Auscultation: the art of listening

Interactive PDF
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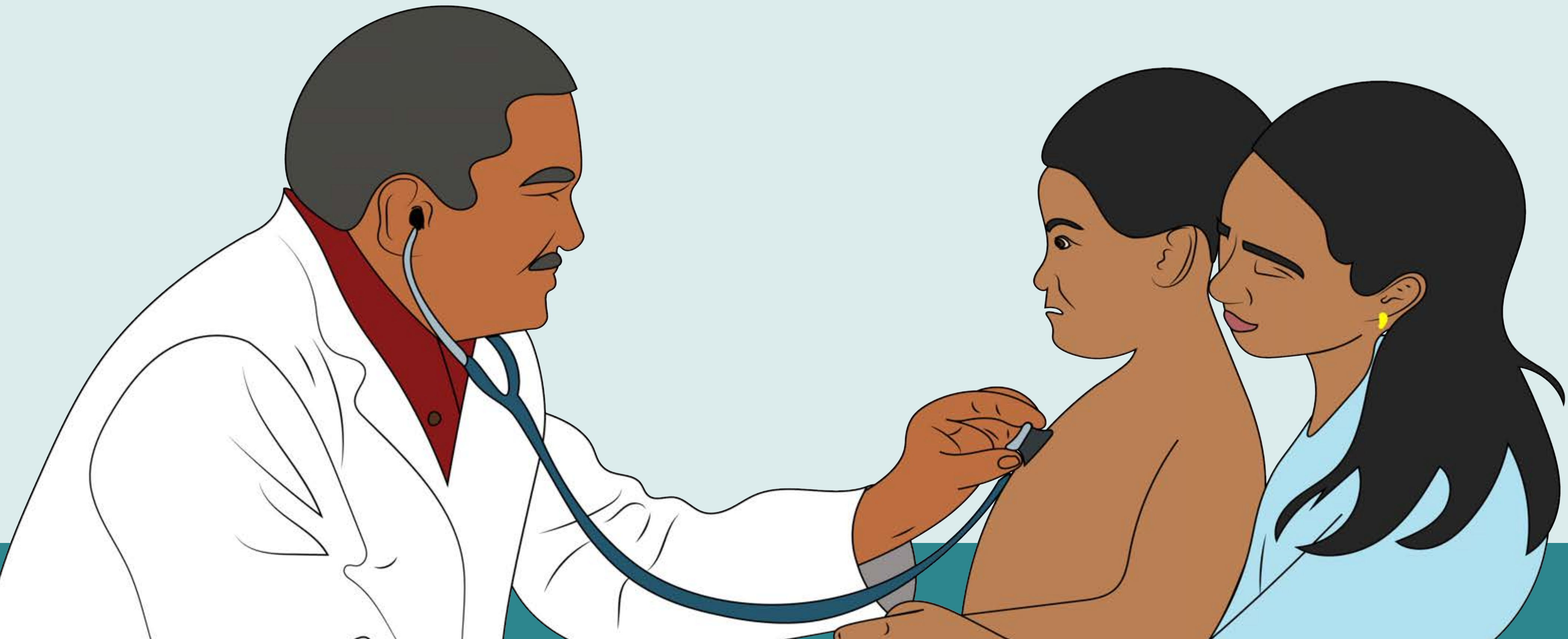
Section 1: Introduction



Section contents menu

1.1 Background

Auscultation is a medical examination technique that involves listening to sounds produced by the body using a stethoscope or other listening devices. It is commonly used to assess various organs and systems, particularly the heart, lungs, and gastrointestinal tract. Auscultation provides valuable information about the structure, function, and potential abnormalities within these areas.

The primary tool used in auscultation is a **stethoscope**, which consists of a chest piece and earpieces which are connected by flexible tubing. The chest piece consists of both a diaphragm and a bell. The diaphragm is used for listening to high-frequency sounds, while the bell is used for low-frequency sounds.

