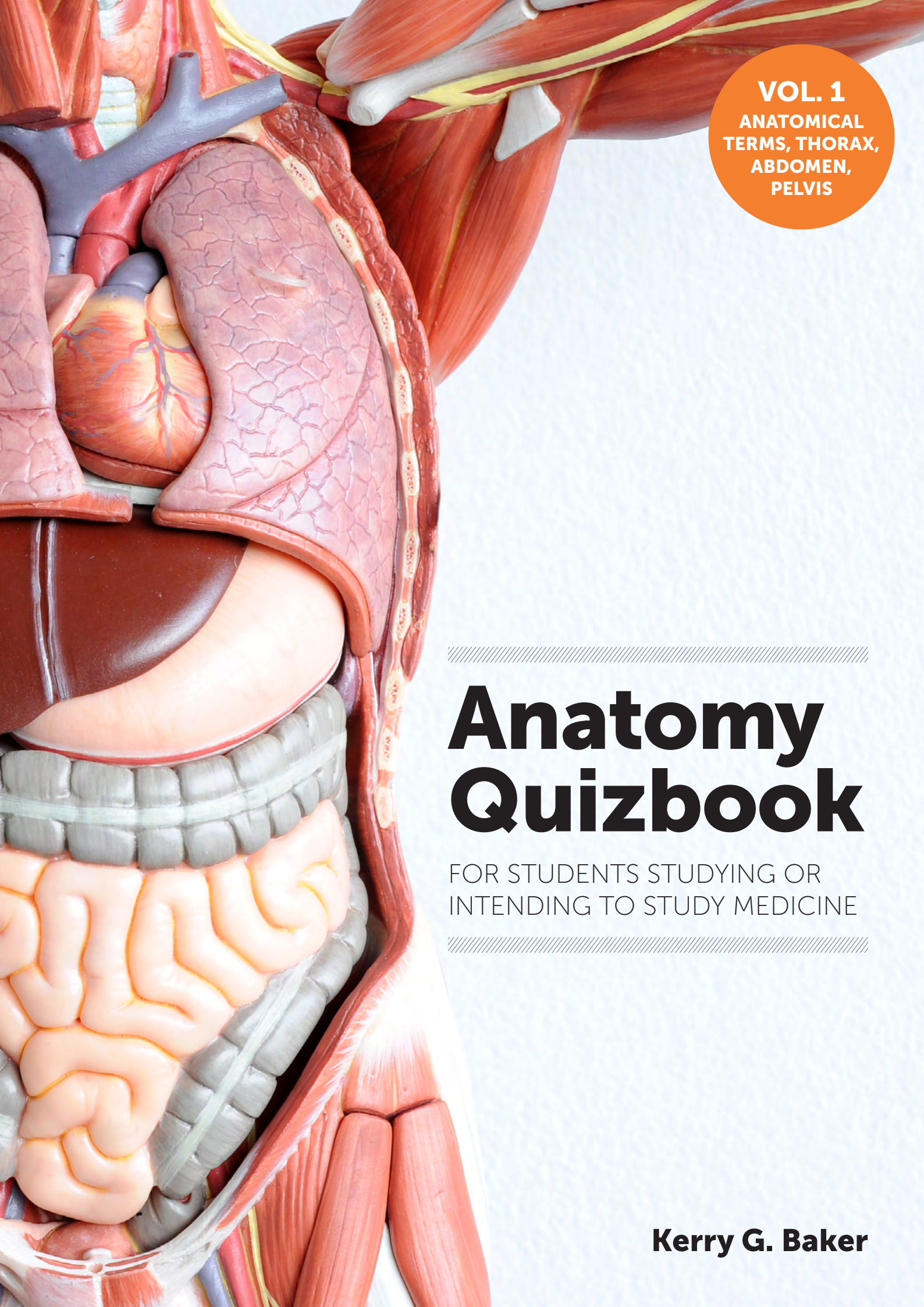

VOL. 1
ANATOMICAL TERMS, THORAX, ABDOMEN, PELVIS

Anatomy Quizbook

FOR STUDENTS STUDYING OR INTENDING TO STUDY MEDICINE

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Anatomy Quizbook

FOR STUDENTS STUDYING OR INTENDING TO STUDY MEDICINE

Volume 1

Contents

Introduction

The Anatomy Quizbook is a series of carefully selected questions addressing core learning in clinically relevant anatomy. It provides the opportunity for both pre-med and medical students to improve their knowledge of anatomy, as well as their performance in tests and examinations.

The form of self-testing presented in the Anatomy Quizbook has many benefits: it is proven to aid retention (Lieberman 2012), it is a very useful method to apply at regular intervals to ensure robust knowledge, and it is extremely beneficial in determining what is known *before* rather than after a test or exam.

Bearing in mind that it is neither necessary nor advisable to learn everything there is to know about anatomy, it is intended that the Anatomy Quizbook be used in conjunction with a comprehensive anatomy textbook such as *Clinically Oriented Anatomy* (Moore et al, 2014) or *Gray's Anatomy for Students* (Drake et al, 2015). And whilst the Anatomy Quizbook is intended primarily for students, tutors may also find this a very useful teaching resource.

Why self testing?

Self-testing is an under-utilized learning method despite 100 years' worth of research proving its effectiveness (Rawson and Dunlosky, 2011; Roediger and Butler, 2011). Repeatedly self-testing the same material at increasing intervals throughout the semester (known as distributed practice) provides a sound basis for exam success (Dunlosky, 2013). However, even if familiar with these revision methods, students may not implement them as they pursue other, more urgent concerns such as assignments and tests or meeting other priorities.

Fortunately, the Anatomy Quizbook encourages strategic knowledge building, being an efficient method of learning for time-poor students (Lieberman, 2012), helping them develop an aptitude for and resilience to regular testing, and most beneficially by reducing the time and effort required for mastering clinically relevant anatomy.

How much anatomy should I know?

Students can be confident the Anatomy Quizbook questions and answers cover information they require because content is based on *A core syllabus in anatomy for medical students – adding common sense to need to know* by McHanwell et al (2007). This syllabus is derived from expert opinion provided by the Education Committee of the Anatomical Society of Great Britain and Ireland and is designed to provide "a necessary minimum of anatomical knowledge for all future newly-qualified medical practitioners".

Whilst being closely based on the McHanwell et al syllabus, the Anatomy Quizbook includes additional basic information not covered in that syllabus, and excludes clinical information which is certain to be taught elsewhere in reputable medical courses.

The Anatomy Quizbook is not a comprehensive coverage of everything there is to know about anatomy because as Monkhouse (2007) states "It is possible to learn anatomy in great detail. This has at least two disadvantages. First, it is mind-numbingly boring, and secondly, you may be lulled into a false sense of security: there is much variation from person to person, and from birth to death".

Monkhouse also asserts it is necessary to differentiate *nice to know* from *need to know* and defines what students need to know as the answer to the question "does it matter to the junior hospital doctor or general practitioner and does it aid the understanding of an important topic?" As Richard Snell so succinctly says in *Clinical Anatomy for Medical Students:* "Anatomy can be a boring subject; clinical anatomy is fascinating"!

The Anatomy Quizbook is an invitation to ascertain and improve knowledge of clinically relevant anatomy. Every effort has been made to ensure pertinent questions and accurate answers, but it is only by attempting these questions prior to accessing the answers that any deficiencies in anatomical knowledge will be revealed. Persistent practice prevents poor performance and hopefully also increases enthusiasm for a subject that underpins much of medicine.

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- See also References and Textbooks at the end of Volume 1 of the Anatomy Quizbook.

About the Author

Kerry Baker has a PhD in Anatomy from the University of New South Wales (UNSW) and is an Honorary Senior Research Fellow at Neuroscience Research Australia. His research includes immunohistochemical investigation of serotonergic and noradrenergic neurons in the human brainstem (UNSW and the University of Sydney), and he has recently published on the short-form Berg Balance Scale (2016) and diagnosis of Alzheimer's disease and dementia with Lewy bodies (2016). His Science teaching includes lecturing in anatomy to medical students at the University of Newcastle Australia and the University of Notre Dame Australia. He is currently preparing Volume 2 of the Anatomy Quizbook for publication, and, as co-author, developing an introductory guide to the structure and function of the human brain.

PART A

Anatomical Terms

Much of the language of Anatomy is built on Greek and Latin words. Students new to this area will find many new and exotic words. However, rather than dealing with the full, and potentially lengthy, terminology of Anatomy, this book provides a specifically focused approach.

In this section you can learn and test your knowledge on key terms and concepts that will enable you to navigate your way around the body, to understand how anatomical planes divide the body, and to describe movement of body parts.

SECTION A1

Define medial, lateral, proximal, distal, superior, inferior, deep, superficial, palmar, plantar, anterior/ventral, posterior/dorsal, rostral, caudal and the anatomical position

A1.1
What is the anatomical position?

A1.2
What does medial mean?

A1.3
What is the relationship of lateral to medial?

A1.4
What does proximal mean?

A1.5
What is the relationship of distal to proximal?

A1.6
What does superior mean?

A1.7
Is inferior just the opposite of superior?

A1.8
Is rostral the same as superior?

A1.9
Caudal means tail but we don't have a tail so what does caudal mean in humans?

A1.10
What are superficial and deep usually in relation to?

A1.11
What does palmar mean?

A1.12
What does plantar mean?

A1.13
Does ventral mean anterior?

A1.14
A. What does posterior mean?
B. Does dorsal mean posterior?
C. Are there structures other than the brain where dorsal = superior?

SECTION A2

Describe the following anatomical planes: axial/transverse/horizontal, coronal and sagittal

A2.1
What are anatomical planes?

A2.2
What are horizontal or transverse planes?

A2.3
Which term is used clinically to describe horizontal and transverse planes?

A2.4
Why is 'axial' used instead of 'horizontal' for CT scans?

Computed Tomography, or CT, is where x-rays are used to produce images of cross-sections through the body.

A2.5
What is the orientation of the coronal plane?

A2.6
What is the orientation of the sagittal plane?

SECTION A3

Define flexion, extension, lateral flexion, pronation, supination, abduction, adduction, medial and lateral rotation, inversion, eversion, plantar flexion, dorsiflexion, protraction, retraction, circumduction, opposition and reposition

A3.1
What does flex mean?

A3.2
Is extension the opposite of flexion?

A3.3
What is the everyday meaning of lateral flexion?

A3.4
What has soup got to do with supination?

A3.5
Is pronation simply the opposite of supination?

A3.6
Why is child abduction similar to movement of the arm and the thumb?

A3.7
How does add aid understanding of adduction?

A3.8
What are medial and lateral rotation?

A3.9
What do your soles do when your feet are inverted?

A3.10
Is eversion simply the opposite of inversion?

A3.11
What knowledge assists learning dorsi and plantar flexion?

A3.12
Which two bones do protraction and retraction usually refer to?

A3.13
Is retraction simply the opposite of protraction?

A3.14
Does knowing what circum means assist understanding circumduction?

A3.15
Which digit can be opposed? Describe this movement. What is the opposite of opposition?

SECTION A4

Define the terms somatic and visceral when used to describe parts and systems (e.g. somatic and visceral motor systems) of the body

A4.1
What does the somatic nervous system mean?

A4.2
Is it the same as the voluntary nervous system?

A4.3
What does visceral mean?

A4.4
What is the visceral motor system?

PART B

Thorax

***Cor pulmonale* means pulmonary heart disease from the Latin for *heart and lungs*, and is a serious heart condition in which there is enlargement and failure of the right ventricle resulting from lung disease. This disease reminds us of the intimate relationship between the two principal organs in the thorax, which is the region below the neck and above the diaphragm.**

In this section you can learn about and test your knowledge of the heart and lungs, in addition to the bones, muscles, blood and lymphatic vessels and nerves also occupying the thorax.

SECTION B1

Demonstrate the main anatomical landmarks of the thoracic vertebrae, ribs and sternum

B1.1
What are the landmarks of the thoracic vertebrae?

B1.2
How do you palpate the 1st rib?

B1.3
How do you count the ribs?

B1.4
Name three readily palpable landmarks of the sternum.

B1.5
Which two bones is the sternal angle between?

SECTION B2

Define the thoracic inlet (superior thoracic aperture) and outlet (inferior thoracic aperture)

B2.1
What are the boundaries of the thoracic inlet?

B2.2
What are the boundaries of the thoracic outlet?

B2.3
What does the thoracic outlet syndrome mean?

SECTION B3

Describe the sternum including the names of each of its components

B3.1
What are the names of the 3 parts of the sternum?

B3.2
What is the significance of the sternal angle?

SECTION B4

State the number of true, false and floating ribs, and identify which are typical

B4.1
What features do all ribs have?

B4.2
Are typical ribs the same as true ribs?

