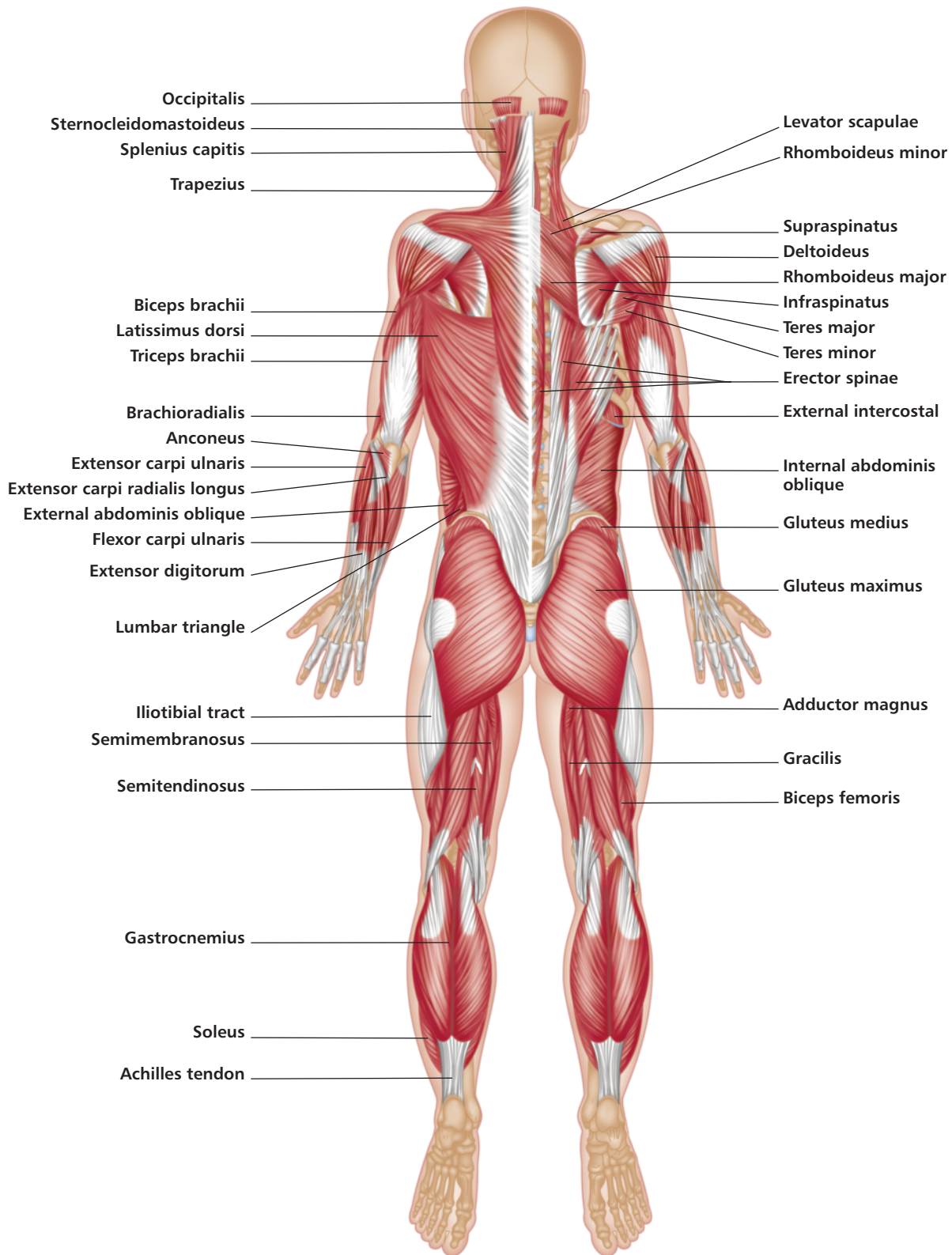


Figure 1.37: b) The major skeletal muscles (posterior view).

Muscle Attachment

Skeletal (somatic or voluntary) muscles constitute approximately 40% of the total human body weight. Their primary function is to produce movement by contracting and relaxing in a coordinated manner. They are attached to bone by tendons (or sometimes directly). The place where a muscle attaches to a relatively stationary point on a bone, either directly or via a tendon, is called the “origin.” When the muscle contracts, it transmits tension to the bones across one or more joints, and movement occurs. The end of the muscle which attaches to the bone that moves is called the “insertion.” Tendon attachments are also referred to as “proximal” (the one nearest the center) and “distal” (farthest from the center).

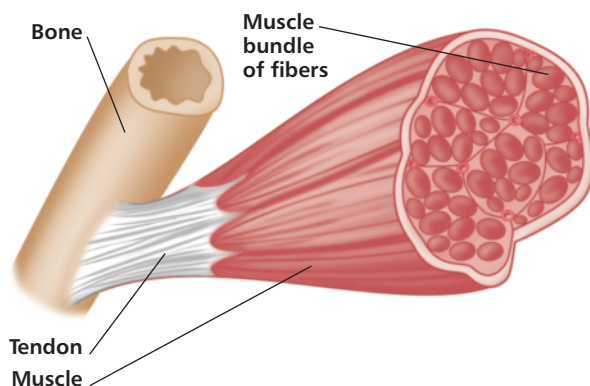


Figure 1.38: A tendon attachment.

Tendons and Aponeurosis

Muscle fascia (connective tissue components of a muscle) combine together and extend beyond the end of the muscle as round cords or flat bands called “tendons,” or as a thin, flat, and broad sheet-like material called an “aponeurosis.” The tendon or aponeurosis secures the muscle to the bone or cartilage, to other muscles, or to a seam of fibrous tissue called a “raphe” (a seam-like union of the two lateral halves of a part or organ, as in the tongue).

Intermuscular Septa

In some cases, flat sheets of dense connective tissue known as “intermuscular septa” penetrate between muscles, providing another medium to which muscle fibers may attach.

