# Anatomy and physiology for sports massage

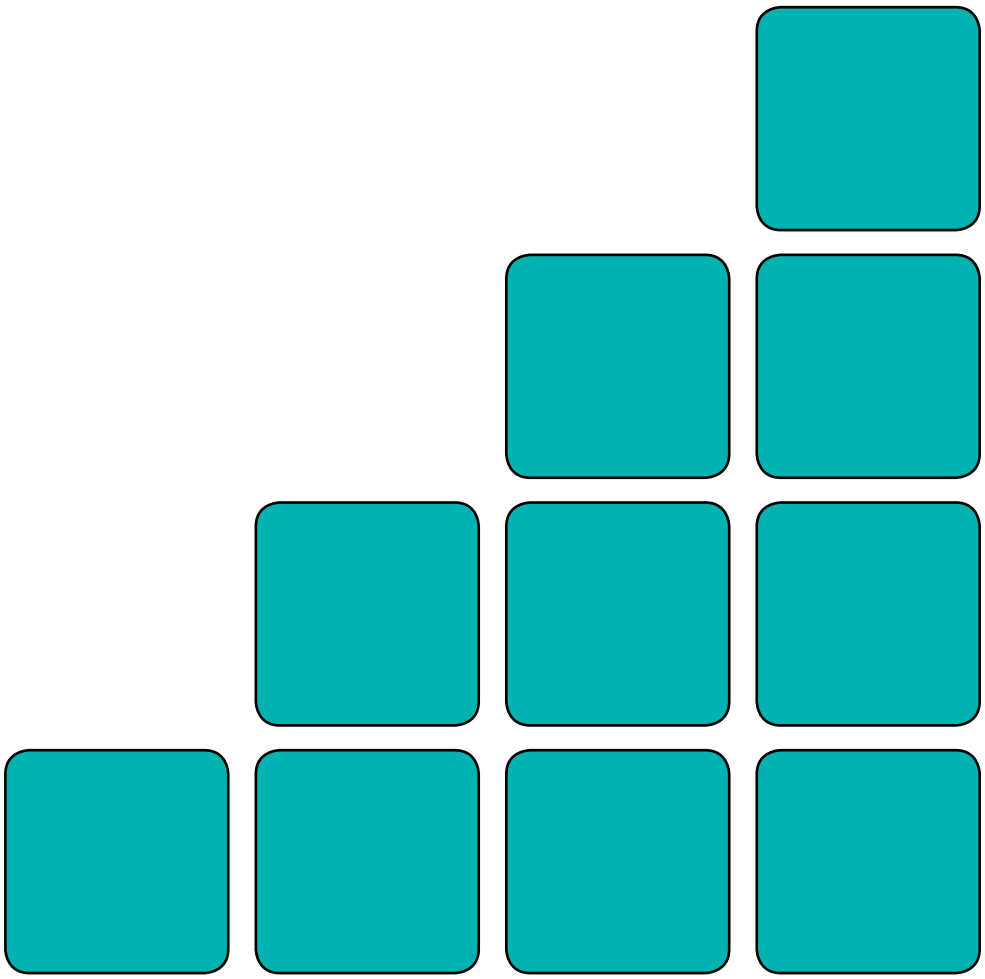
USP41

J/506/7220

Learner name:

Learner number:

VRQ



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## Statement of unit achievement

By signing this statement of unit achievement you are confirming that all learning outcomes, assessment criteria and range statements have been achieved under specified conditions and that the evidence gathered is authentic.

This statement of unit achievement table must be completed prior to claiming certification.

| Unit code | Date achieved | Learner signature | Assessor initials | IV signature (if sampled) |
|---|---|---|---|---|
| | | | | |

## Assessor tracking table

All assessors using this Record of Assessment book must complete this table. This is required for verification purposes.

| Assessor name | Assessor signature | Assessors initials | Assessor number (optional) |
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# USP41

## Anatomy and physiology for sports massage

The aim of this unit is to develop the knowledge and understanding of anatomy and physiology relevant to sports massage. You will explore the anatomy and physiology of each of the body systems and look at the physical, physiological, neurological and psychological effects of sports massage on these systems.