B4.3
What is a true rib?

B4.4
How many true ribs are there?

B4.5
How many false ribs are there?

B4.6
How many floating ribs are there?

B4.7
How many typical ribs are there?

B4.8
How many atypical ribs are there?

B4.9
How do I remember which ribs are atypical?

SECTION B5

Describe the diaphragm including naming its three openings and tendinous attachment to the lumbar spine

B5.1
Which two body cavities does the diaphragm lie between?

B5.2
What nerve innervates and activates the diaphragm?

B5.3
Why is the diaphragm called the chief muscle of inspiration?

B5.4
Which part of the diaphragm moves and why?

B5.5
Why is the right dome higher than the left?

B5.6
How high do the domes go during expiration?

B5.7

What are the attachments of the diaphragm to the lumbar spine?

B5.8

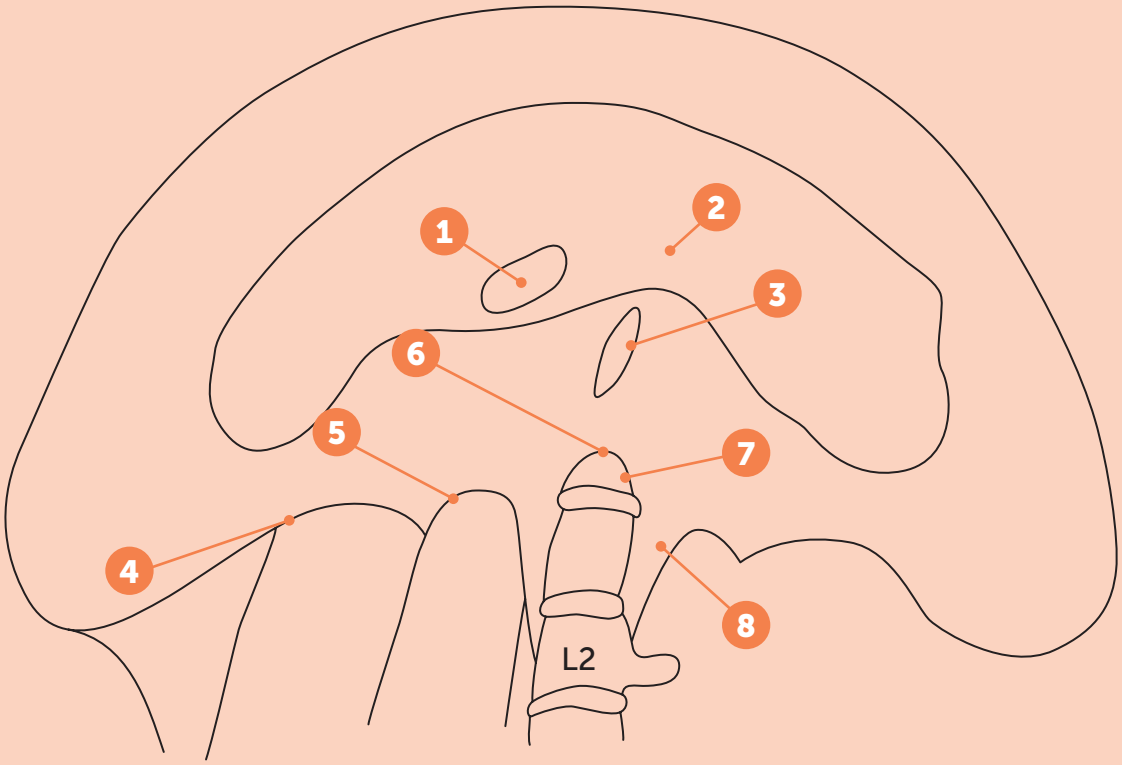
Where else does the diaphragm attach?

B5.9

Which bone is the central tendon attached to?

B5.10

Name the eight important features of the diaphragm indicated on the diagram.



INFERIOR VIEW OF DIAPHRAGM

SECTION B6

Explain the anatomy of the intercostal muscles. Describe a neurovascular bundle in a typical intercostal space

B6.1
What are the superior and inferior attachments of the external intercostal muscles?

B6.2
What are the superior and inferior attachments of the internal intercostal muscles?

B6.3
What are the superior and inferior attachments of the innermost intercostal muscles?

B6.4
What is the direction/orientation of the external intercostal muscles?

B6.5
What is the direction/orientation of the internal intercostal muscles?

B6.6
What is the direction/orientation of the innermost intercostal muscles?

B6.7
What is the acronym for the neurovascular bundle?

B6.8
What do the letters V A N stand for?

B6.9
Where is the neurovascular bundle located?

SECTION B7

Explain the movements and muscles involved in normal and vigorous respiration

B7.1
What muscle performs normal quiet breathing?

B7.2
How does normal quiet inspiration occur?

B7.3
How does normal quiet expiration occur?

B7.4
What muscles are responsible for inspiration during heavy breathing?

B7.5
Which muscle is primarily responsible for the up and out movement of the ribs?

B7.6
Which muscles are accessory muscles of inspiration that help lift the rib cage?

B7.7
What muscles are responsible for expiration during heavy breathing?

B7.8
What are the muscles that depress the ribcage for expiration during heavy breathing (ie which other muscle is involved in forced expiration)?

SECTION B8

Summarise the anatomy of the trachea

B8.1
What are the superior and inferior boundaries of the trachea?

B8.2
What are the dimensions of the adult trachea?

B8.3
What is the chief component of the wall of the trachea?

B8.4
What is the function of the tracheal rings?

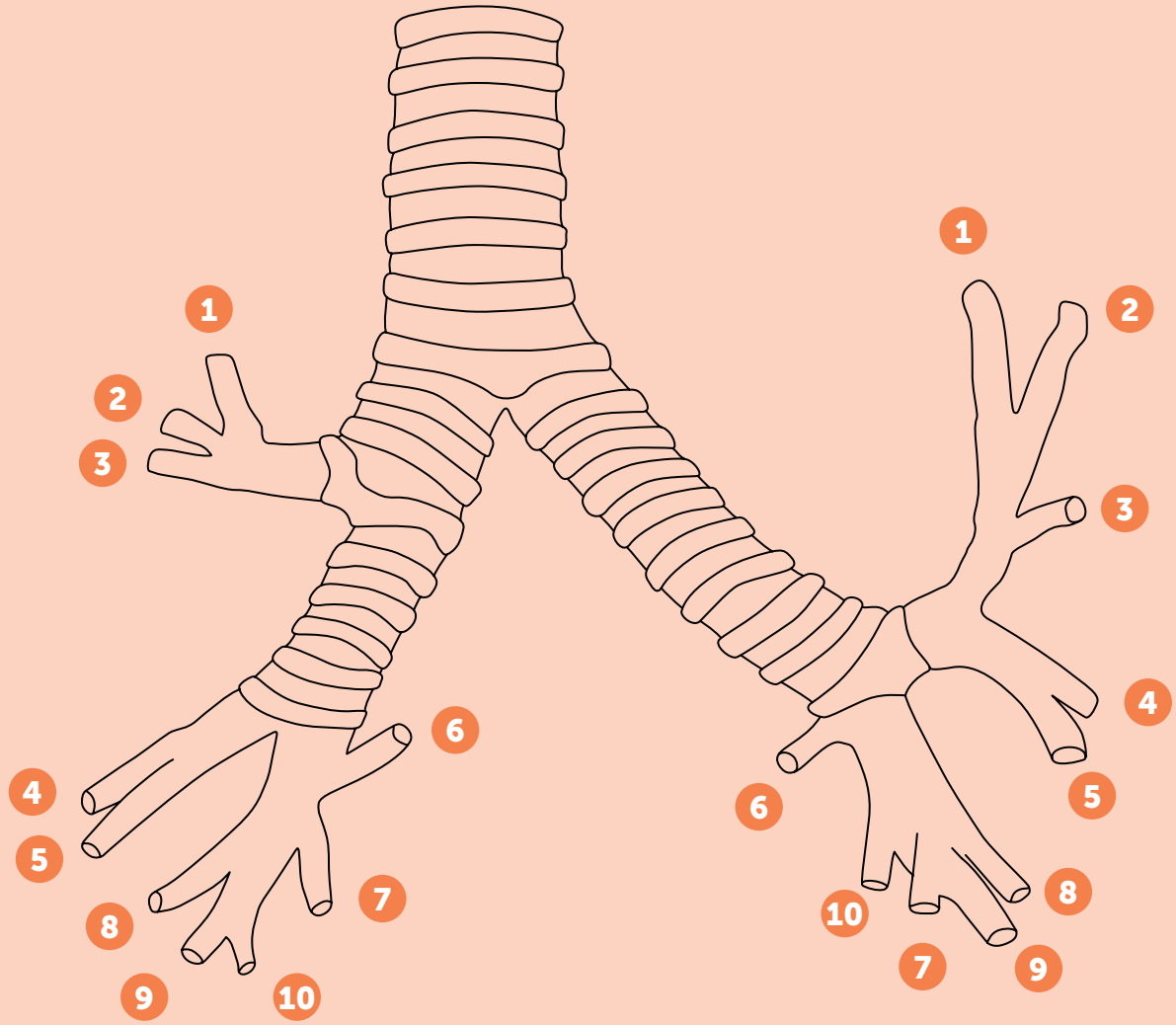
B8.5
What is the main function of the trachea?

SECTION B9

Summarise the anatomy of the bronchial tree and bronchopulmonary segments

B9.1

Name the ten important features of the bronchial tree indicated on the diagram



BRONCHIAL TREE

B9.2

What is a bronchopulmonary segment?

B9.3

Describe the bronchi and vessels supplying each segment.

B9.4
Name the segmental bronchi of the right lung.

B9.5
Name the segmental bronchi of the left lung.

B9.6
What is the clinical significance of bronchopulmonary segments?

SECTION B10

Name the lobes of each lung and the fissures dividing them

B10.1
What are the lobes of the right lung?

B10.2
What are the lobes of the left lung?

B10.3
What are the fissures of the right lung?

B10.4
What are the fissures of the left lung?

SECTION B11

Describe the structures in the hilum and the surfaces and borders of each lung

B11.1
What is the hilum of the lung and what structures pass through it?

B11.2
Where is the hilum located?

B11.3
What are the surfaces of each lung?

B11.4
What are the borders of each lung?

SECTION B12

State the relationship of the visceral pleura to the lung and the parietal pleura to the chest wall. Describe the pleural cavity and the meeting of the visceral and parietal pleura

B12.1
Where is the visceral pleura?

B12.2
Where is the parietal pleura?

B12.3
What are the four parts of the parietal pleura?

B12.4
What is the pleural cavity?

B12.5
What is the function of the pleural cavity?

B12.6
Where do the visceral and parietal pleura meet?

SECTION B13

Outline the main divisions of the mediastinum and state the contents of each division

B13.1
Where is the mediastinum?

B13.2
What divides the superior mediastinum from the inferior mediastinum?

B13.3
What is in the superior mediastinum?

B13.4
What are the three parts of the inferior mediastinum?

B13.5
What is in the anterior mediastinum?

B13.6
What is in the middle mediastinum?

B13.7
What is in the posterior mediastinum?

SECTION B14

State the borders and describe the surfaces, base and apex of the heart

B14.1
What are the borders of the heart?

B14.2
What does the anterior surface of the heart consist of?

B14.3
What does the diaphragmatic surface of the heart consist of?

B14.4
What does the left pulmonary surface of the heart consist of?

B14.5

What does the right pulmonary surface of the heart consist of?

B14.6

Which atrium comprises the base of the heart?

B14.7

How do you recognize the base of the heart?

B14.8

Which ventricle comprises the apex of the heart?