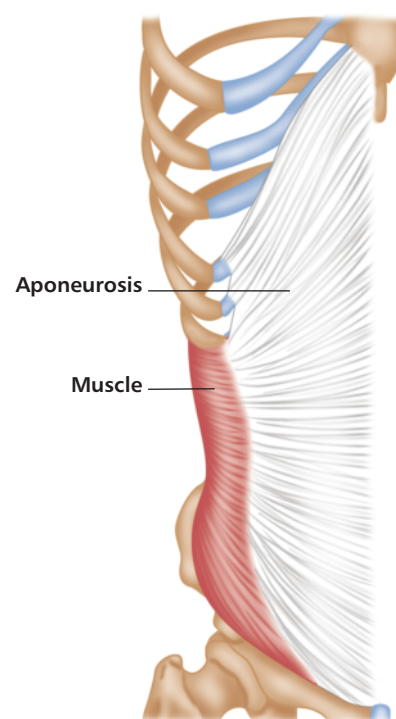


Figure 1.39: An attachment by aponeurosis.

Sesamoid Bones

If a tendon is subject to friction, it may (though not necessarily) develop a sesamoid bone within its substance. An example is the peroneus longus tendon in the sole of the foot. However, sesamoid bones might also appear in tendons not subject to friction. The main functions are to modify pressure, reduce friction, and sporadically change the direction of a muscle pull.

Multiple Attachments

Many muscles have only two attachments, one at each end. However, more complex muscles are often attached to several different structures at their origin and/or insertion. If these attachments are separated, effectively meaning the muscle gives rise to two or more tendons and/or aponeuroses inserting into different places, the muscle is said to have two heads. For example, the biceps brachii has two heads at its origin: one from the coracoid process of the scapula and one from the supraglenoid tubercle (see Chapter 6). The triceps brachii has three heads and the quadriceps has four.

2

Muscles of Respiration

Yoga and Breath

Breathing is the essence of yoga and one of the main reasons the practice is so vital (notice the first “awareness” of every asana pictured: Breath). Yoga consciously connects the mind and body through attention to breath work, unifying the body processes as the breath heals, nourishes, cleanses, and energizes. Called *prana*, the breath is the awakened life force, as compared to *kundalini*, the dormant energy. Yoga invests *prana* to discover the latent energy.

In Sanskrit (yoga’s language) breath work is *pranayama*, the fourth of eight limbs described in the ancient yoga sutras of Patanjali. Different techniques are used to influence the flow, rate, and volume of air through the respiratory system in a conscious way, enabling one to link the mind/body to the unconscious. Examples are *Ujjayi* (Ocean Breath) and *Nadi Shodhana* (Alternate Nostril Breath).

During asanas, the breath becomes regulated with movement: the inhalation is used to expand and the exhalation to release. The forces of *prana* and *apana* are apparent here: *prana* is taking breath in for nourishment and healing, and *apana* (“that which takes away”) is the down/out action of elimination.³

Focus on breath is also used in relaxation methods to quiet the active mind.

In *The Vital Psoas Muscle* (Staugaard-Jones 2012) I stated that the *psoas major* and the diaphragm, the main breathing muscle, come together at a point known as the “solar plexus.” This is an area around the navel and upper lumbar spine that houses a central nerve complex. Within the subtle energy

system known as the “chakras,” *Manipura*, the third chakra, exists at this junction, where breath is a vital component. Physical, emotional, and spiritual aspects deeply connect here. Chakras will be discussed in more detail in Chapter 5.

The Act of Breathing

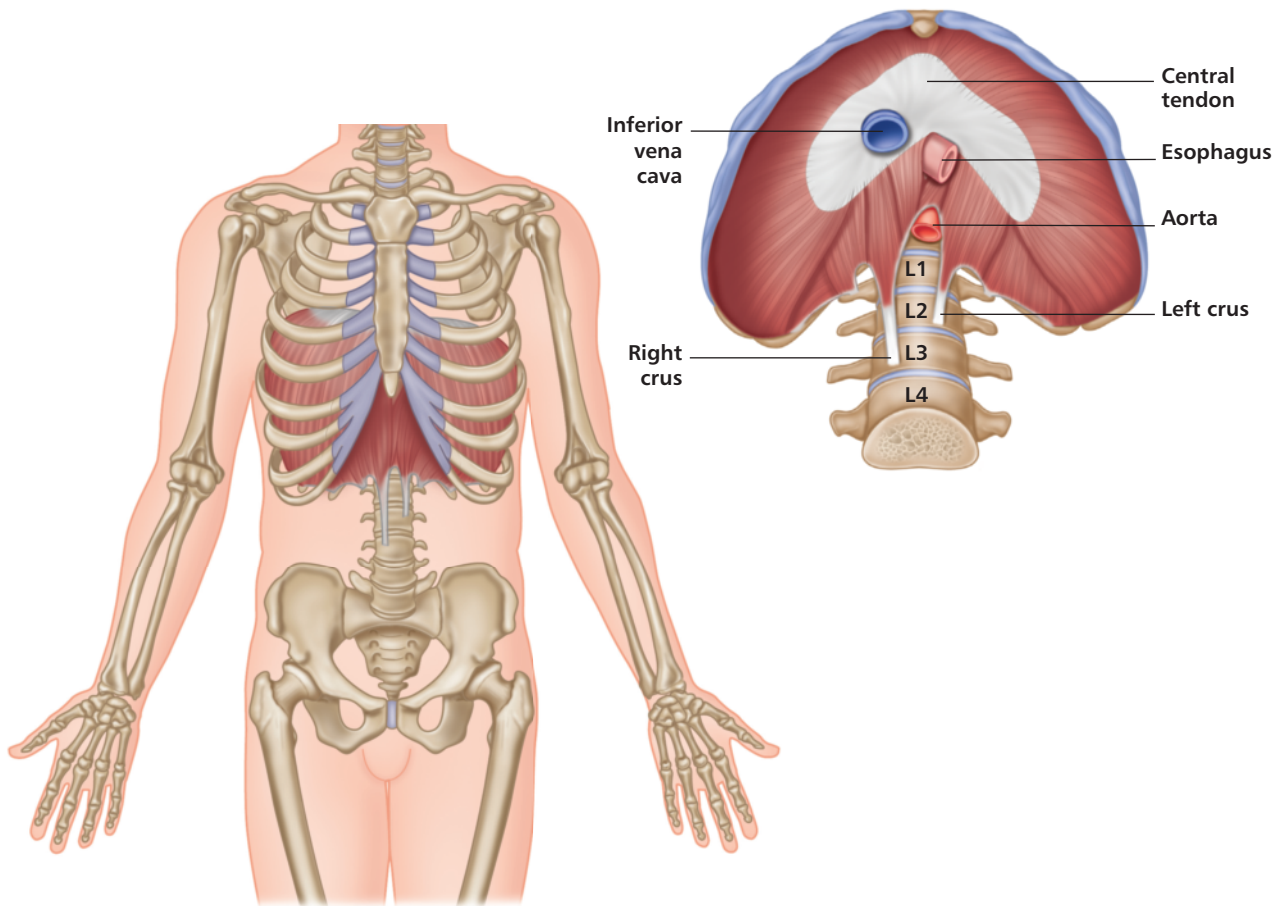
Respiration is the process of inhalation and exhalation, stimulating the flow of air, fluids, nerve conduction, and energetic force down to the cellular level. The mechanism is multifaceted and happens naturally.