Areas of Auscultation:

Heart: Auscultation is used to listen to heart sounds, including the normal lub-dub sound of the heartbeat and any abnormal murmurs, clicks, or other irregularities.

Lungs: Auscultation is used to listen to breathing sounds, such as vesicular sounds (normal lung sounds), crackles (abnormal lung sounds indicating fluid or inflammation), wheezes (narrowing of airways), or decreased breath sounds.

Gastrointestinal Tract: Auscultation of the abdomen detects bowel sounds, which are normal intestinal noises produced by the movement of the digestive tract.

Blood Vessels: Auscultation over specific arteries, such as the carotid arteries in the neck or the femoral arteries in the groin, can help identify bruits. A bruit (brew-ee) is an abnormal sound heard during auscultation that is caused by turbulent blood flow within a blood vessel.

Some limitations to auscultation include the need for further diagnostic tests to confirm or clarify findings. Other diagnostic tools, such as imaging studies (e.g:., X-rays, ultrasounds, echocardiograms) or laboratory tests, may be needed for a comprehensive evaluation.

1.2 Soundwaves

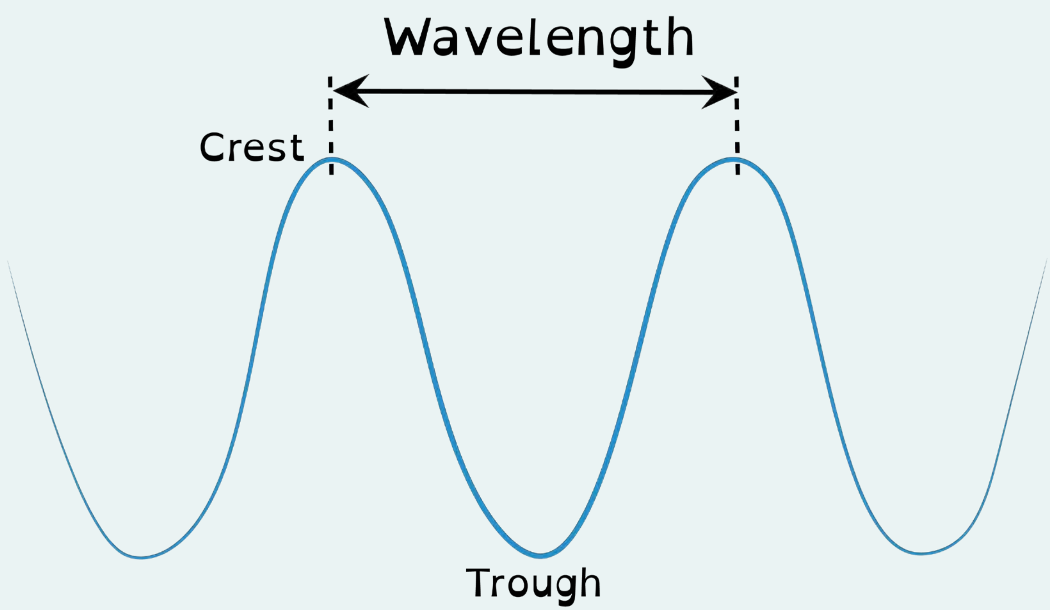
The most basic definition of **sound** is a sensation perceived by the sense of hearing. In physics sound is a pressure wave created from an object vibrating or moving. A pressure wave moves molecules around causing molecular collisions. The movement of sound waves through space sets surrounding particles in motion and transport energy through the medium. The eardrum vibrates in response to sound waves, converting sound pressure into kinetic energy that is transferred to the fluids within the cochlea hairs are stimulated by the fluctuating movement of fluid, triggering nerve impulses which are transmitted to the brain.