B14.9

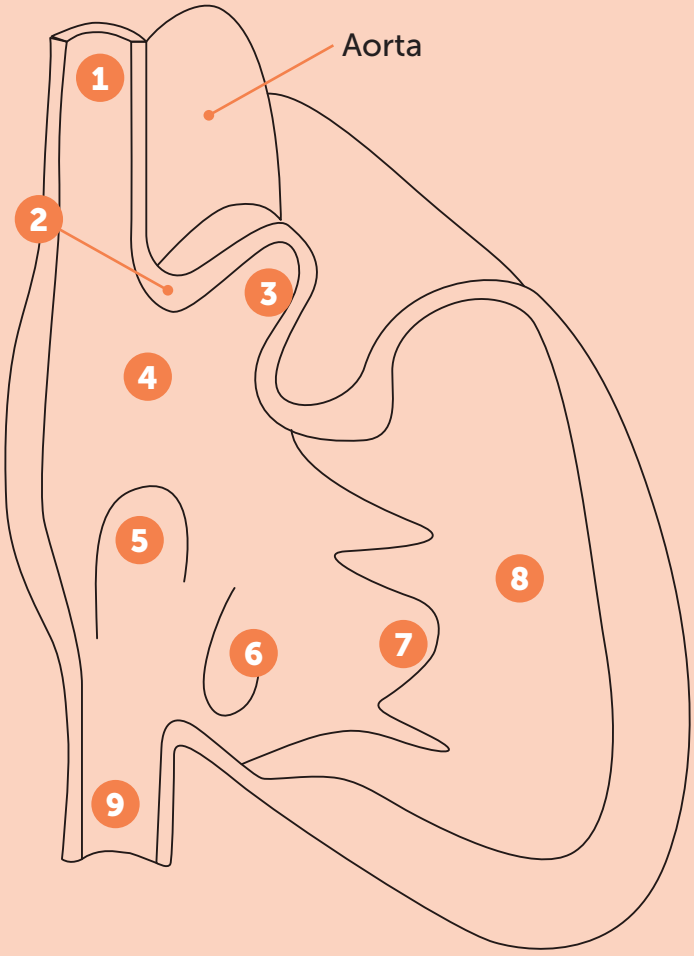
How do you recognize the apex of the heart?

SECTION B15

Identify the major anatomical features of each chamber of the heart and explain their functional significance

B15.1

Name the nine important features of the right atrium and right ventricle indicated on the diagram (note that the sinuatrial node is actually invisible).



RIGHT ATRIUM AND VENTRICLE

B15.2

What is the significance of the auricles and the fossa ovalis?

B15.3

What three veins enter the right atrium?

B15.4
What structures do the SVC, IVC and Coronary sinus drain?

B15.5
What is the function of the right atrium?

B15.6
Name four significant features of the right ventricle.

B15.7
What is the function of the tricuspid valve?

B15.8
What is the function of the chordae tendineae and papillary muscles?

B15.9
What is the function of the right ventricle?

B15.10
Name four important features of the left atrium and state their location.

B15.11
State one important function of the left atrium.

B15.12
Which ventricle has the thicker wall and is circular in cross-section?

B15.13
Why does this ventricle have such a thick wall?

B15.14
Does the left ventricle contain similar structures to the right ventricle?

SECTION B16

Describe the function and position of the pulmonary, atrioventricular and aortic valves

B16.1
Where is the pulmonary valve located?

B16.2
Where is the aortic valve located?

B16.3
What is the function of the pulmonary and aortic valves?

B16.4
Where is the bicuspid mitral (left atrioventricular) valve located?

B16.5
Where is the tricuspid (right atrioventricular) valve located?

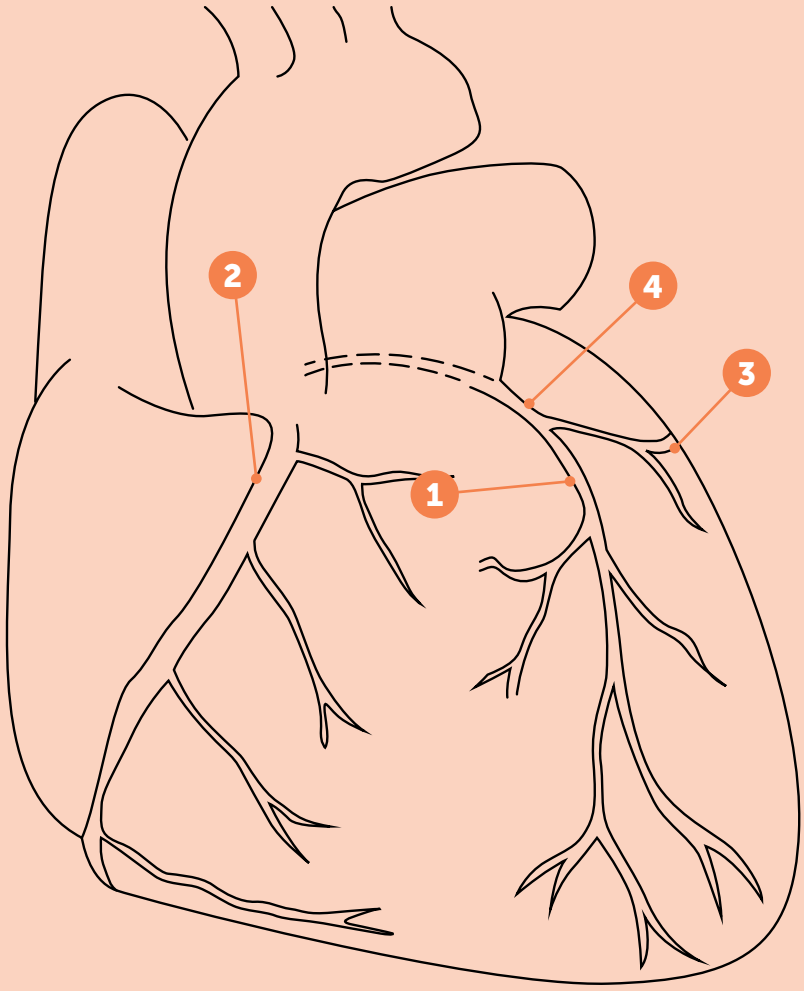
B16.6
What is the cause of heart sounds?

SECTION B17

Describe the origin, course and main branches of the left and right coronary arteries

B17.1

Name the four important arteries indicated on the diagram showing occlusion sites (Note: Numbers 1-3 account for 85% of coronary artery occlusions and are numbered such that 1 = most frequent occlusion site, 2 = next most frequent occlusion site, etc)



CORONARY ARTERY OCCLUSION

B17.2

What is the origin of the left coronary artery?

B17.3

Name the main branches of the left coronary artery and anterior interventricular artery more commonly known as the left anterior descending artery (LAD).

B17.4
What is the course of LAD?

B17.5
What is the origin of the right coronary artery?

B17.6
What is the course of the right coronary artery?

B17.7
Name the main branch of the right coronary artery (RCA).

B17.8
Why are the LAD, RCA and circumflex arteries important?

SECTION B18

Understand the anatomical course of the spread of excitation through the chambers of the heart

B18.1
List, in order of excitation, the components making up the conduction system of the heart.

B18.2
What is the sinuatrial node (SAN)?

B18.3
Where is the SAN?

B18.4
What is the atrioventricular node (AVN)?

B18.5
Where is the AVN?

B18.6
Where is the bundle of His located?

B18.7
What are the Purkinje fibres?

B18.8
Where are the Purkinje fibres?

B18.9
Electrical excitation in the heart proceeds from SAN to AVN to bundle of His, but what is located between the bundle of His and Purkinje fibres?

SECTION B19

Demonstrate the arrangement of the fibrous and serous layers of the pericardium

B19.1
What is the pericardium?

B19.2
What are the two parts of the pericardium?

B19.3
What are the two parts of the serous pericardium?

B19.4
What is the other name for the visceral layer of the serous pericardium?

SECTION B20

Describe the course of the ascending aorta, the arch of the aorta and the descending thoracic aorta. Name their major branches and the structures they supply

B20.1
What is the course of the ascending aorta?

B20.2
What is the course of the arch of the aorta?

B20.3

What arteries originate from the arch of the aorta and what do they supply?

B20.4

Which part of the mediastinum contains the thoracic aorta?

B20.5

What is the course of the thoracic aorta in relation to:
1. Vertebral column?
2. Left bronchus?
3. Oesophagus?
4. Diaphragm?

B20.6

What are all the branches of the thoracic aorta?

B20.7

Which are the major branches of the thoracic aorta and what do they supply?

B20.8

An important artery in the thorax arises from the subclavian artery, what is it called?

B20.9

What is the origin of the anterior intercostal arteries?

SECTION B21

Describe the origins, course and relationships of the brachiocephalic veins, inferior and superior venae cavae and the azygos venous system

B21.1

What are the A. Origins B. Course and C. Relations of the brachiocephalic veins i.e. where do the brachiocephalic veins go and what structures are near them?

B21.2

What are the A. Origins B. Course and C. Relations of the superior vena cava (SVC)?

B21.3

What are the A. Origins B. Course and C. Relations of the inferior vena cava (IVC) in the thorax?

B21.4

Describe the azygos venous system including the structures drained.

SECTION B22

Describe the origin, course and distribution of the vagus nerve and its branches, and the phrenic nerves on both the right and left sides of the thorax

B22.1

What is the origin of the vagus nerve?

B22.2

Where does the vagus nerve enter the thorax and where does it go?

B22.3

State the relationship of the vagus nerve to the hilum of the lung, oesophagus and heart.

B22.4

Where does the vagal parasympathetic input to the pulmonary vessels and bronchial tree come from?

B22.5

How do I remember what the vagus nerve innervates in the thorax?

B22.6

What do A. the cardiac and B. pulmonary plexuses innervate?

B22.7

Why is the parasympathetic division called the D division?

B22.8

What is the relationship of the phrenic nerve to the hilum of the lung?

B22.9

Where does the phrenic nerve enter the diaphragm and does it supply other structures?

SECTION B23

Describe the composition and function of the sympathetic chains and splanchnic nerves

B23.1
What is a sympathetic chain?

B23.2
Where are the sympathetic chains in the thorax?

B23.3
What do the sympathetic chains do?

B23.4
Which of the sympathetic chain ganglia are relevant to organs in the thorax?

B23.5
What are the splanchnic nerves?

B23.6
Which of the sympathetic chain ganglia give rise to splanchnic nerves innervating organs in the abdomen and pelvis?

SECTION B24

Describe the course and relations of the oesophagus within the thorax

B24.1

What is the course of the oesophagus in the thorax?

B24.2

What are the relations of the oesophagus in the thorax?

B24.3

Does knowing the location of the three oesophageal constrictions of the oesophagus assist with understanding and remembering its course?

SECTION B25

Describe the course of the thoracic duct and the other lymph systems within the thorax

B25.1

A. What is the course of the thoracic duct in the thorax and B. What are its relations?

B25.2

What are the two major groups of lymph vessels in the thorax?

B25.3

Which lymph nodes does the chest wall drain to?

B25.4

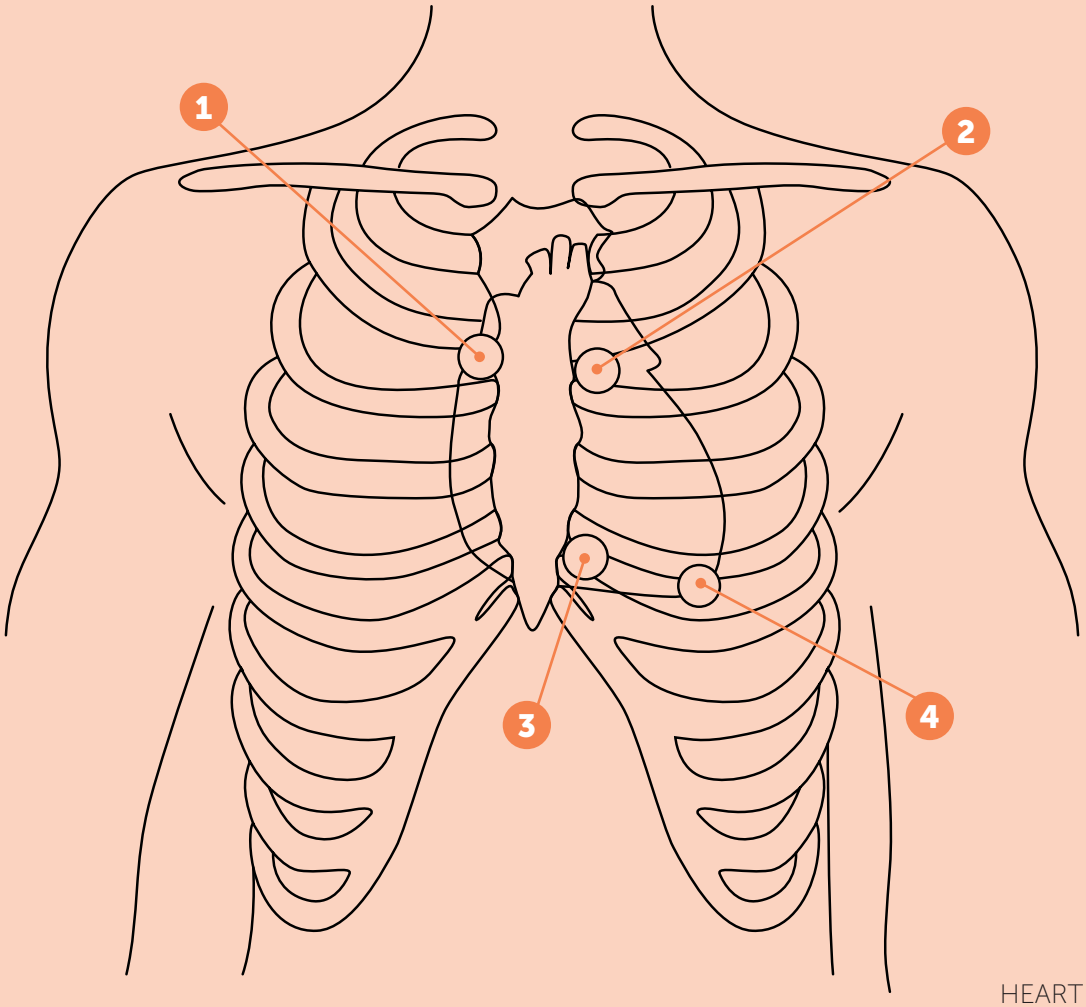
Which lymph nodes does the thoracic viscera drain to?