The dome-shaped diaphragm muscle rhythmically contracts and relaxes to change pressure and volume in the thoracic cavity through the ANS, which controls involuntary actions. As one takes air in, the diaphragm contracts to allow the rib cage and lungs to expand. The diaphragm gets its signal from the phrenic nerve, causing sensation in the diaphragm’s central tendon. This area is drawn in by contraction as one inhales, which enables the thoracic cavity to increase in volume and decrease in pressure. Upon exhalation, this is reversed: the capacity is decreased and the pressure is increased, much like a balloon expelling air.

The abdominal cavity is also active. The shape of the belly and spine can change as the diaphragm pushes the belly down and out on inhalation and allows the abdominals to fall back on exhalation. In yoga this is called “belly breath,” and is accomplished when the attachments of the muscle on the rib cage, sternum, and lumbar spine are fixed. “Chest breathing” is associated with the central tendon (top portion) of the diaphragm being fixed. Other muscles also aid in stabilization and accompany diaphragmatic action.

³ *Prana* and *apana* are two of the five *vayus* (*vayu* = Lord of the Winds) that are used in yoga to govern breath work through different body areas in various ways. The other three are *samana* (balanced breath centered around the navel), *udana* (upward movement around the throat), and *vyana* (whole body circulation and expansiveness).

DIAPHRAGM



Greek, *dia*, across; *phragma*, partition, wall.

Origin

Sternal portion: Back of xiphoid process.

Costal portion: Inner surfaces of lower six ribs and their costal cartilages.

Lumbar portion: Upper two or three lumbar vertebrae (L1–L3).

Medial and lateral lumbocostal arches (also known as the “medial and lateral arcuate ligaments”).

Insertion

All fibers converge and attach onto a central tendon, i.e., this muscle inserts upon itself.

Action

Forms floor of thoracic cavity. Pulls its central tendon downward during inhalation, thereby increasing volume of thoracic cavity.

Nerve

Phrenic nerve (ventral rami), C3, C4, C5.

Functional movement

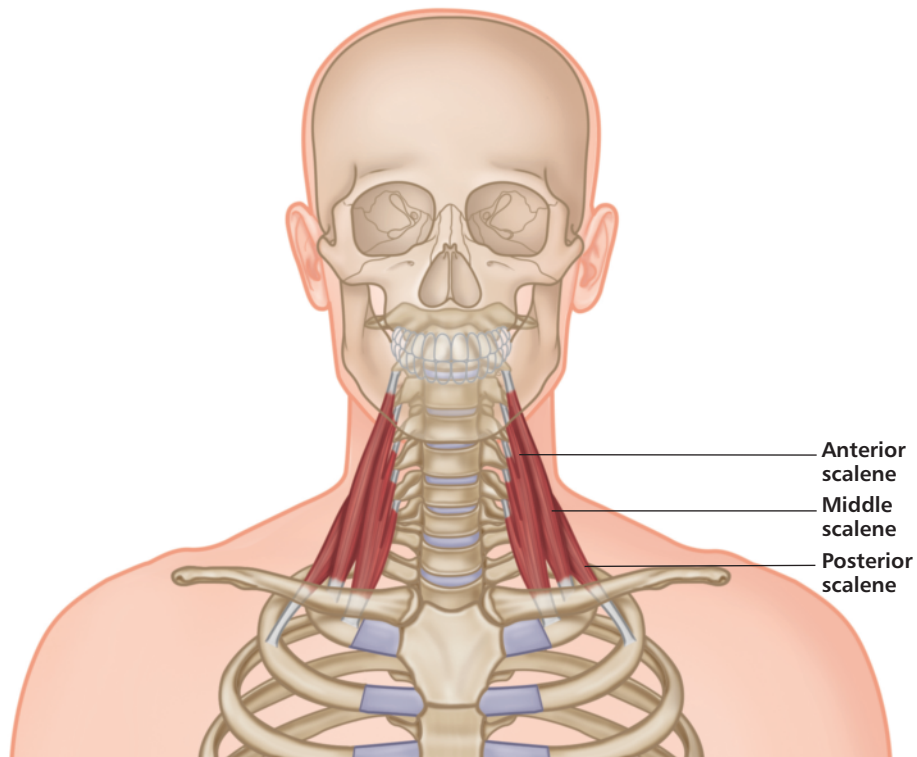
Produces about 60% of breathing capacity.

Asanas that heavily use this muscle

All asanas, as well as pranayamas.

The diaphragm is pictured in *Vajrasana* (Kneeling Pose) under “Scaleni.”

SCALENI



Along with the intercostals, the scaleni form part of the accessory muscles of inspiration.

Greek, *skalenos*, uneven. **Latin**, *anterior*, in front; *medius*, middle; *posterior*, behind.

Origin
Transverse processes of cervical vertebrae.

Insertion
Anterior and medius: First rib.
Posterior: Second rib.

Action
Acting together: Flex neck. Raise first rib during a strong inhalation.
Individually: Laterally flex and rotate neck.

Nerve
Ventral rami of cervical nerves, C3–C8.

Functional movement
The scaleni are primarily muscles of inspiration.