Level

3

Credit value

10

GLH

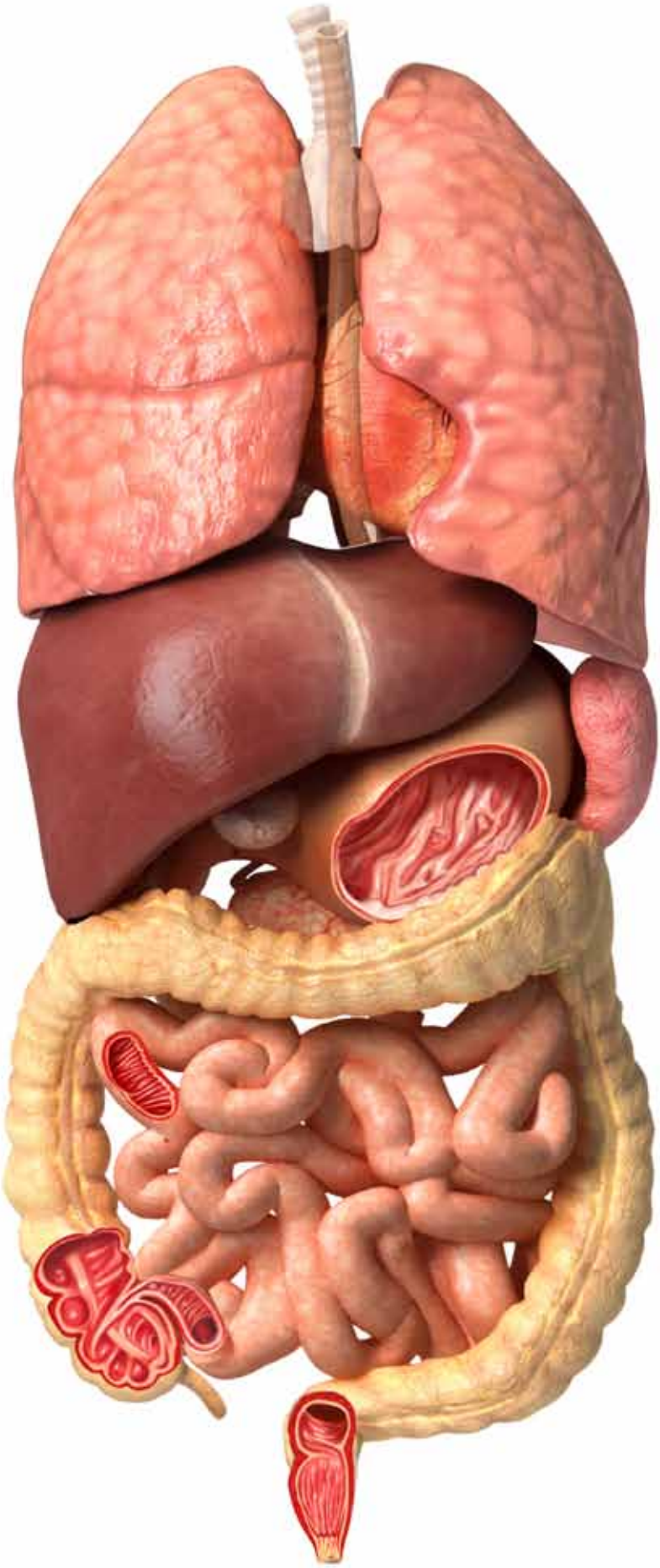
70

Observation(s)

0

External paper(s)

1



# Anatomy and physiology for sports massage

## Learning outcomes

On completion of this unit you will:

1. Understand the structural organisation of the human body
2. Understand the structure and functions of the skin
3. Understand the structure and functions of the skeletal system
4. Understand the structure and functions of joints
5. Understand the structure and functions of the muscular system
6. Know the structure and functions of the nervous system
7. Understand the structure and functions of the endocrine system
8. Understand the structure and functions of the cardiovascular system
9. Understand the structure and functions of the respiratory system
10. Understand the structure and functions of the lymphatic system
11. Know the structure and functions of the digestive system
12. Know the structure and functions of the urinary system
13. Understand the effects of sports massage on the body systems

## Evidence requirements

1. *Knowledge outcomes*
   There must be evidence that you possess all the knowledge and understanding listed in the Knowledge section of this unit. In most cases this can be done by professional discussion and/or oral questioning. Other methods, such as projects, assignments and/or reflective accounts may also be used.

2. *Tutor/Assessor guidance*
   Your tutor/assessor **must** adhere to the **'Assessment Guidance and Evidence Requirements'** for this unit. This can be found under documents on the relevant qualifcation page at www.vtct.org.uk.

   You will be guided by your tutor/assessor on how to achieve learning outcomes in this unit. All outcomes must be achieved.