SECTION B26

Demonstrate the surface markings of the heart and the position of the four major valves

B26.1

Name the heart valve ascultated (listened to with a stethoscope) at each of the numbered areas on the diagram.



B26.2
What are the auscultatory areas of the four heart valves?

B26.3
Why are we interested in the position of the heart valves?

B26.4
What are the surface markings of the heart?

SECTION B27

Demonstrate the surface projections of the margins of the pleura and the lobes and fissures of the lungs

B27.1
What are the surface projections of the margins of the pleura?

B27.2
What are the surface projections of the lungs?

B27.3
What are the surface projections of the fissures of the lungs?

PART C

Abdomen

Abdominous **means having a paunch or a big belly and this Latin word is readily understood because abdomen means the same in both Latin and English. Although *abdominous* sounds trivial and possibly even amusing, abdominal fat can portend serious cardiovascular problems.**

The abdomen contains all the large internal organs with the exception of the heart and lungs. Therefore, this section will help you learn and test your knowledge of not only the organs of the gastrointestinal tract, but also the pancreas, liver, gallbladder, kidneys, spleen and their supporting structures including muscles, blood and lymphatic vessels and nerves.

SECTION C1

State the boundaries of the abdomen

C1.1

What is the upper boundary of the abdomen?

C1.2

What is the lower boundary of the abdomen?

SECTION C2

Demonstrate the bony and cartilaginous landmarks visible or palpable on abdominal examination

C2.1

Which bony and cartilaginous landmarks are readily palpated in the abdomen?

SECTION C3

Name and demonstrate the four quadrants and nine descriptive regions of the abdomen. Describe the location and palpability of the abdominal organs

C3.1

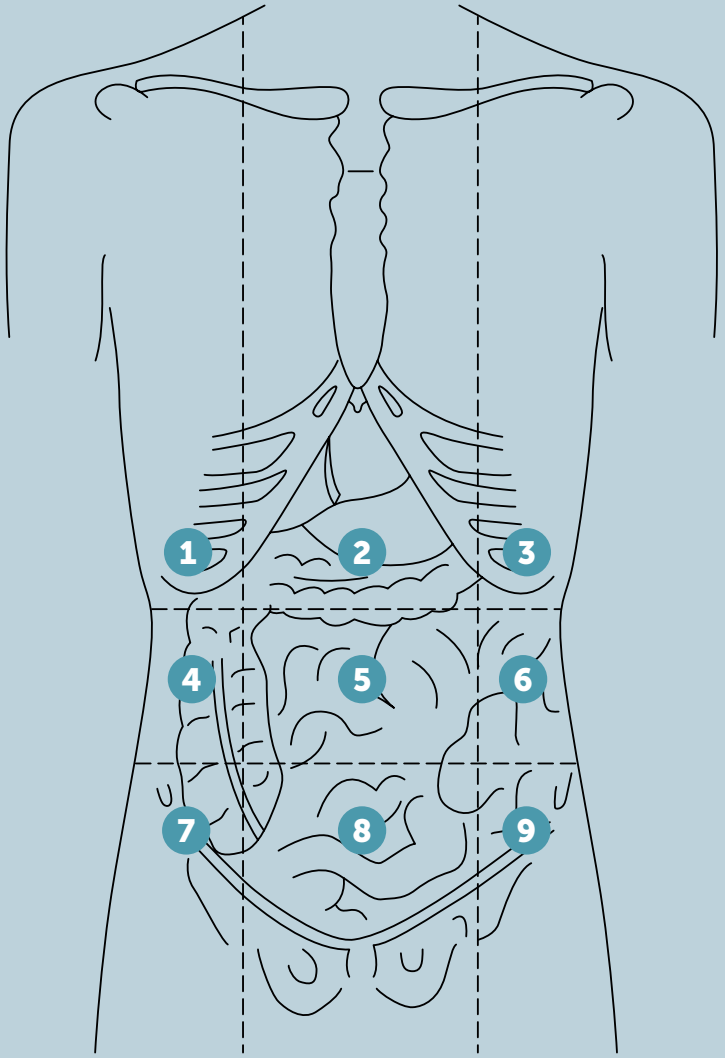
What are the four quadrants of the abdomen?

C3.2

Which planes divide the abdomen into 9 regions A. Two vertically, B. Two horizontally?

C3.3

Name the nine abdominal regions indicated on the diagram.



NINE ABDOMINAL REGIONS

C3.4
Which organs are palpable and which are not palpable in the RUQ?

C3.5
Which organs are palpable and which are not palpable in the LUQ?

C3.6
Which organs are palpable and which are not palpable in the RLQ?

C3.7
Which organs are palpable in the LLQ?

SECTION C4

Describe the anatomy, innervation and functions of the muscles of the anterior and posterior abdominal walls

C4.1
Is the anterior or the posterior abdominal wall more relevant?

C4.2
What are A. The general attachments. B. Fibre direction. C. Actions of the rectus abdominis muscle.

C4.3
What are A. The general attachments. B. Fibre direction. C. Actions of external oblique muscle?

C4.4
What are A. The general attachments B. Fibre direction C. Actions of internal oblique muscle?

C4.5

What are A. The general attachments B. Fibre direction C. Actions of transversus abdominus muscle?

C4.6

What is the innervation of all the abdominal muscles mentioned above?

SECTION C5

Demonstrate the anatomy of the attachments of the inguinal ligament; the anatomy of the superficial and deep inguinal rings and how the anterior abdominal wall muscles form the inguinal canal. Describe the contents of the inguinal canal in both males and females

C5.1

The inguinal ligament comprises the inferior border/aponeurosis of which muscle?

C5.2

Where does each end of this ligament attach?

C5.3

Describe the length and location of the inguinal canal.

C5.4

What are the openings (A. Entrance; B. Exit) at each end of the inguinal canal called?

C5.5

Describe the anatomy of the deep inguinal ring.

C5.6

Describe the anatomy of the superficial inguinal ring.

C5.7
What does the male inguinal canal contain?

C5.8
What does the female inguinal canal contain?

SECTION C6

Describe the relationship between the femoral canal and the inguinal ligament

C6.1
How is the femoral sheath (containing the femoral artery, vein and canal) orientated with respect to the inguinal ligament and inguinal canal?

C6.2
What is the relationship between the femoral canal and the inguinal ligament?

SECTION C7

Describe the organisation of the parietal and visceral peritoneum; its lesser and greater sacs, mesenteries and peritoneal 'ligaments'

C7.1
Define the peritoneum.

C7.2
Describe the visceral peritoneum.

C7.3
Describe the parietal peritoneum.

C7.4
What is the lesser sac and where is it located?

C7.5
What is the greater sac and where is it located?

C7.6
What is a mesentery?

C7.7
Name three mesenteries other than the small bowel mesentery.

C7.8
What are the peritoneal ligaments?

SECTION C8

Summarise the structure, location, appearance and function of the small bowel mesentery known as *the* mesentery

C8.1
What is the structure of the mesentery and what are its attachments?

C8.2
Describe the appearance, layout and function of the mesentery.

SECTION C9

Explain the meaning of 'retroperitoneal' and list all retroperitoneal abdominal structures

C9.1
What does retroperitoneal mean in relation to position and mesenteries?

C9.2
Explain what primarily and secondarily retroperitoneal mean and give examples.

C9.3
List abdominal viscera that are retroperitoneal.

C9.4
Explain the position of the kidneys in relation to the parietal peritoneum.

C9.5
Are there any organs in the peritoneal cavity?

SECTION C10

Describe the anatomy of the stomach, its position, parts, blood and nerve supply and key relations to other abdominal organs

C10.1

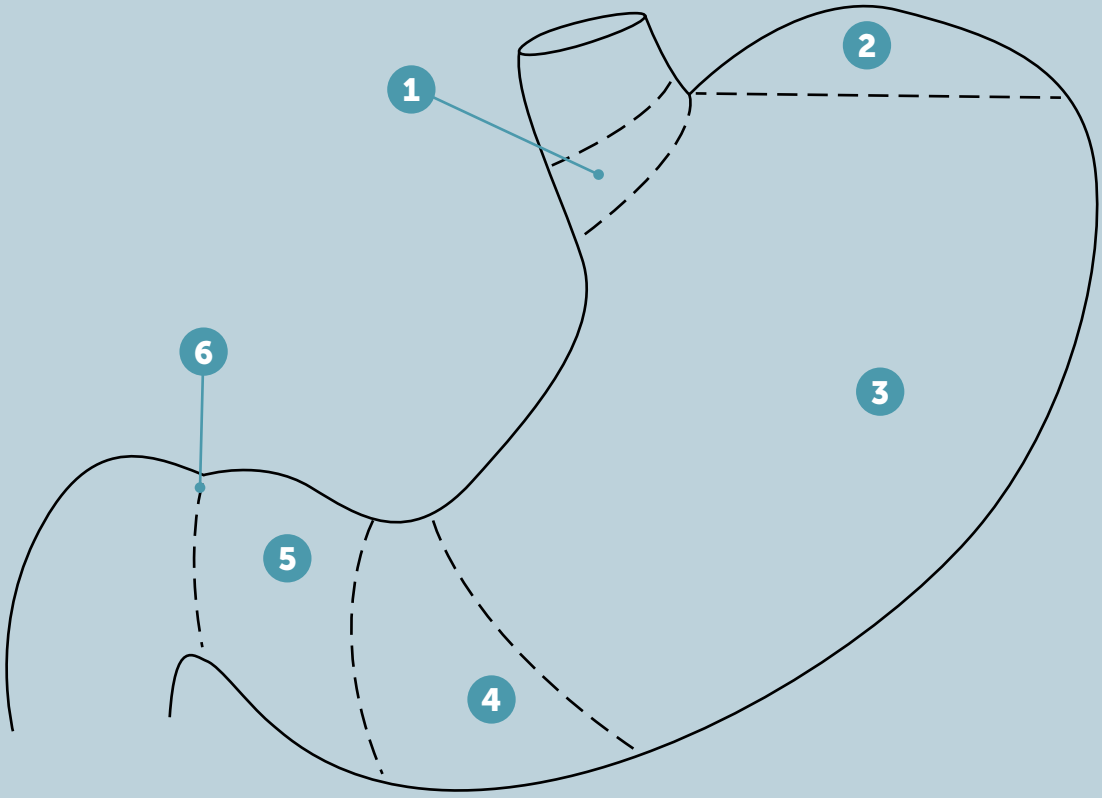
The bed of the stomach is posterior to the stomach just as our bed is posterior to the stomach when we lie supine – list the contents of the bed.

C10.2

Where is the stomach located in relation to the diaphragm, pancreas, kidney, spleen, and liver?

C10.3

Name the six areas of the stomach indicated on the diagram.



SIX REGIONS OF THE STOMACH

C10.4
What is the blood supply of the stomach?

C10.5
What is the nerve supply of the stomach?

SECTION C11

Describe the parts and position of the duodenum and its key relations to other abdominal organs

C11.1
What are the four parts of the duodenum?

C11.2
What are the relations of the duodenum?

SECTION C12

Describe the small and large intestine including the anatomy of the appendix (Note: some of the sigmoid colon and all of the rectum are in the pelvis and are discussed in section D)

C12.1
Which quadrants of the abdomen contain the jejunum and ileum?

C12.2
How long is the small intestine A. In a cadaver B. in a living person?

C12.3
State four differences between the jejunum and the ileum.

C12.4
Why do the differences between the jejunum and ileum matter to
A. Medical students
B. Radiographers
C. Surgeons?

C12.5
Where does the colon begin and end?

C12.6
What are the 5 parts of the colon?

C12.7
What is the location and arrangement of the various parts of the colon?

C12.8
Where does the appendix attach to the colon?

C12.9
How long is the appendix?

C12.10
Where is the appendix in relation to the caecum?

SECTION C13

Describe the position and form of the pancreas and its relationship to other organs and structures

C13.1
Where is the pancreas?

C13.2
State the four major parts of the pancreas.