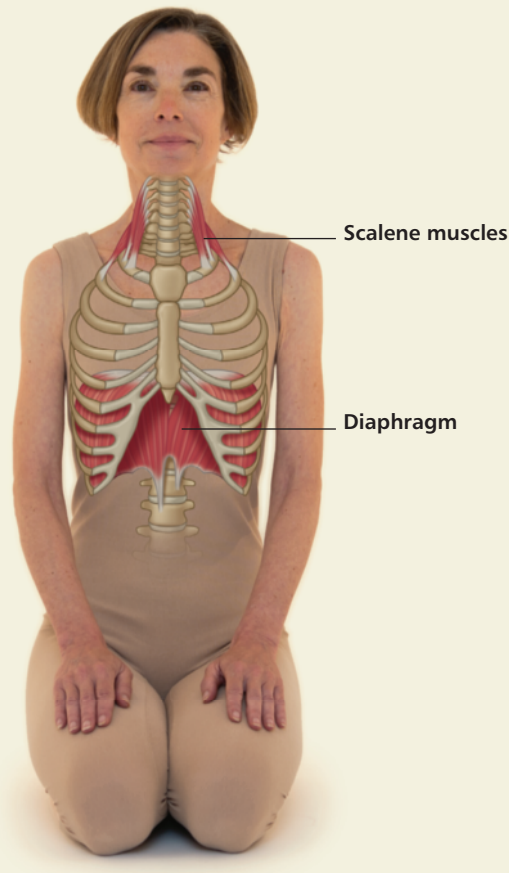
Common problems when muscles are chronically tight or shortened
Painful conditions of the neck, shoulder, and arm, because hypertonic muscle puts pressure on a bundle of nerves called the “brachial plexus” and on the subclavian artery.

Asanas/movements that heavily use these muscles

Strengthening: *Vajrasana* (Kneeling Pose), lifting rib cage during inhale. *Apanasana* (Wind Reliever). Pranayamas.

Stretching: Cervical Circles. Any downward movement of rib cage on exhale.

Vajrasana (Kneeling Pose) Level I



vajra = diamond, thunderbolt;
(vaj-RAHS-anna)

Awareness: Breath, rib cage expansion, centering, chakras.

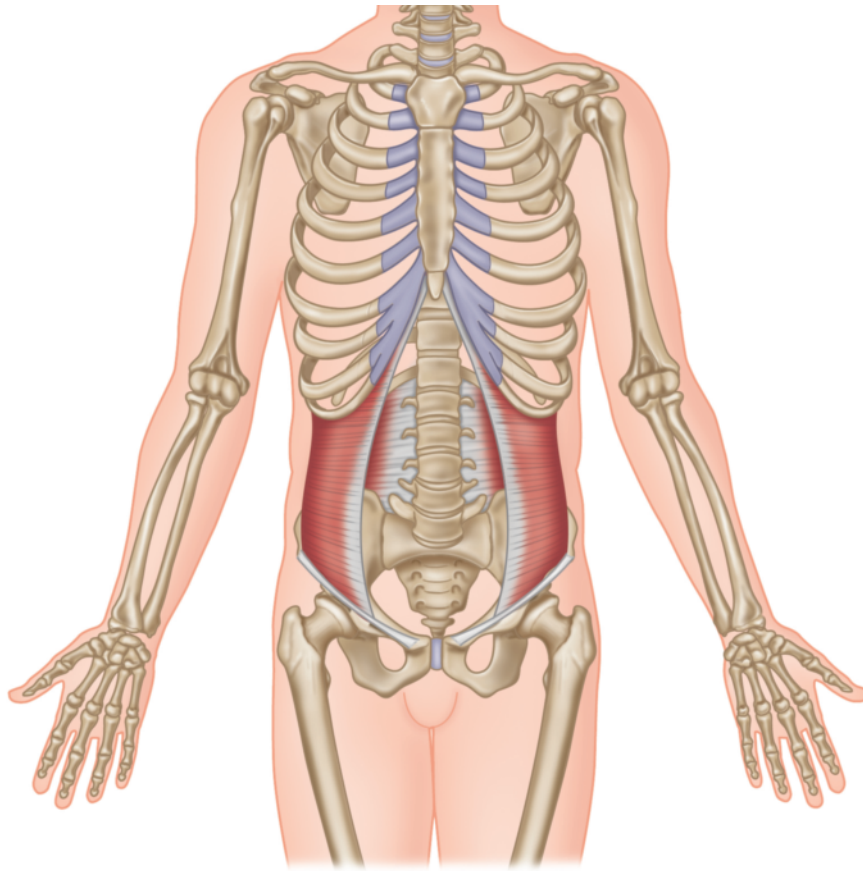
Action and Alignment: Spine extension, shoulder and girdle neutral, hip and knee flexion. Weight of the torso is directly above the sit bones. Viewed from the side, the mid-ear, shoulder, and hip are aligned with each other.

Technique: Begin kneeling with the sit bones on the heels (toes can be tucked under or extended). The spine is lengthened. This can be performed at any time when the practitioner needs to focus inward.

Helpful Hints: This posture is ideal for many pranayamas and/or meditation. If sitting upright with the legs underneath is uncomfortable, a block or blanket may be used under the sit bones or between the thighs and calves, as raising the hips will accommodate the knees to an easier bend, and put less stress on the ankles and feet. It is recommended to hold this position no longer than ten minutes.

Counter Pose: *Purvottanasana* (see Chapter 6).

TRANSVERSUS ABDOMINIS



The transversus abdominis is one of the accessory muscles of expiration.

Latin, *transversus*, across; *abdominis*, of the belly/stomach.

Origin

Anterior two-thirds of iliac crest.
Lateral third of inguinal ligament.
Costal cartilages of lower six ribs.
Thoracolumbar fascia.

Insertion

Linea alba via abdominal aponeurosis (tendinous band extending between the sternum and pubis).

Action

Compresses abdomen, helping to support the abdominal viscera against the pull of gravity.

Nerve

Ventral rami of thoracic nerves T7–T12, ilioinguinal and iliohypogastric nerves.

Functional movement

Important during forced expiration, sneezing, and coughing. Helps maintain good posture.