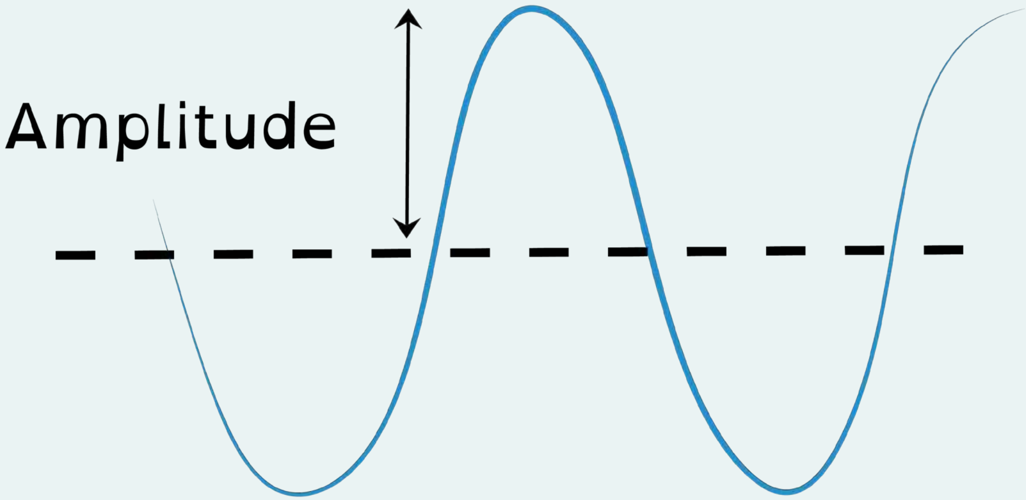
The properties of sound waves include amplitude, frequency, and wavelength. Amplitude refers to the magnitude or intensity of the sound wave and determines its loudness. Frequency is the number of complete cycles of the wave that occur in one second and determines the pitch of the sound. Wavelength is the distance between two consecutive points in a sound wave.

Sound waves can travel through different mediums, but their speed depends on the properties of the medium. In general, sound waves travel faster in denser materials. For example, sound travels faster in solids compared to liquids, and faster in liquids compared to gases. In medicine, sound waves travel at different rates through varying tissue types. There are notable differences when performing auscultation on a patient who is obese compared to a patient who is under or at normal weight.

Waves can be measured using their wavelength, amplitude and frequency.

Wavelength is measured by the distance from the crest (peak) of one wave to the next. Sound wavelength depends on environmental factors including the speed of the sound wave, the medium the sound is traversing through and the temperature of the medium. Wavelength directly depends on the speed that the waves can travel through the given temperature and medium. Sound passage through varying regions of the body is affected by tissue type.





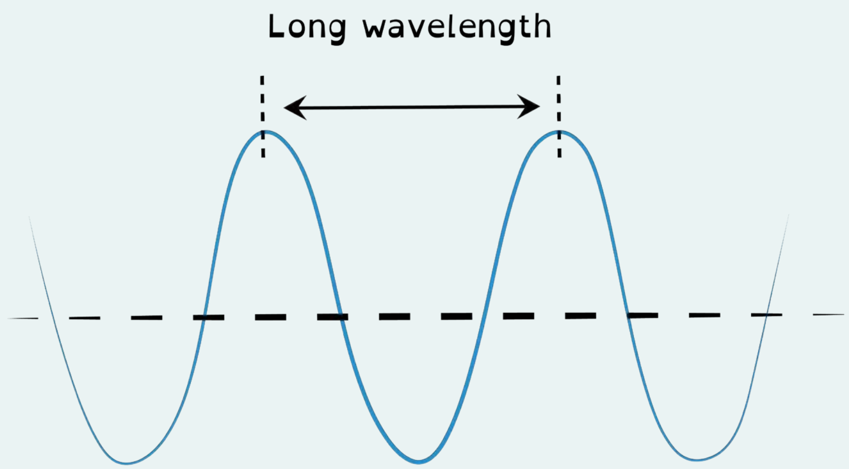
The wavelength's **amplitude** is related to the sound waves' energy. It is measured by the height of the sound waves from the mean position. The perceived loudness of the wavelength is dependent on the amplitude. Amplitude tends to be measured on a logarithmic scale and is measured in decibels (dB).