C13.3
What is the name of the duct running from the tail to the head where it joins the bile duct?

C13.4
How would you describe the relationship of the head of the pancreas to the duodenum?

C13.5
What is the relationship of the pancreas to the stomach?

C13.6
What is the relationship of the uncinate process to
A. the superior mesenteric artery (SMA) and vein (SMV)
B. left renal vein
C. aorta?

SECTION C14

Describe the position, blood supply and form of the liver including its lobes, segments, surfaces and impressions

C14.1

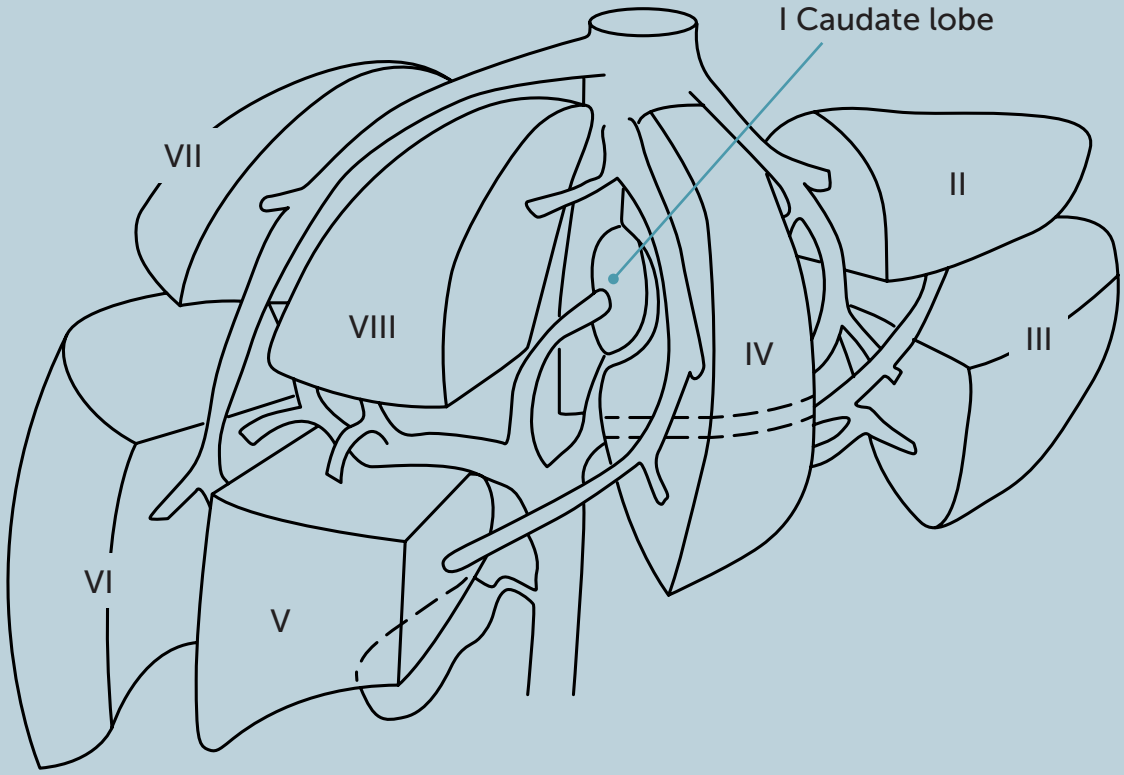
Where is the liver?

C14.2

A. Which two vessels transport blood to the liver? B. What percentage is carried by each?

C14.3

Explain the eight (surgical) segments of the liver referring to the Liver segments diagram.



LIVER SEGMENTS

C14.4

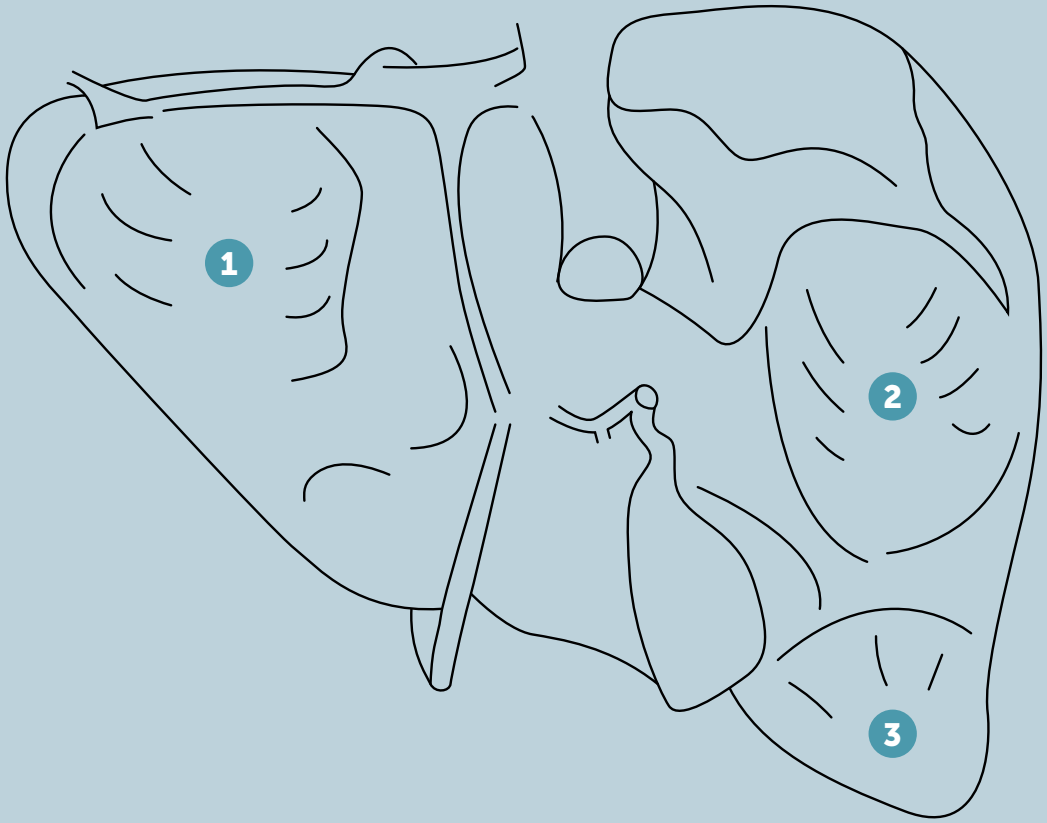
Are the lobes a useful division of the liver?

C14.5

Name the four lobes of the liver.

C14.6

Name the three impressions on the visceral surface of the liver indicated on the diagram.



LIVER IMPRESSIONS

C14.7

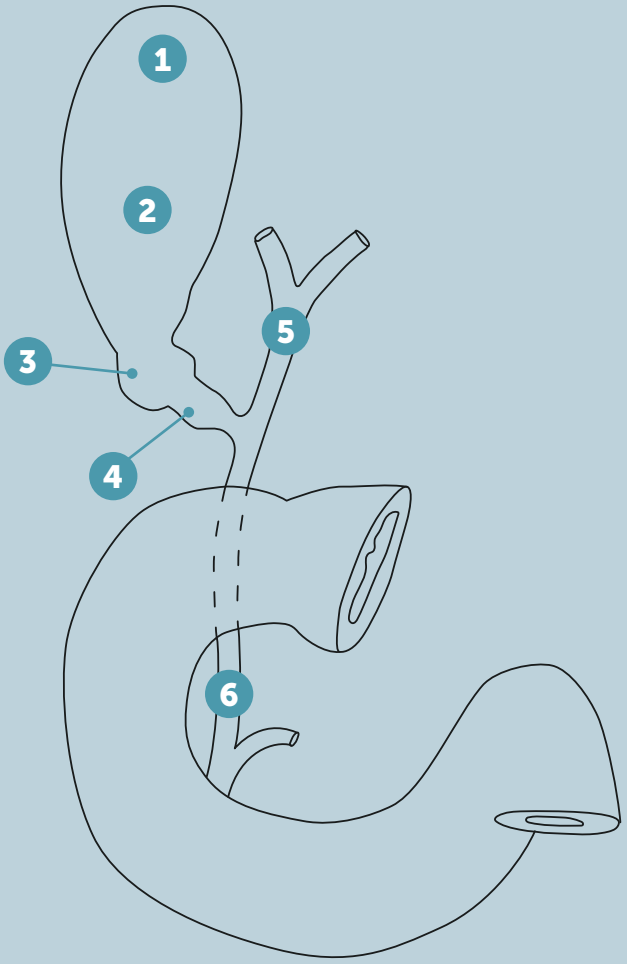
What are the surfaces of the liver?

SECTION C15

Describe the position, form and blood supply of the gallbladder and biliary tree

C15.1

Name the six structures indicated on the diagram of the gallbladder and biliary tree.



GALLBLADDER AND BILIARY TREE

C15.2

What is the relationship of the gallbladder to the liver?

C15.3

What is the major blood supply to the gallbladder?

SECTION C16

Summarise the functional anatomy of the portal vein and the portal venous system

C16.1

A. Where is the portal vein and B. what does it do?

C16.2

Define and describe the portal venous system.

SECTION C17

Describe the position, coverings (fascia, capsules), components (poles, lobes, hilum, pelvis, sinus, calices, medulla, cortex, pyramid) and blood supply of the kidneys. Describe the course and blood supply of the ureters

C17.1

What are the vertebral levels of the kidneys?

C17.2

Where are the poles of the kidney located?

C17.3

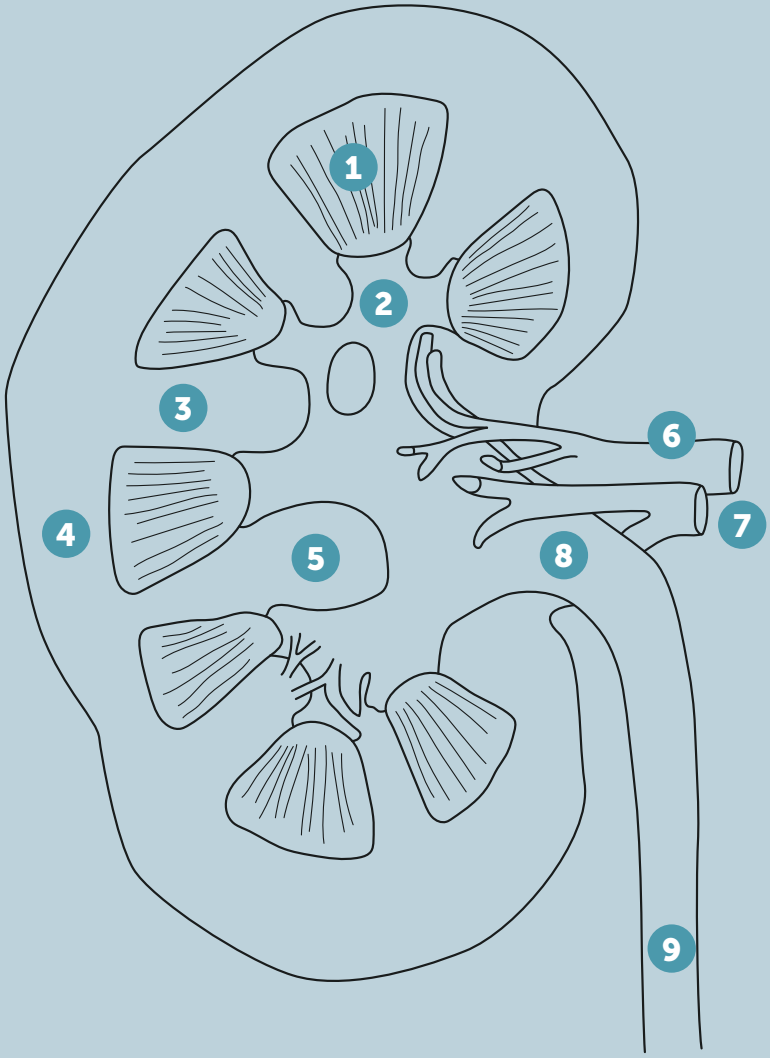
What is the hilum of the kidney?

C17.4

What constitutes a lobe and how many lobes does the average kidney have?

C17.5

Name the nine structures indicated on the diagram of the kidney and ureter.



VERTICAL SECTION THROUGH KIDNEY AND URETER

C17.6

What are the three layers of tissue covering each kidney?

C17.7

List the arteries and veins of the kidney beginning with the renal artery and ending with the renal vein.

C17.8

Outline the course of the ureters.

C17.9

How long is each ureter?

C17.10
State the blood supply of the upper and middle ureters, and the blood supply of the ureters in the pelvic cavity.

SECTION C18

Relations of each kidney

C18.1
What structures are above the right kidney?