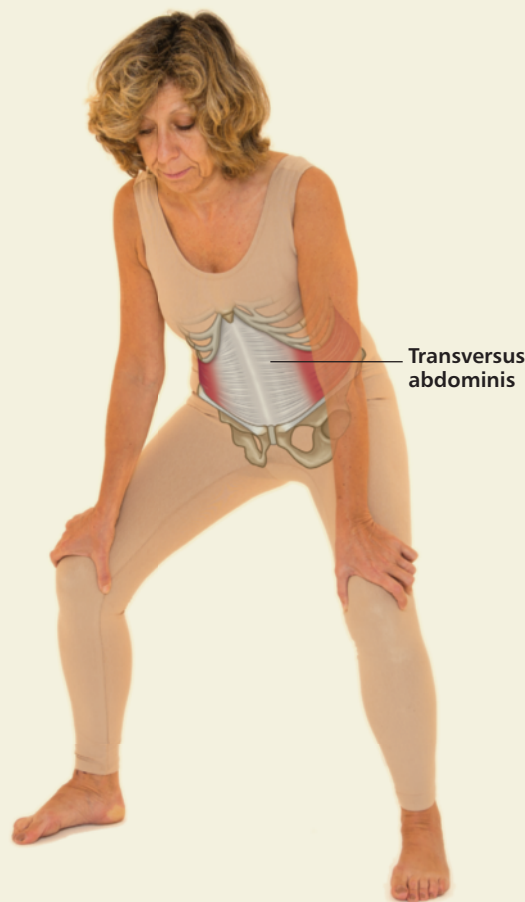
Common problems when muscle is weak

Injury to lumbar spine, because abdominal muscle tone contributes to stability of lumbar spine.

Asanas that heavily use this muscle

Strengthening: Any asana where a forced exhale can be incorporated, such as *Agni Sara* (Fire Cascade). *Bidalasana* (Cat). *Adho Mukha Svanasana* (Down Dog). *Uttihiti Chaturanga Dandasana* (Plank).

Stretching: *Bitilasana* (Cow). *Setu Bhandasana* (Bridge). Strong inhalation.



agni = fire; *sara* = essence, waterfall; (AHG-ni Sar-ah)
Note: *Agni Sara* is not a posture in the true sense of the word, but more a dynamic practice.

Awareness: Breath, solar plexus, power, pelvic floor (perineum) and rectal lift, abdominal squeeze.

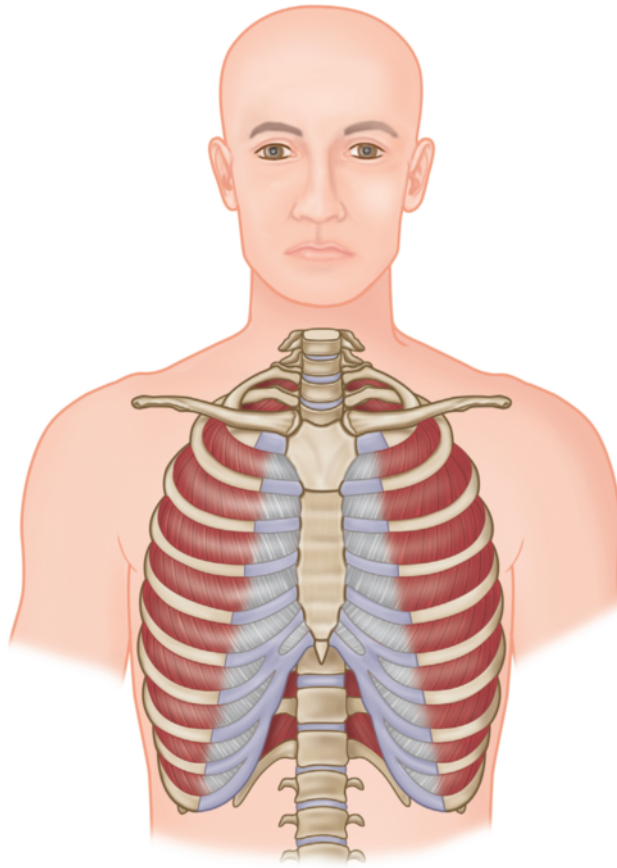
Action and Alignment: Spinal flexion and extension, shoulder and girdle neutral, elbow extension, pelvic tilt, slight hip and knee flexion. Knees are in line with toes, spine is neutral at beginning, shoulders are down.

Technique: Standing with feet at least shoulder-width apart, bend knees and support torso by placing the hands above the knees. The abdominals are activated by expanding on the inhale (spine extension) and contracting inward on the exhale (spine flexion). Repeat three to five times. The transversus abdominis is engaged with a forceful exhale, bringing the belly toward the spine in deep flexion. The “fire” is created in the solar plexus, the third chakra, *Manipura* (see “Chakras” in Chapter 5).

Helpful Hints: This is a powerful, active posture that heats up the central core and affects the interior of the body. Do more gently if pregnant or menstruating, or if there is a hiatal hernia or there are cardiovascular issues. This asana can be performed at any time during the practice, but seems most effective at the beginning or midway point, when warmth is needed.

Counter Pose: *Tadasana* (see Chapter 3).

INTERCOSTALES EXTERNI (External Intercostals)



Along with the scaleni and intercostales interni, the intercostales externi are part of the accessory muscles of inspiration.

Latin, *inter*, between; *costa*, rib; *externi*, external.

The lower external intercostal muscles may blend with the fibers of the external oblique, which overlap them, thus effectively forming one continuous sheet of muscle, with the external intercostal fibers seemingly stranded between the ribs. There are eleven external intercostals on each side of the rib cage.

Origin

Lower border of a rib.

Insertion

Upper border of rib below (fibers run obliquely forward and downward).

Action

Muscles contract to stabilize the rib cage during various movements of the trunk.

May elevate ribs during inspiration, thus increasing volume of thoracic cavity (although this action is disputed).

Prevents the intercostal space from bulging out or sucking in during respiration.

Nerve

The corresponding intercostal nerves.