Frequency is the number of vibrations per second measured in Hertz (Hz). The frequency of a wave determines our perception of the pitch. Frequency is dependent on the number of wavelengths per second. Low frequencies have a low pitch and high frequencies have a high pitch. When wavelengths are short, there are more of them per second and thus higher frequencies. When the wavelengths are longer the frequencies will be lower Many heart sounds are at the low end of pitch and frequency, so they are not as audible from a distance and need to be amplified.

Low-frequency sounds are often associated with deep, rumbling, or vibrating sensations and can carry over long distances. These sounds occur naturally in many phenomena, such as thunder, earthquakes, ocean waves, and large animal vocalisations, such as whales.

There are many practical applications of low frequency sounds. They are used in technologies like sonar systems for underwater navigation, seismic monitoring for detecting earthquakes, and in medical imaging techniques such as ultrasound. Low frequency ultrasounds penetrate deeper into the body than high frequency sounds.

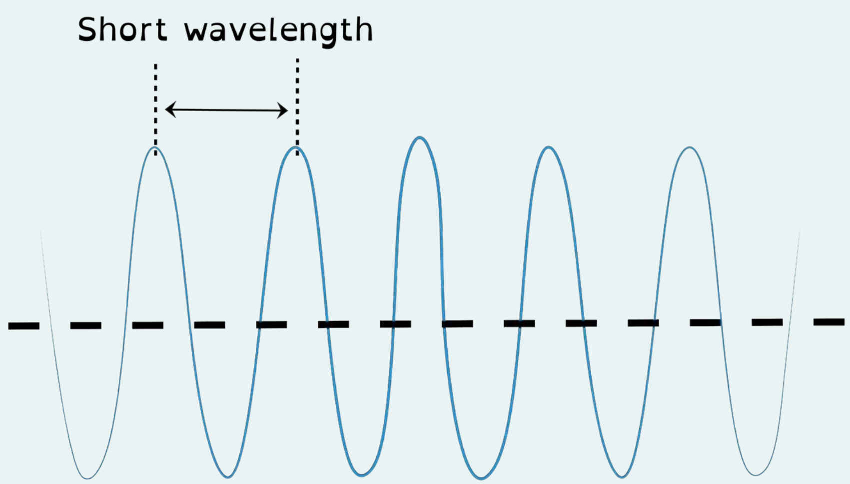
Low Frequency



High-frequency sounds refer to sounds with a high pitch or higher frequencies. These sounds are typically sharper, crisper, or more piercing in nature. Whistles, whining sounds, or screeches are some examples of high-frequency sounds. They can be produced by air escaping from a small opening, rapid movement, or the friction between surfaces.

Sound is made up of various frequencies strung together. Fundamental frequency is the lowest frequency of a sound wave, and it helps to determine the pitch of the sound. Pitch is determined by the speed at which the soundwaves vibrate. Individual characteristics of sound depend on the relative amplitude of the overtones.

High Frequency



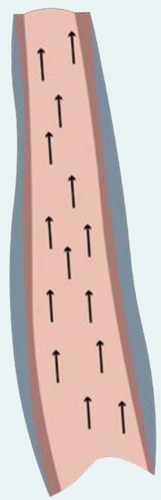
1.3 Flow

Flow is generally referred to as the movement of gases and liquids. Flow can be used to describe how fluids move, behave and interact with their environment. In medicine, flow can be used to describe the blood flow through the body and gas exchange in the lungs. There are three main types of flow: laminar flow, turbulent flow, and the transition region. Depending on the medium of interest and the type of flow present, various sounds can be produced.