C18.2
What structures are above the left kidney?

C18.3
What structures are immediately anterior to the right kidney?

C18.4
What structures are immediately anterior to the left kidney?

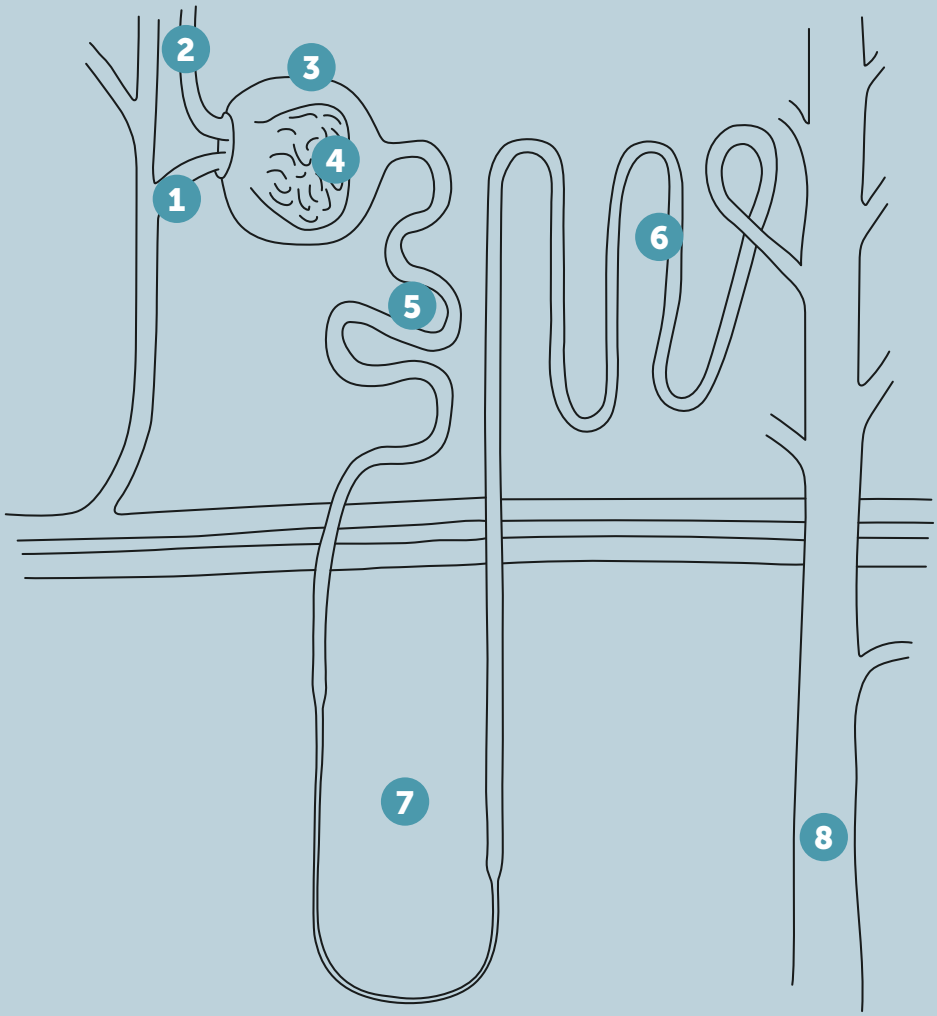
C18.5
What structures are posterior to both kidneys?

SECTION C19

Understanding of the nephron is required as it is the functional unit of the kidney, and has the same prefix (nephro meaning kidney) as many important terms, e.g. nephrology

C19.1

Name the eight structures indicated on the diagram of a nephron.



NEPHRON

C19.2

How many nephrons are there in each kidney?

C19.3

Outline the function of a nephron.

C19.4
What is the glomerulus?

C19.5
What is the path of blood to and from the glomerulus?

C19.6
Describe the role of glomerular filtration in the nephron in urine formation.

C19.7
Describe tubular reabsorption which follows glomerular filtration.

C19.8
Describe tubular secretion which follows tubular reabsorption.

C19.9
What is urine?

C19.10
What is the path of urine from the nephron?

SECTION C20

Describe the relations and functional anatomy of the suprarenal (adrenal) glands

C20.1
What is functional anatomy?

C20.2
How does the structure of the adrenal glands relate to function?

C20.3
What is the relationship of the adrenal glands to the kidneys and the diaphragm?

C20.4
What is the significance of the adrenal hilum?

C20.5
Why do the adrenal glands have two names (adrenal and suprarenal)?

SECTION C21

Describe the position, blood supply and form of the spleen, including its surfaces, poles, impressions and relationship to the ribs

C21.1
Where are the poles of the spleen?

C21.2
What do the spleen and the liver superficially have in common?

C21.3
Relate the impressions on the spleen to the pancreas, stomach, kidneys and colon?

C21.4
What is the relationship of the spleen to the ribs?

C21.5
What is the blood supply of the spleen?

SECTION C22

Explain the relationship of the foregut, midgut, and hindgut to the blood supply of the gut

C22.1
Which artery supplies the foregut?

C22.2
Where does the foregut end inferiorly and which artery supplies the stomach, liver, gallbladder and spleen (the spleen is included here because it develops in association with foregut structures)?

C22.3
Which artery supplies the midgut?

C22.4
What are the boundaries of the midgut?

C22.5
Which artery supplies the hindgut (extending from the distal boundary of the midgut inferiorly)?

SECTION C23

Describe the origins and course of the abdominal aorta, coeliac trunk, superior and inferior mesenteric arteries and their major branches, plus the renal and gonadal arteries

C23.1
What is the origin and course of the abdominal aorta?

C23.2
What are the anterior relations of the abdominal aorta?

C23.3
At what vertebral levels do the following arise and what are their major branches:
A. coeliac trunk?
B. Superior mesenteric artery (SMA)?
C. Inferior mesenteric artery (IMA)?

C23.4
Whereabouts on the aorta do the renal arteries arise from?

C23.5
Where do the testicular and ovarian arteries arise (these arteries can be sexless and less specifically called the gonadal arteries)?

SECTION C24

Describe the origin, course and surface marking of the inferior vena cava (IVC)

C24.1
Describe the origin, course and surface marking of the IVC.

SECTION C25

Describe the nerve supply of the gut tube and gut pain

C25.1
What part of the nervous system directly controls the gut?

C25.2
What part of the nervous system modulates the intrinsic neural activity of the myenteric plexuses?

C25.3
What is the source of ANS innervation of abdominal viscera?

C25.4
How does pain get referred to the skin on the anterior wall of the abdomen?

C25.5
Where is pain referred to from the foregut, midgut and hindgut?

SECTION C26

Describe the anatomy of the lymph nodes involved in lymph drainage of abdominal viscera including separate drainage of the foregut, midgut and hindgut

C26.1
How does lymph get from abdominal structures to the nodes associated with major arteries such as the coeliac trunk, SMA and IMA.

C26.2
Which lymph nodes drain foregut structures such as the stomach pancreas, gallbladder, liver and most of the first two parts of the duodenum, plus foregut-associated structures such as the spleen?

C26.3
Which lymph nodes drain midgut structures such as the 3rd and 4th parts of the duodenum, jejunum, ileum, caecum, ascending colon and two thirds of the transverse colon?

C26.4
Which lymph nodes drain hindgut structures such as the descending colon, sigmoid colon and upper rectum?

C26.5
Where do the pre-aortic lymph nodes drain to?

PART D

Pelvis

***Inter urinas et faeces nascimur*, attributed to St Augustine (354 - 430 AD), means we are born between urine and faeces and obliquely refers to the major urinary, digestive and reproductive organs in the pelvis. However, the pelvis also has a significant bony structure and includes a number of crucial supporting muscles.**

In this section you can learn about and test your knowledge of: the pelvic bones and major ligaments; the musculature and features of the male and female pelves; the location and relationship between major digestive and excretory organs (colon, rectum, bladder and urethra); and the vessels and nerves in the pelvic region.

SECTION D1

Describe the bones and major ligaments (sacroiliac, sacrotuberous and sacrospinous) comprising the pelvis and list the differences between male and female pelvises

D1.1
Name the bones of the pelvis.

D1.2
A. Where do the ilium, ischium and pubic bones meet? B. What is the name of their joining cartilage?
C. Why is identifying this cartilage useful despite ossifying in adolescence and becoming obliterated in both sexes before the age of 25?

D1.3
Describe the three sacroiliac ligaments and identify which ligaments are responsible for transferring weight from the axial skeleton to the femur?

D1.4
What are the two main parts of each sacroiliac joint (SIJ)?

D1.5
What is the location and significance of the sacrotuberous and sacrospinous ligaments?

D1.6
List three differences between the male and female pelvis that impact on childbirth.

D1.7
Why do you need to know the differences between the male and female pelvis?

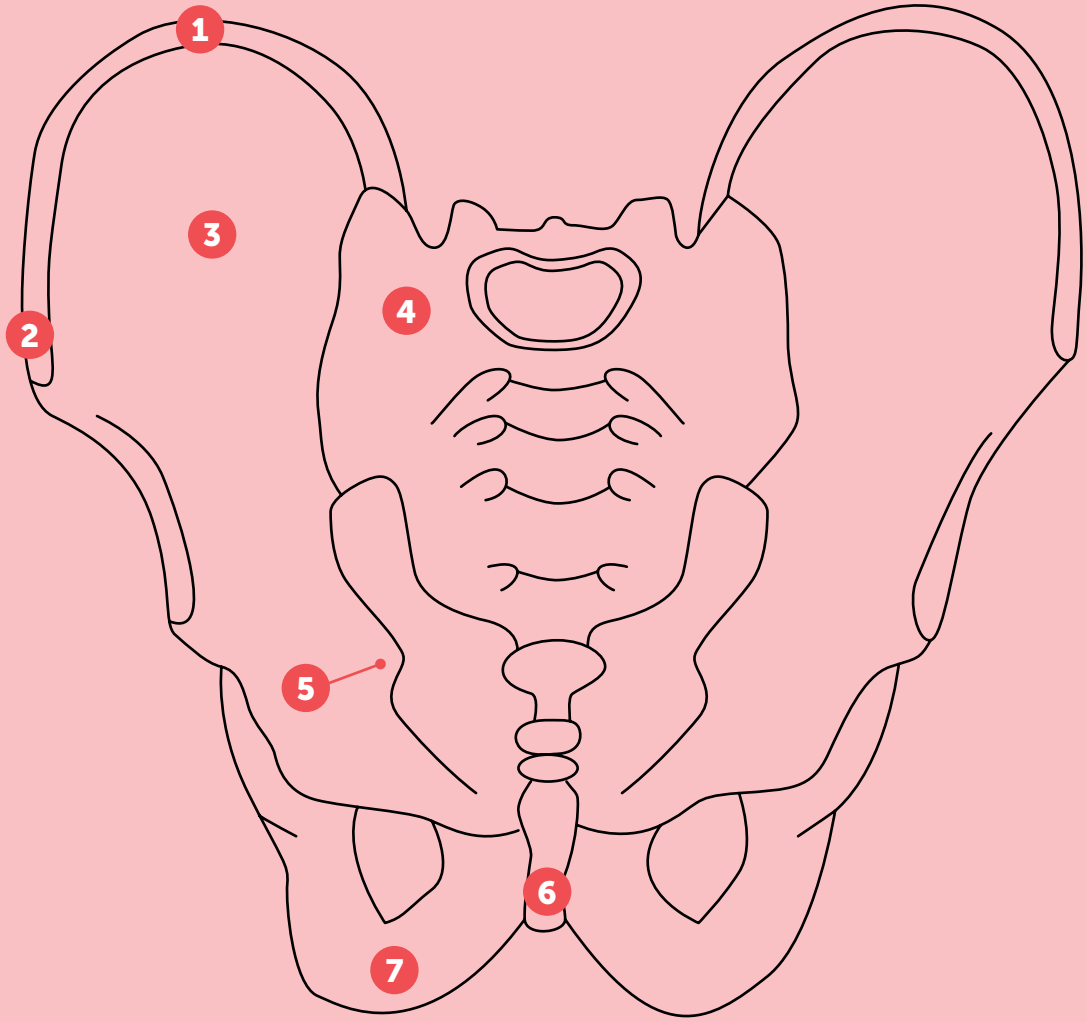
D1.8
What is the easiest way to differentiate between the male and female pelvis on X-Ray?

SECTION D2

Demonstrate the palpable anatomical landmarks of the iliac, ischial and pubic bones in the living and on the bones

D2.1

Identify the seven parts of the bony pelvis indicated on the diagram.



BONY PELVIS

D2.2

How do you locate anterior superior iliac spine (ASIS) and iliac crest in a living person?