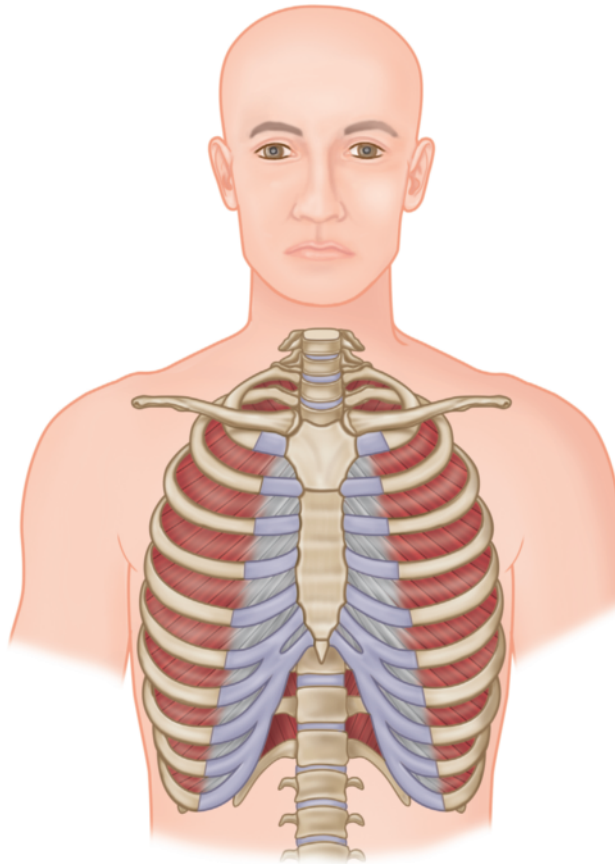
Asanas that heavily use the intercostals

Strengthening/Stabilizing:

Virabhadrasana I, II, III (Warriors). *Trikonasana* (Triangle). *Sirsasana* (Headstand). *Vasisthasana* (Side Plank) and High Plank. *Adho Mukha Vrksasana* (Handstand).

Stretching: *Matsyasana* (Fish Pose). Strong inhalation, pranayamas.

INTERCOSTALES INTERNI (Internal Intercostals)



Along with the scaleni and intercostales externi, the intercostales interni are part of the accessory muscles of inspiration.

Latin, *inter*, between; *costa*, rib; *interni*, internal.

Internal intercostal fibers lie deep to and run obliquely across the external intercostals. There are eleven internal intercostals on each side of the rib cage.

Origin

Upper border of a rib and costal cartilage.

Insertion

Lower border of rib above (fibers run obliquely forward and upward toward the costal cartilage).

Action

Muscles contract to stabilize the rib cage during various movements of the trunk.

May draw adjacent ribs together during forced expiration, thus decreasing volume of thoracic cavity (although this action is disputed).

Prevents the intercostal space from bulging out or sucking in during respiration.

Nerve

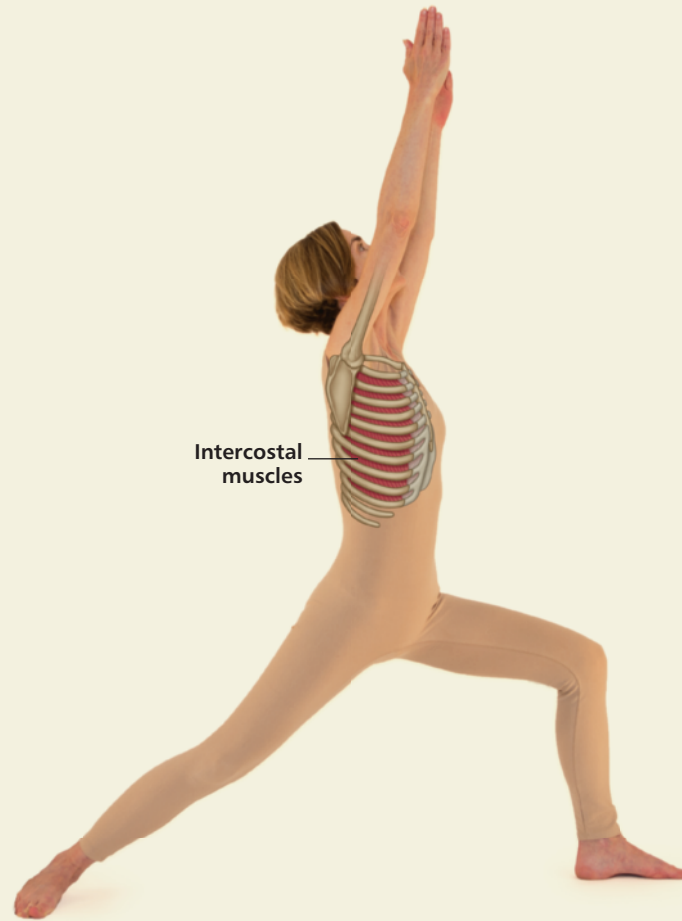
Corresponding intercostal nerves.

Asanas that heavily use the intercostals

Strengthening/Stabilizing:

Virabhadrasana I, II, III (Warriors). *Trikonasana* (Triangle). *Sirsasana* (Headstand). *Vasisthasana* (Side Plank) and High Plank. *Adho Mukha Vrksasana* (Handstand).

Stretching: *Matsyasana* (Fish Pose). Strong inhalation, pranayamas.



Virabhadra = warrior or super-being from Indian mythology; (veer-ah-bah-DRAHS-anna)

Awareness: Breath, strength, stretch, rib cage expansion, core engagement, *drishti* (focus).

Action and Alignment: Spine extension to hyperextension, shoulder flexion, shoulder girdle elevation to depression, hip and knee flexion (front leg), hip and knee extension (back leg). Pelvis square to the front, front knee directly over ankle, back foot no more than a 45-degree angle from front, front heel in line with middle of back foot arch.

Technique: Stand in *Tadasana*, hands on hips; step back with one leg and position the lower body as stated above, bending the front knee. Inhale and lift arms as demonstrated, eyes forward or up. Two variations can be performed: one with the back foot

at 45 degrees (only if the hips can still be squared to the front), and one with the back foot forward to aid in squaring the pelvis to the front (the stance would be more narrow). The core engages by dropping the tailbone, lifting the pelvic floor, and pulling the abdominals in and up.