3. *External paper*
   The external paper will test your knowledge of Learning Outcomes 2, 3, 4, 5, 6, 8, 9, 10 and 13. **There is one external paper that must be achieved.**

# Developing knowledge

## Achieving knowledge outcomes

You will be guided by your tutor and assessor on the evidence that needs to be produced. Your knowledge and understanding will be assessed using the assessment methods listed below*:

- Projects
- Observed work
- Witness statements
- Audio-visual media
- Evidence of prior learning or attainment
- Written questions
- Oral questions
- Assignments
- Case studies
- Professional discussion

**This is not an exhaustive list.*
Where applicable your assessor will integrate knowledge outcomes into practical observations through professional discussion and/or oral questioning.

When a criterion has been orally questioned and achieved, your assessor will record this evidence in written form or by other appropriate means. There is no need for you to produce additional evidence as this criterion has already been achieved.

Some knowledge and understanding outcomes may require you to show that you know and understand how to do something. If you have practical evidence from your own work that meets knowledge criteria, then there is no requirement for you to be questioned again on the same topic.

## Tutor/assessor guidance

Your tutor/assessor **must** adhere to the **'Assessment Guidance and Evidence Requirements'** for this unit. This document will give guidance for the tutor/assessor on breadth and depth of content that must covered in this unit. This can be found under the documents tab on the relevant qualification page at www.vtct.org.uk.

## Achieving the external paper

The external paper will test your knowledge of **Learning Outcomes 2, 3, 4, 5, 6, 8, 9, 10 and 13. A pass mark of 70% must be achieved.**

In addition to the overall 70% pass mark, learners must achieve 40% or more in each section:

**Section 1** - Skeletal system and joints (LO3, LO4)

**Section 2** - Muscular system (LO5)

**Section 3** - Cardiovascular and respiratory (LO8, LO9)

**Section 4** - Skin, nervous, lymphatic systems, and effects of sports massage (LO2, LO6, LO10, LO13)

Learning outcomes 1, 7, 11 and 12 are **not** assessed in the MCQ and therefore portfolio evidence must be provided.

| Paper | Date achieved | Assessor initials |
|---|---|---|
| 1 of 1 | | |

# Knowledge

## Learning outcome 1

### Understand the structural organisation of the human body

| You can: | Portfolio reference |
|---|---|
| a. Outline the structural organisation of the human body | |
| b. Describe the structure of the human cell | |
| c. Describe the functions of the human cell | |
| d. Describe the different types of human tissue | |
| e. Explain the functions of the different types of human tissue | |

## Learning outcome 2

# Understand the structure and functions of the skin

| You can: | Portfolio reference |
|---|---|
| a. Describe the structure of the skin | |
| b. Describe the functions of the skin | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 3

# Understand the structure and functions of the skeletal system

| You can: | Portfolio reference |
|---|---|
| a. Describe the structure of the skeletal system | |
| b. Describe the functions of the skeletal system | |
| c. Explain the classification of bones | |
| d. Explain the stages of bone growth and repair | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 4

# Understand the structure and functions of joints

| You can: | Portfolio reference |
|---|---|
| a. Describe the different joint categories | |
| b. Explain the structure of synovial joints | |
| c. Describe joint actions at the major joints | |
| d. Explain the characteristics of ligaments | |
| e. Explain the characteristics of tendons | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 5

# Understand the structure and functions of the muscular system

| You can: | Portfolio reference |
|---|---|
| a. Describe the characteristics of the types of muscle tissue | |
| b. Locate the major anterior and posterior skeletal muscles | |
| c. Identify and locate the muscle attachment sites for the major muscles of the body | |
| d. Describe the action of the major anterior and posterior skeletal muscles | |
| e. Describe the roles of muscles during movement | |
| f. Explain the different types of muscle contraction | |
| g. Explain the principles of muscle contraction | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 6

# Know the structure and functions of the nervous system

| You can: | Portfolio reference |
|---|---|
| a. Describe the structure of the nervous system | |
| b. Outline the functions of each subdivision of the nervous system | |
| c. Explain the characteristics of the different types of nerves | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 7

# Understand the structure and functions of the endocrine system

| You can: | Portfolio reference |
|---|---|
| a. Describe the structure of the endocrine system | |
| b. Explain the role of hormones | |
| c. Name key hormones and their actions | |

## Learning outcome 8

# Understand the structure and functions of the cardiovascular system

| You can: | Portfolio reference |
|---|---|
| a. Describe the structure of the cardiovascular system | |
| b. Describe the functions of the cardiovascular system | |
| c. Decscribe the flow of blood around the circulatory system | |
| d. Describe the composition of blood | |
| e. Describe blood pressure | |
| f. Describe factors that may affect blood pressure | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 9