D2.3

How do you locate the ischial tuberosities in a living person?

D2.4
What is the most easily identified landmark of the pubic bone in the living?

D2.5
How do you identify the pubic crest in the living?

D2.5
How do you identify the pubic tubercle in the living?

SECTION D3

Describe the pelvic cavity (also known as the lesser pelvis or true pelvis) and the bones and ligaments that form the pelvic inlet and outlet

D3.1
What is the pelvic cavity?

D3.2
What are the boundaries and walls of the pelvic cavity?

D3.3
Which structures form the pelvic inlet (also known as the superior pelvic aperture)?

A good way to remember these structures is to physically and conceptually travel clockwise from the pubic symphysis palpating the first three then imagining the arcuate line between the superior pubic ramus and sacrum.

D3.4
Which structures form the pelvic outlet (also known as the inferior pelvic aperture)?

Anteriorly, structures forming the pelvic inlet are similar to outlet structures, and the ischial tuberosities and coccyx are palpable.

SECTION D4

Describe the functional importance of the pelvic floor musculature, and the structures passing through it in males and females

D4.1

What are the muscles of the pelvic diaphragm forming the pelvic floor?

D4.2

What is the importance of the pelvic diaphragm?

D4.3

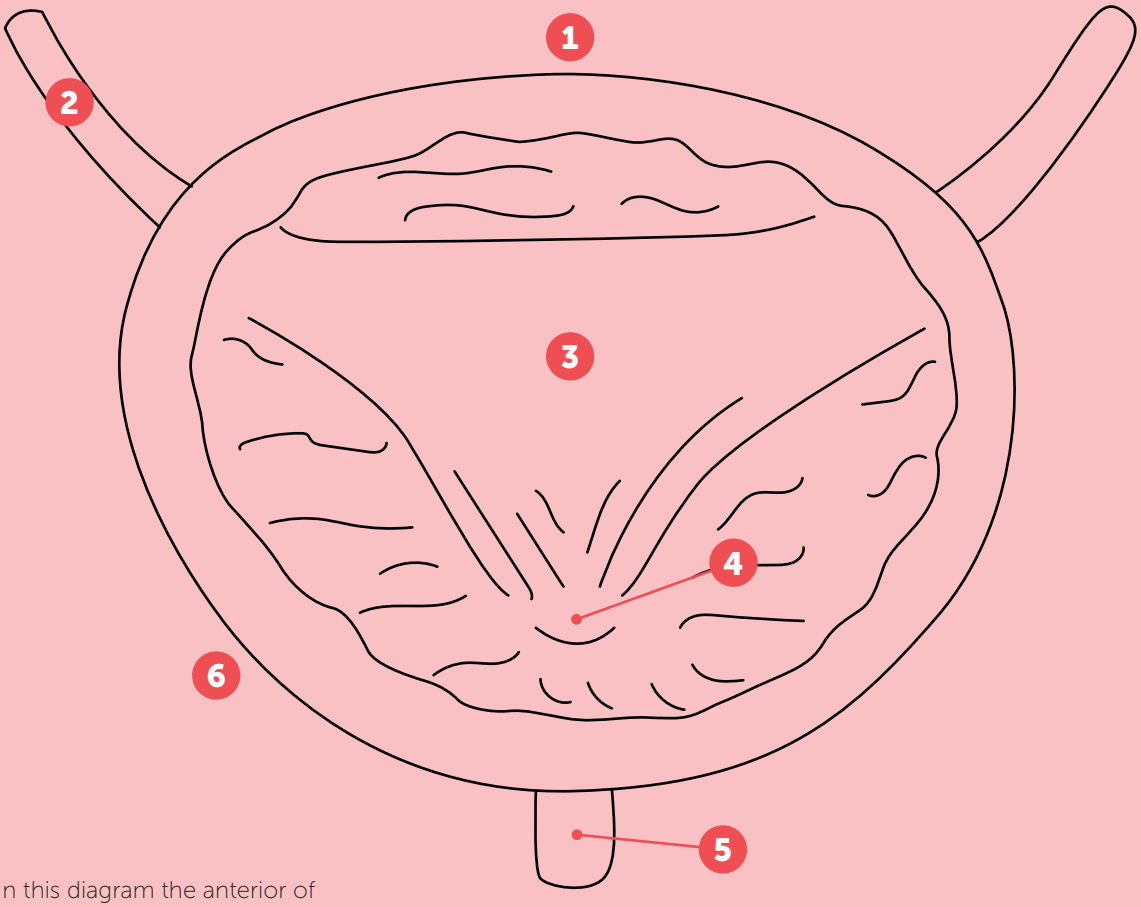
What are the structures passing through the pelvic diaphragm in males and in females?

SECTION D5

Describe the anatomy of the bladder, its base and ureteric openings and its changes in position with filling and pregnancy

D5.1

Name the six structures indicated on the diagram of the bladder and urinary tubes.



(Note: In this diagram the anterior of the bladder including the apex – site of attachment of the medial umbilical ligament – has been removed.)

BLADDER AND URINARY TUBES

D5.2

Where is the neck of the bladder?

D5.3

Where is the base (also known as the fundus) of the bladder?

D5.4
What is the muscle inside the bladder called?

D5.5
Where is the bladder located in relation to other organs?

D5.6
What is the bed of the bladder?

D5.7
How does a full bladder assist catheterization?

D5.8
What is the capacity of the bladder?

D5.9
How does urine get to and from the bladder?

D5.10
A. What happens to the bladder during pregnancy? B. How is urination affected by pregnancy?

SECTION D6

Describe the innervation of the bladder and its sphincters and the mechanism of micturition

D6.1
What is the innervation of the bladder?

D6.2
Describe the male and female sphincters and the difference between them.

D6.3
What is the basic mechanism of micturition?

SECTION D7

Describe the anatomy of the male and female urethra including its different parts

D7.1
How long is the male urethra and what is the name of each of its various parts?

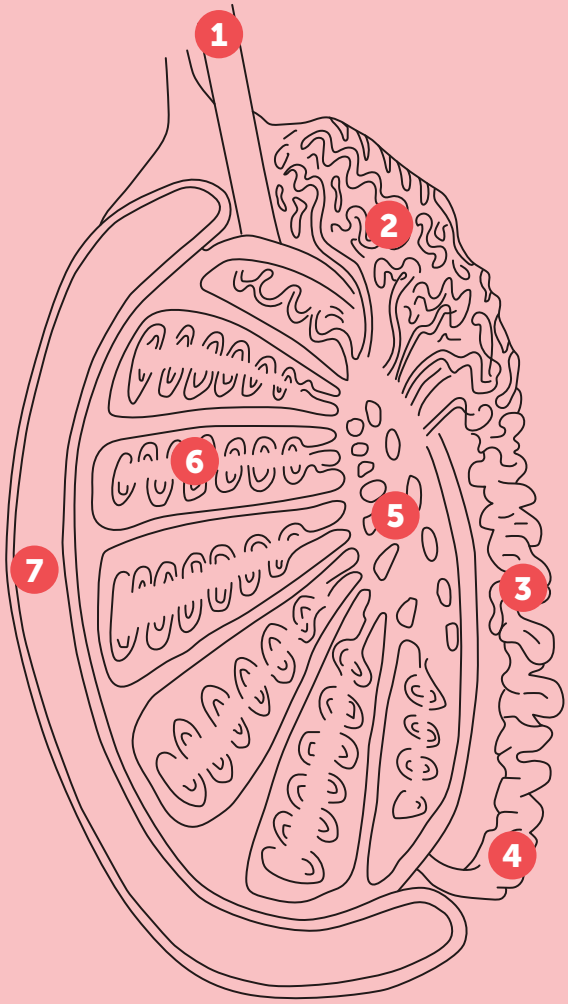
D7.2
How long is the female urethra and how does it compare to the male with regard to catheterization?

SECTION D8

Describe the anatomy of the scrotum, testis and epididymis

D8.1

Name the seven structures indicated on the diagram of the vertical section through the testicle.



VERTICAL SECTION THROUGH TESTICLE

D8.2

Describe the anatomy of the scrotum.

D8.3

What do the seminiferous tubules do?

D8.4
What is the rete testis?

D8.5
What does the epididymis do?

SECTION D9

Describe the structure and course of the spermatic cord and vas deferens

D9.1
What is the relationship of the vas deferens to the spermatic cord?

D9.2
From inside out, what are the coverings and other structures that constitute the spermatic cord?

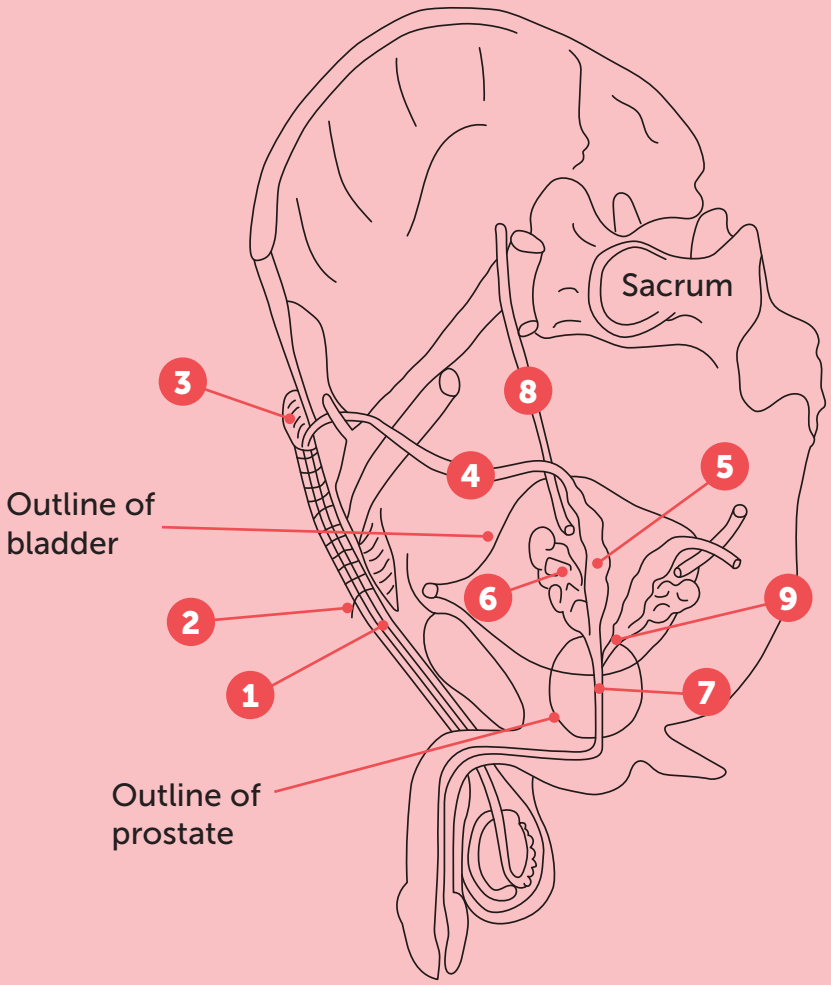
D9.3
Apart from containing the above structures what is an additional function of the spermatic cord?

D9.4
What is the course of the spermatic cord from inside the pelvis to the scrotum?

D9.5
What is the role and course of the vas (ductus) deferens?

D9.6

Name the nine structures indicated on the diagram showing the route of the vas deferens.



ROUTE OF THE VAS DEFERENS

SECTION D10

Describe the anatomy of the prostate gland and seminal vesicles

D10.1

Describe the prostate gland.

D10.2

What are the main components and zones of the prostate?

D10.3

What is immediately A. Posterior B. Anterior C. Superior D. Inferior to the prostate?

D10.4

Where are the seminal vesicles located?