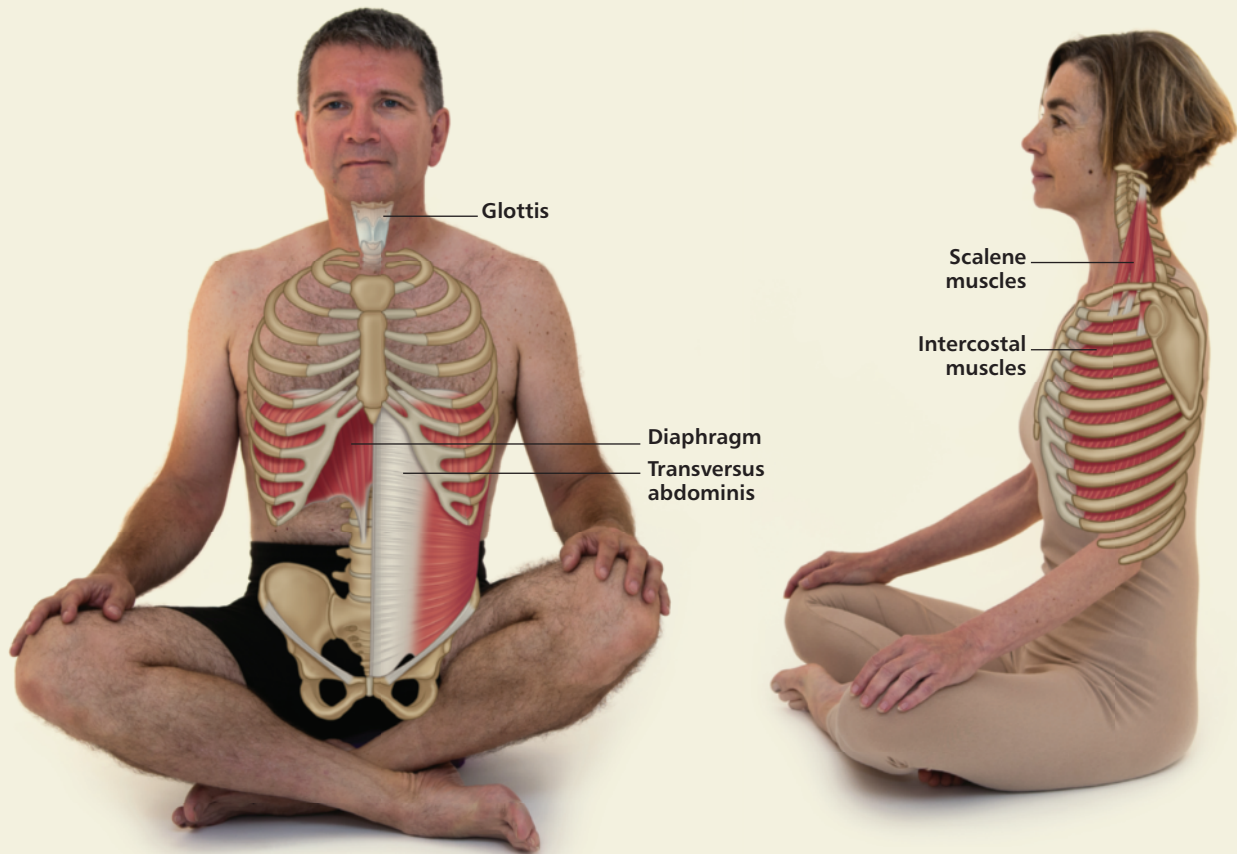
Helpful Hints: This is a vigorous posture that helps warm up the body, if done toward the beginning of class, and is also used as a transitional pose. Focus on the breath and soften the intensity. Engage the core to protect the lower spine. Make sure the front knee is facing forward and not hiding the big toe. Press the outside edge of the back foot into the ground and pull energy from the ground up. Both feet are the foundation.

Counter Pose: *Tadasana* (see Chapter 3, add Side Bends).

GLOTTIS AND UJJAYI

Ujjayi (Ocean Breath) is a three-part breath that takes air into the belly, then the mid-chest, and up through the upper chest; the process is reversed on exhalation. An ocean sound is created through the nostrils and resonates in the throat, as the glottis (the space between the vocal folds) is controlled by the larynx muscles to increase or decrease the area according to need. Sounds emanate from this space, as in voice pronunciation. When tension in the folds is changed, the ocean sound can be produced. *Ujjayi* is a warming and very grounding breath used in pranayamas and asanas.

Sukhasana (Easy Pose) Level I



sukha = easy, comfortable, happy;
(suk-HAS-anna)

Awareness: Breath, ease,
centering.

Action and Alignment: Spinal
extension, shoulder and girdle
neutral, hip flexion and outward
rotation, knee flexion. Weight of
the torso is directly above the sit
bones, with equal weight on both.

Technique: Cross the legs in a
sitting position. Lengthen the spine
and rest the hands on the thighs, in
the lap, or extended on the floor.

Helpful Hints: This is a wonderful
meditation and breathing posture,
and can be done at any time during
class. It is especially beneficial
at the beginning, where balance,
centering, and harmony can be
introduced. It is best to have the
knees lower than the hips to help
extend the spine, but for some
people this is not “easy.” Sitting
on a block or blankets will help.
Uncross the legs and sit in a chair
if there is strain.

Counter Pose: Change the leg that
is in front. After the asana has been
performed in both leg positions,
extend the legs and shake them
out.

3

Muscles of the Face, Head, and Neck

Although in today's society yoga is sometimes portrayed as a marketable exercise program, or even as a cult in some circles, the ancient and true goal of yoga is meditation, leading to awareness of the true self, our deepest nature of oneness and infinity. Asanas and pranayamas are practiced to attain this state of unity.

The neck muscles are obviously important for movement of the head, but the muscles of the face and skull must also be included; otherwise, how can one achieve inner peace unless attention is focused on the muscles of concentration, emotion, and tension found in this area? A few of these will be presented here to help the practitioner understand that, as muscles and mechanisms are understood in yoga, a profound knowledge can be gained.