# Understand the structure and functions of the respiratory system

| You can: | Portfolio reference |
|---|---|
| a. Describe the structure of the respiratory system | |
| b. Describe the functions of the respiratory system | |
| c. Identify the main muscles involved in breathing | |
| d. Describe the passage of air through the cardio-respiratory systems including gaseous exchange | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 10

# Understand the structure and functions of the lymphatic system

| You can: | Portfolio reference |
|---|---|
| a. Outline the structure of the lymphatic system | |
| b. Describe the functions of the lymphatic system | |
| c. Describe the structure of a lymph node | |
| d. Explain the functions of a lymph node | |
| e. State the location of the major lymph nodes | |

***This learning outcome will be assessed in the external paper.***

## Learning outcome 11

# Know the structure and functions of the digestive system

| You can: | Portfolio reference |
|---|---|
| a. Outline the structure of the digestive system | |
| b. Outline the functions of the digestive system | |

## Learning outcome 12

## Know the structure and functions of the urinary system

| You can: | Portfolio reference |
|---|---|
| a. Outline the structure of the urinary system | |
| b. Outline the function of the urinary system | |

## Learning outcome 13

# Understand the effects of sports massage on the body systems

| You can: | Portfolio reference |
|---|---|
| a. Explain the physical effects of sports massage | |
| b. Explain the physiological and neurological effects of sports massage | |
| c. Explain the psychological effects of sports massage | |

***This learning outcome will be assessed in the external paper.***

# Unit content

This section provides guidance on the recommended knowledge and skills required to enable you to achieve each of the learning outcomes in this unit. Your tutor/assessor will ensure you have the opportunity to cover all of the unit content.

## Learning outcome 1: Understand the structural organisation of the human body

**Structural organisation:** Chemical, cellular, tissues, organs, systems, organisms.

**Structure of human cell:** Extracellular fluid, cell membrane, protoplasm, cytoplasm, cytosol, organelles (nucleus, nucleolus, smooth endoplasmic reticulum (ER), rough ER, ribosomes, golgi apparatus, lysosomes, mitochondria, vacuole), cytoskeleton (microfilaments, intermediate filaments, microtubules, flagella, cilia).

**Functions of human cell:** Function of each structural component and organelle.

**Human tissue:** Epithelial tissue (simple squamous, columnar, cuboidal, ciliated, stratified and transitional epithelium cells), glandular tissue, (exocrine, endocrine), connective tissue (areolar, adipose, fibrous, elastic, reticular), bone (compact and cancellous), lymphoid tissue, nervous tissue, cartilage (hyaline, elastic, fibrocartilage), muscle tissue (smooth, striated, voluntary, involuntary), membranes (mucous, synovial, serous).

**Functions of human tissue:** Functions of each type of human tissue (epithelial, glandular, connective, bone, lymphoid, nervous, cartilage, muscle, membranes).

## Learning outcome 2: Understand the structure and functions of the skin

**Structure of skin:** Epidermis (horny, clear, granular, prickle cell, basal), dermis, subcutaneous layer, appendages (arrector pili, eccrine glands, pores, apocrine glands, sebaceous glands, sensory nerve endings, blood vessels).

**Function of skin:** Sensation, heat regulation (vasoconstriction, vasodilation, shivering and sweating), absorption, protection, excretion, secretion, synthesis of vitamin D.

## Learning outcome 3: Understand the structure and functions of the skeletal system

**Structure of skeletal system:**

**Axial skeleton** – cranium, cervical vertebrae, thoracic vertebrae, lumbar vertebrae, sacral vertebrae, coccyx, intervertebral discs, sternum, ribs.

**Appendicular skeleton** – scapula, clavicle, humerus, radius, ulna, carpals, metacarpals, phalanges, ilium, ischium, pubis, femur, patella, tibia, fibula, tarsals, metatarsals, phalanges.

**Functions of skeletal system:** Support and shape, protection, muscle attachment and movement, production of blood cells, mineral homeostasis, storage.

**Classification of bones:** Composition of bone, microscopic structure of (compact, cancellous), types of bone (long, short, flat, irregular, sesamoid), locations of types of bone throughout the body, classification based on structure and function.

**Bone growth and repair:** Processes of bone growth, processes of bone repair, bone remodelling, cells involved (osteoblasts, osteoclasts, osteocytes), ossification (intramembranous, endochondral).