D10.5

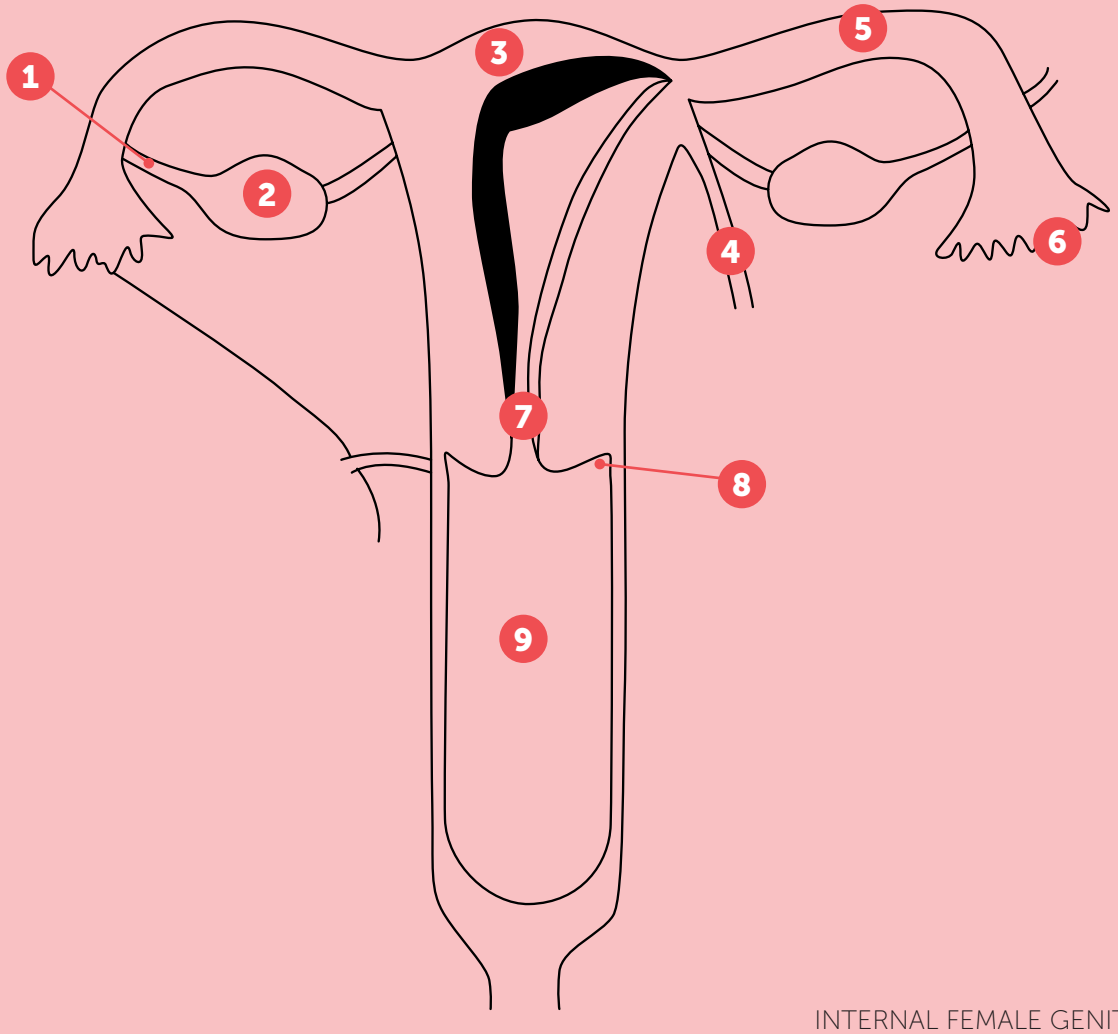
What is the role of the seminal vesicles?

SECTION D11

Describe the position and form of the ovary, uterine tubes, uterus, cervix and vagina and their relations including the rectouterine pouch (pouch of Douglas)

D11.1

Name the nine structures indicated on the diagram of the female internal genital organs.



INTERNAL FEMALE GENITAL ORGANS

D11.2

What roles do the uterus, uterine tubes, ovaries and vagina have in reproduction?

D11.3

What is the general arrangement of the uterus, uterine tubes (Fallopian tubes) and ovaries?

D11.4
Where are the cervix and vagina in relation to the uterus?

D11.5
Where are the ovaries located?

D11.6
What is their shape and size?

D11.7
A. Where is each uterine (Fallopean) tube connected to the uterus?
B. Where does each tube extend to?

D11.8
A. How long is each uterine tube?
B. What is each uterine tube contained within?

D11.9
What are the four main parts of each uterine tube called?

D11.10
What is the fundus of the uterus?

D11.11
Describe the body of the uterus.

D11.12
What is the cervix and where is it located?

D11.13
A. Where is the internal os located?
B. Where is the external os located?

D11.14
What is the fornix and where is it located?

D11.15
What is an alternative name for the vagina related to its role in reproduction?

D11.16
Name the structure immediately
A. anterior to the vagina
B. posterior to the vagina.

D11.17
A. Where is the rectouterine pouch of Douglas?
B. What is the significance of the pouch of Douglas (also known as the cul-de-sac of Douglas because this pouch has a blind end similar to a cul-de-sac street)?

SECTION D12

Describe the origin, course and relations of the uterine, ovarian and testicular arteries

D12.1
What are the origin, course and relations of the uterine artery?

D12.2
What are the origin, course and relations of the ovarian artery?

D12.3
What are the origin, course and relations of the testicular artery?

SECTION D13

Describe the origin, course and branches of the pudendal nerves

D13.1
Describe the origin and course of the pudendal nerve.

D13.2
What are the 3 major branches of the pudendal nerve?

D13.3
What does the inferior rectal nerve innervate?

D13.4
What does the perineal nerve innervate?

D13.5
What part of the penis does the dorsal nerve of the penis innervate?

SECTION D14

Describe the anatomy of the sigmoid colon and rectum and their anatomical relationships including peritoneal

D14.1
What part of the gut is immediately A. Proximal B. Distal to the sigmoid colon?

D14.2
What is the shape and course of the sigmoid colon?

D14.3
What are the relations of the sigmoid colon?

D14.4
A. What is the name of the mesentery of the sigmoid colon? B. This mesentery is significant in that it means the sigmoid colon is either intraperitoneal or retroperitoneal. Which is correct?

D14.5
Rectus means straight – is the human rectum straight?

D14.6
Is the rectum inside or outside the pelvic cavity?

D17.7
Does the rectum usually contain faeces or is it normally empty?

D14.8
What are the relations of the rectum?

D14.9
Does the rectum A. have a mesentery and B. is it an intraperitoneal, extraperitoneal or a retroperitoneal structure?

SECTION D15

Explain the anatomy of the anal canal and the functional anatomy of the anal sphincters

D15.1
Describe the anatomy of the anal canal.

D15.2
Describe the internal anal sphincter.

D15.3
Explain the function of the internal anal sphincter.

D15.4
Describe the external anal sphincter.

D15.5
Explain the function of the external anal sphincter.

SECTION D16

Describe the anatomy of the ischioanal fossa

D16.1
Describe the anatomy of the ischioanal fossa.

SECTION D17

Describe the structure of the penis, clitoris and vulva

D17.1
Name and describe the major parts of the penis.

D17.2
Which are the dorsal and ventral surfaces of the penis?

D17.3
Name the three longitudinal cylinders of erectile tissue comprising the penis.

D17.4
Describe the corpus spongiosum.

D17.5
Describe the corpora cavernosa.

D17.6
Describe the bulb of the penis.

D17.7
Name and describe the major parts of the clitoris.

D17.8
What two muscles do the penis and clitoris have in common?

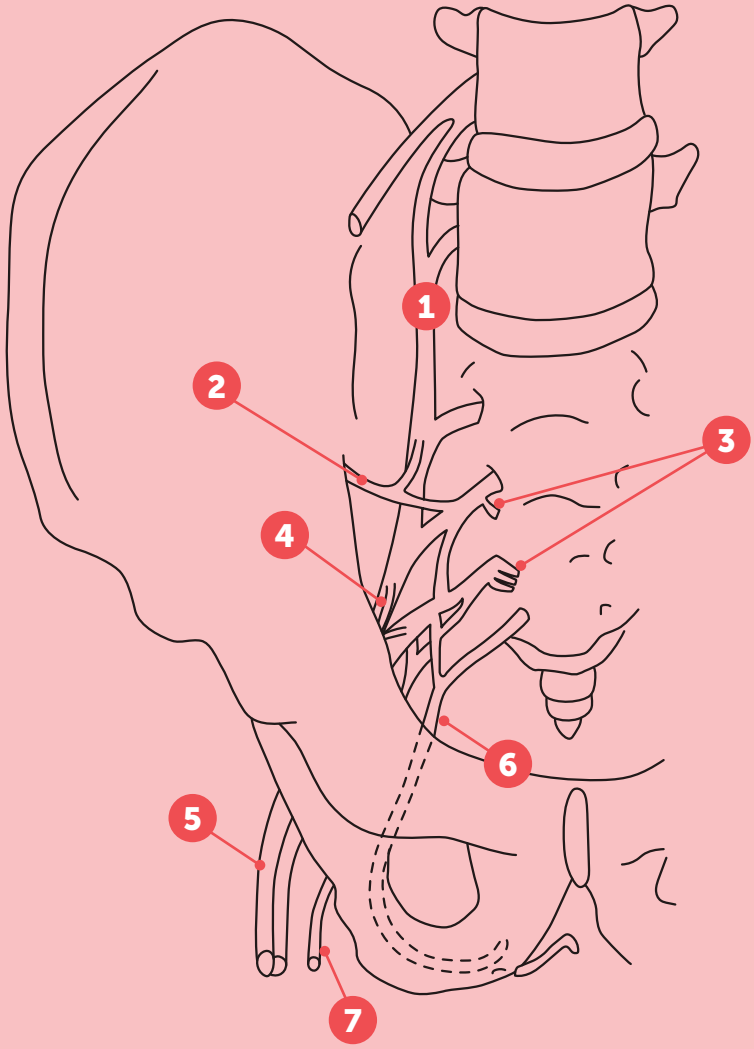
D17.9
What structures comprise the vulva?

SECTION D18

Describe the nerves arising from the sacral plexus (including the pudendal nerve discussed above), coccygeal plexus and pelvic autonomic nerves

D18.1

Name the seven nerves indicated on the diagram of the sacral plexus.



SACRAL PLEXUS

D18.2

Name the areas that each of the following supply: **1.** Sciatic nerve **2.** Superior Gluteal **3.** Nerve to quadratus femoris and inferior gemellus **4.** Inferior gluteal **5.** Nerve to obturator internus and superior gemellus **6.** Nerve to piriformis **7.** Posterior cutaneous nerve of the thigh **8.** Pudendal **9.** Pelvic splanchnic **10.** Nerve to levator ani and coccygeus

D18.3

What are the names of the four pelvic autonomic nerves and plexuses? For the nerves state whether these are part of the sympathetic or parasympathetic nervous system and their distribution.

SECTION D19

Name the arteries arising from the anterior and posterior divisions of the internal iliac artery and the organs they supply excluding the uterine artery described above

D19.1
Name the arteries arising from the anterior division of the internal iliac artery and the organs they supply.

D19.2
What are the branches of the internal pudendal artery? These arteries are well named and consequently the organs they supply are obvious from their names.

D19.3
Name the arteries arising from the posterior division of the internal iliac artery and the organs they supply.

D19.4
What is a mnemonic for arteries of the male pelvis: **A.** Anterior division of the internal iliac artery.
B. Branches of the internal pudendal artery.
C. Posterior division of the internal iliac artery.

D19.5
How do these differ from the arteries of the female pelvis?

SECTION D20

Describe the lymphatic drainage of the pelvis and perineum

D20.1
Where do most pelvic viscera drain to?

D20.2
Where do the ovaries and associated parts of the uterus drain to?

D20.3
Where does lymph from the deep perineum drain to?

D20.4
Where does lymph from the penis, scrotum, clitoris and labia major drain to?

D20.5
Where does lymph from the glans of the penis, glans of the clitoris, labia minor and inferior end of the vagina drain to?

FURTHER REFERENCES & TEXTBOOKS

Drake R.L. Vogl A.W. and Mitchell A.W.M., *Gray's Anatomy for Students.* Elsevier, Philadelphia (2015).

Superb illustrations but slightly less comprehensive than *Clinically Oriented Anatomy* (see below), and therefore less likely to overburden students with excessive detail. However, some students will appreciate Moore et al's (2014) more complete coverage of clinical information.

Mirjalili S.A. Hale S.J.M. Buckenham T. et al., *A reappraisal of adult thoracic surface anatomy.* Clinical Anatomy 25:827-834 (2012a).

Surface anatomy derived from living humans instead of cadavers.

Mirjalili S.A. McFadden S.L. Buckenham T. et al., *A reappraisal of adult abdominal surface anatomy.* Clinical Anatomy 25:844-850 (2012b).

Surface anatomy based on living humans instead of cadavers.

Monkhouse S., *Clinical Anatomy.* Churchill Livingstone, Edinburgh (2007).

As mentioned in the Introduction to the Anatomy Quizbook, this book focuses on clinically pertinent anatomy. As a result it is the most relevant and inexpensive of the anatomy textbooks mentioned here. It has the advantage of presenting essential information in a way that can be understood by most pre-med and medical students.

Moore K.L. Dalley A.F. and Agur A.M.R., *Clinically Oriented Anatomy.* Wolters Kluwer, Philadelphia (2014).

This is the most authoritative and comprehensive of the textbooks mentioned here. Moore has an excellent coverage of clinical conditions together with high quality photographs and illustrations. Consequently, it is an extremely useful reference book on anatomy.

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