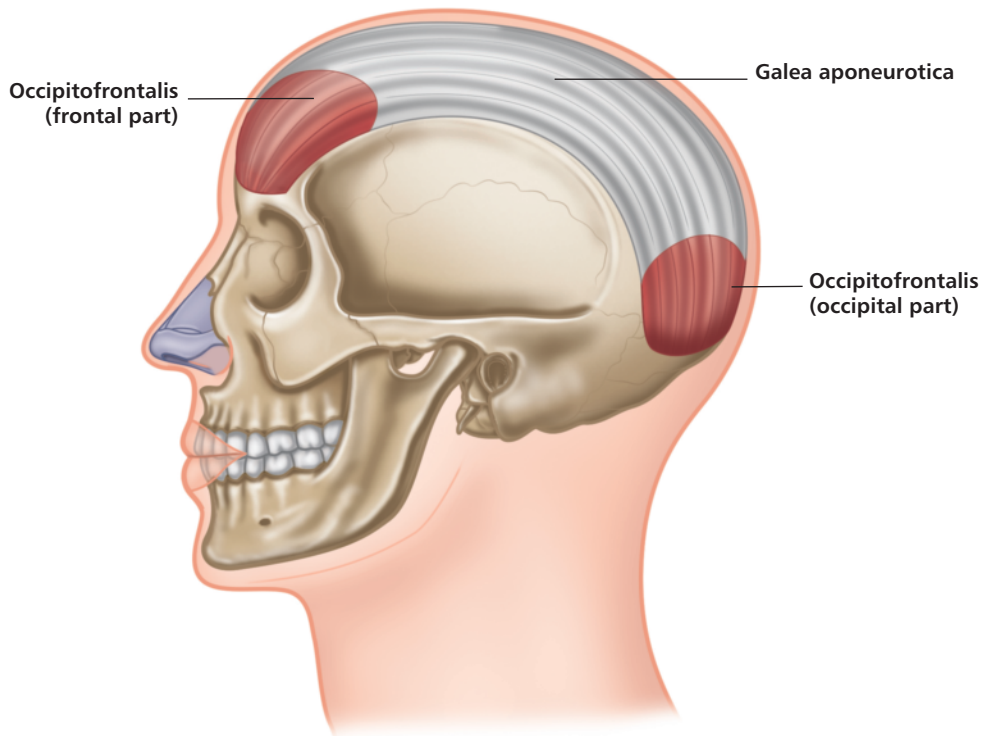
Muscle Relaxation and Contraction: The Motor Unit

The relaxation of certain muscles is paramount if one wishes to achieve correct posturing and release in yoga. Skeletal muscles can be brought under conscious control, as they are linked directly to the somatic nervous system (SNS), which is part of the peripheral nervous system (PNS). The SNS carries information from the nerves to the central nervous system (CNS) and from the CNS to the muscles and sensory fibers; it is associated with voluntary muscle control.

A "motor unit" is defined as the motor neuron (there can be many in a single muscle) and all the muscle fibers it innervates; it is the single connection between the CNS and muscular activity. When the neuron transmits a nerve impulse, the muscle contracts: when the neuron does not transmit an impulse, the muscle relaxes. It has been proven that one has the ability to "train" the motor units to become quiet, allowing relaxation.

In simple terms, a willful decision of the mind can release internal signals to help silence the nerve impulses, resulting in relaxation. Imagine the following face and head muscles at rest, allowing for deeper release of tension. This leads to clarity.

OCCIPIFOFRONTALIS



Latin, *occiput*, back of the head; *frontalis*, relating to the front of the head.

This muscle is effectively two muscles (occipitalis and frontalis) united by an aponeurosis called the “galea aponeurotica,” so named because it forms what resembles a helmet (Latin *galea*) upon the skull.

Origin

Occipitalis: Occipital bone.
Mastoid process of temporal bone.
Frontalis: Galea aponeurotica (a sheet-like tendon leading to frontal belly).

Insertion

Occipitalis: Galea aponeurotica.
Frontalis: Fascia and skin above eyes and nose.

Action

Occipitalis: Pulls scalp backward.
Frontalis: Pulls scalp forward.

Nerve

Facial VII nerve.

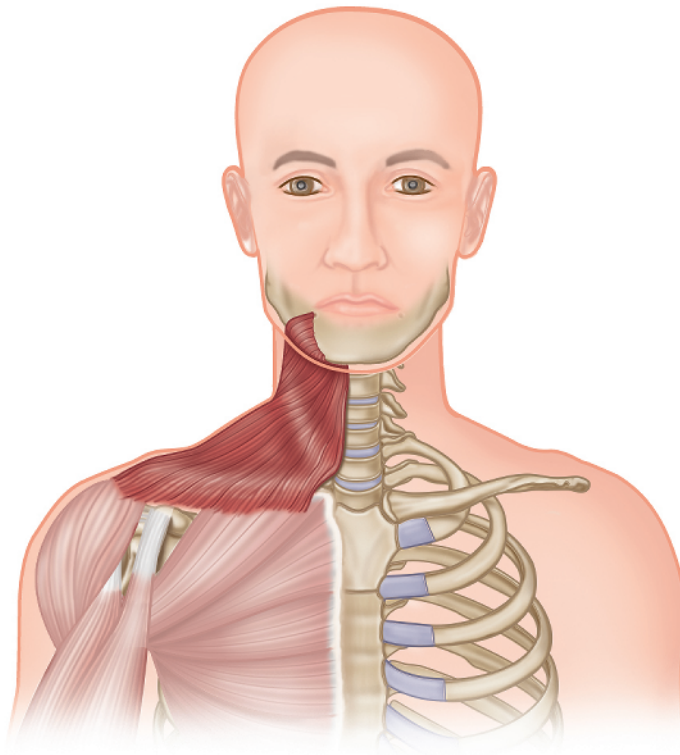
Basic functional movement

Example: Raises eyebrows (wrinkles skin of forehead horizontally).

Asanas that heavily use this muscle

Simhasana (Lion Pose).

PLATYSMA



Greek, *platys*, broad, flat.

This muscle may be seen to stand out in a runner finishing a hard race.

Origin

Subcutaneous fascia of upper quarter of chest (fascia overlying pectoralis major and deltoid muscles).

Insertion

Subcutaneous fascia and muscles of chin and jaw. Inferior border of mandible.

Action

Pulls lower lip from corner of mouth downward and laterally.
Draws skin of chest upward.

Nerve

Facial VII nerve (cervical branch).

Basic functional movement

Example: Produces expression of being startled or of sudden fright.

Simhasana (Lion Pose) Level I



simha = lion; *simhasana* = throne;
(sim-HAHS-anna)

Awareness: Breath; release of chest, facial, and breath tension; can engage three major bandhas; benefits chakras 4–6.

Action and Alignment: Spine extension, joints neutral, hip flexion depending on position, facial expression.

Technique: In any sitting meditation position, inhale deeply through the nose, then exhale as the tongue stretches out, curling the tip to the chin. The eyes open wide, with the gaze forward or up toward the eyebrows. A “ha” sound, or sometimes a “roar,” is made on the exhale.

Helpful Hints: If body movement is added, one can begin in *Sukhasana* (Easy Pose), then lean onto the hands as the facial expression is performed, bringing the whole torso forward as shown in the illustration. Be mindful of the knees as weight is put upon them in this action. This posture can be added at any point in the class structure.

Counter Pose: Change the front leg if in *Sukhasana*, and then extend and shake out the legs.