## Learning outcome 4: Understand the structure and functions of joints

**Joint categories:** Structural classification (fibrous, cartilaginous, synovial), functional classification (synarthrosis/immovable, amphiarthrosis/slightly moveable, diarthrosis/freely moveable), types of synovial joint (gliding, pivot, ball and socket, hinge, saddle, condyloid).

**Synovial joints:** Articulating bone, articular capsule, fibrous capsule, synovial cavity, synovial membrane, synovial fluid, articular cartilage, menisci, bursae, periosteum, accessory ligaments (intra/extra capsule), fat pads.

**Joints:**

**Major joints** – cervical spine, shoulder, elbow, wrist, thoracic spine, lumbar spine, hip, knee, ankle.

**Joint actions** – flexion, extension, hyperextension, abduction, adduction, horizontal flexion, horizontal extension, circumduction, rotation, pronation, supination, inversion, eversion, retraction, protraction, elevation, depression, plantar-flexion, dorsi-flexion, medial rotation, lateral rotation.

**Ligaments:** Structure, function, properties.

**Tendons:** Structure, function, properties.

## Learning outcome 5: Understand the structure and functions of the muscular system

**Muscle tissue:** Types (skeletal, cardiac, smooth), characteristics of each type (location, microscopic structure, nervous control, fibre diameter, fibre length, contraction speed).

**Anterior and posterior muscles:** Scalenes, sternocleidomastoid, levator scapular, pectoralis major/minor, deltoids, biceps, triceps, trapezius, rhomboids, rotator cuff (supraspinatus, infraspinatus, teres minor, subscapularis), teres major, brachioradialis, coracobrachialis, common wrist flexors/extensors, brachialis, serratus anterior, latissimus dorsi, erector spinae, quadratus lumborum, rectus abdominis, obliques (internal/external), transversus abdominis, diaphragm, intercostals, Iliopsoas (psoas and iliacus), gluteus maximus, abductors (gluteus medius, minimus, tensor fascia latae), piriformis, gracilis, adductors (longus, magnus, brevis), quadriceps (rectus femoris, vastus group), hamstrings (biceps femoris, semitendinosus, semimembranosus), pectineus, sartorius, gastrocnemius, soleus, plantaris, popliteus, tibialis anterior, peroneus(fibularis)-longus, brevis, tertius, tibialis posterior, extensor/flexor digitorum longus, extensor/flexor hallucis longus.

**Muscle attachment sites:** Origin and insertion sites for major anterior and posterior muscles (as above).

**Actions of anterior and posterior muscles:** Joint actions controlled by the major muscles (as above).

**Roles of muscles:** Agonist (prime mover), antagonist, fixator, synergist, muscles working in pairs, muscle roles during functional and sporting movements.

**Types of muscle contraction:** Concentric, eccentric, static/isometric, isotonic, isokinetic.

**Principles of muscle contraction:** Sliding filament theory, components involved (myofibril, sarcomere, actin, myosin, troponin, tropomyosin, calcium, sarcoplasmic reticulum, ATP), neurotransmitters, synapse, resting potential, action potential, all or none law.

## Learning outcome 6: Know the structure and functions of the nervous system

**Structure of nervous system:** Central (brain, spinal cord), peripheral, sensory, motor, somatic, autonomic (sympathetic, parasympathetic).

**Functions of nervous system:** Central (brain, spinal cord), peripheral, sensory, motor, somatic, autonomic (sympathetic, parasympathetic).

**Characteristics of nerves:** Types of nerves (motor, sensory, inter-neurons), characteristics (dendrites, axons, axon terminals, myelin sheath, cell body).

## Learning outcome 7: Understand the structure and functions of the endocrine system

**Structure of the endocrine system:** Hypothalamus, thyroid, parathyroid, pituitary, pineal and adrenal, pancreas, ovaries, testes.

**Role of hormones:** Regulate chemical composition and volume of body fluids within internal environment, regulate metabolism and energy balance, regulate contraction of smooth and cardiac muscle, maintain homeostasis, regulate immune system activity, growth and development, reproductive processes.

**Key hormones and actions:** Thyroxine, adrenaline, noradrenaline, human growth hormone, melatonin, cortisol, insulin, glucogen, oestrogen, progesterone, testosterone, adrenocorticotropic hormone (ACTH).

## Learning outcome 8: Understand the structure and functions of the cardiovascular system

**Structure of cardiovascular system:** Heart (endocardium, myocardium, pericardium, atria, ventricles, septum, nodes), heart valves (bicuspid, tricuspid, semi-lunar), coronary circulation, cardiac conduction (sinoatrial node, atrioventricular node, right and left bundle branches, bundle of HIS, purkinje fibres), blood vessels (arteries, veins, capillaries).

**Functions of cardiovascular system:** Transport (oxygen, carbon dioxide, nutrients, waste products, hormones), regulation (body temperature, acid balance), protection (blood loss, fighting foreign microbes).

**Flow of blood:** Systemic circulation (oxygenated blood from lungs, pulmonary vein, left atrium, left ventricle, aorta, arteries, arterioles, capillaries, muscles and organs), pulmonary circulation (deoxygenated blood from muscles and organs, capillaries, venules, veins, vena cava, right atrium, right ventricle, deoxygenated blood to the lungs for oxygenation).

**Composition of blood:** Plasma, plasma proteins, red blood cells (haemoglobin), white blood cells, platelets.

**Blood pressure:** Definition of blood pressure, systolic pressure, diastolic pressure, blood pressure classifications (hypotension, normal, high normal, mild hypertension, moderate hypertension, severe hypertension).

**Factors affecting blood pressure:** Nutrition, exercise, alcohol, smoking, stress, medication, medical conditions.

## Learning outcome 9: Understand the structure and functions of the respiratory system

**Structure of respiratory system:** Nose (cilia, mucus and goblet cells), pharynx, larynx, trachea, bronchi, bronchioles, lungs, alveoli, diaphragm.

**Functions of respiratory system:** Breathing (inspiration and expiration), pulmonary ventilation, external respiration, internal respiration, sense of smell, filtration of inspired air, production of sound, elimination of wastes.

**Breathing muscles:** Muscles during normal breathing (diaphragm, external intercostals), accessory muscles during forced inspiration (sternocleidomastoids, scalenes, pectoralis minor), accessory muscles during forced expiration (internal intercostals, transversus abdominus, rectus abdominus).

**Passage of air:** Upper respiratory tract (mouth, nose and pharynx), lower respiratory tract (larynx, trachea, bronchi, bronchioles), alveoli, alveolar sacs, process of gaseous exchange (pulmonary ventilation, external respiration, internal respiration, partial pressure differences, diffusion of gases, relative composition of inhaled and exhaled air).

## Learning outcome 10: Understand the structure and functions of the lymphatic system

**Structure of lymphatic system:** Capillaries, vessels, ducts, nodes, lymph fluid (monocytes, lymphocytes), primary and secondary lymph organs.

**Functions of lymphatic system:** Fight infection, white blood cells, immunity, distribution of fluid throughout the body, transportation of fats.

**Structure of lymph nodes:** Capsule, trabeculae, cortex, follicles, medulla, medullary cords, afferent vessels, efferent vessels.

**Functions of a lymph node:** Filtration of foreign substances, destruction of foreign substances, immune response.

**Major lymph nodes:** Occipital, submandibular, cervical, auricular, axillary, abdominal, inguinal, popliteal, supratrochlear (cubital).

## Learning outcome 11: Know the structure and functions of the digestive system

**Structure of digestive system:** Mouth, tongue, teeth, salivary glands (parotid, submandibular, sublingual, buccal), pharynx (epiglottis), oesophagus, stomach, small intestine (duodenum, jejunum, ileum), pancreas, liver, gall bladder, large intestine, rectum, anus.

**Functions of digestive system:** Ingestion, mastication, enzyme breakdown in the mouth (amylase), peristalsis, mechanical and chemical breakdown of foods in the stomach (hydrochloric acid, pepsin), role of pancreatic enzymes (trypsin, amylase, lipase), role of bile, process of absorption, elimination of waste.

## Learning outcome 12: Know the structure and functions of the urinary system

**Structure of urinary system:** Kidneys, ureters, bladder, urethra.

**Functions of urinary system:** Main functions (controlling blood composition, controlling blood volume and pressure, removing and restoring water and solutes), functions of each urinary structure (kidneys, ureters, bladder, urethra).

## Learning outcome 13: Understand the effects of sports massage on the body systems

**Physical effects:** Tissue permeability, stretching of muscle tissue and fascia, decreased excess scar tissue, realignment with underlying structures.

**Physiological and neurological effects:** Increased blood supply and vasodilation, increased lymph flow, waste removal, decreased swelling, enhanced immune system, pain reduction, muscle relaxation.

**Psychological effects:** Relaxation, invigoration, stress and anxiety reduction.

# Notes

Use this area for notes and diagrams