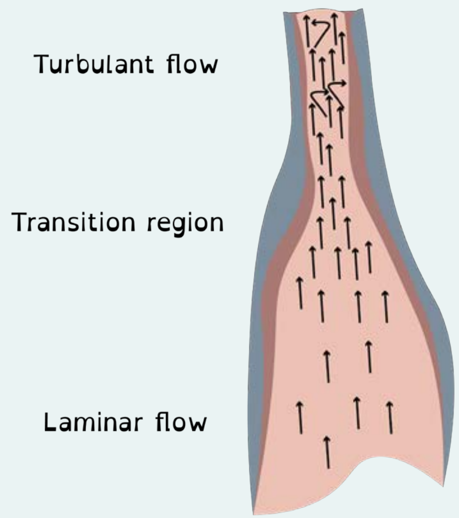
Laminar flow is a type of flow that occurs in low pressure situations and is usually silent. Laminar flow is directly proportional to driving pressure. Small airways that are less than 2 mm such as the alveoli experience laminar flow and do not produce breathing sounds that are audible.

The transition region is a type of flow that occurs between laminar and turbulent regions. In medicine it is usually caused by narrowing of an artery or windpipe. This section is usually characterised by laminar flow on the outside and turbulent flow in the middle.

Laminar flow



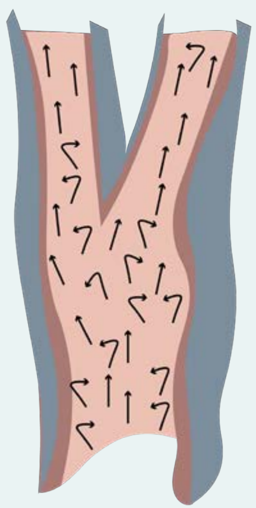
Transition region



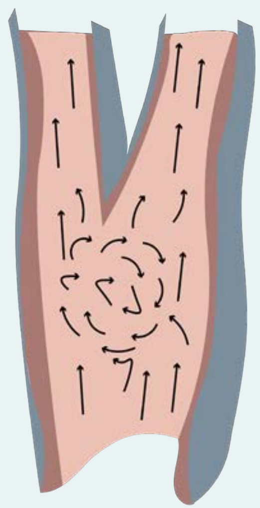
Turbulent flow occurs when liquids and gases quickly pass through large diameter airways or vessels, especially those with irregular walls. Turbulent flow tends to be disorganised, chaotic and can be heard through auscultation.

Regarding gases, such as air in the lungs, turbulent flow is dependent on air's density rather than viscosity. The inhalation of lighter gas mixtures reduces turbulent flow and makes laminar flow more likely. The noise produced from turbulent flow is caused by air molecules colliding with the airway wall and with each other.

Turbulant flow



Vortices



Vortices are another mechanism for breath sound generation. Vortices can be formed when a stream of gas starts to form a circular orifice to a wider channel. This type of turbulence can be found between the 5th and 13th generations of the bronchial tree. This mechanism is thought to be responsible for most of the sounds generated during inspiration and expiration.

1.4 How to listen

Distinguishing body sounds can be difficult. Throughout this guide, you will learn how to identify common body sounds that you will be expected to know when you finish medical school. In each section you will find diagrams showing the best place to listen to a sound. Many of the sounds can be heard in more than one location, but this is where it is the loudest or clearest. You will also find short explanations of the physiology behind the cause of the sounds aided with diagrams.

To listen, place the stethoscope firmly against the skin over the area of interest. You will listen for any sounds or abnormalities while adjusting pressure, position, and the bell/diaphragm as needed. The stethoscope bell should be used with low-pitched sounds and the diaphragm for medium or high-pitched sounds.

Auscultation should be done in a quiet room, preferably on a patient who is in a sitting position and ideally done on bare skin. When listening to breathing sounds ask the patient to take deep breaths with their mouth open. At least one complete respiratory cycle should be heard at each site. When possible, compare symmetrical points on the left and right hand side.

Also listen for the quality of the breath sounds, the intensity of the breath sounds, and the presence of **adventitious sounds.** Adventitious sounds are sounds that can be heard in addition to the normal, expected breath sounds.

1.5 Using the stethoscope

The stethoscope is composed of a few simple parts that help with sound transfer and amplifying the sound waves. These parts include the chest piece (bell and diaphragm) headset, and tubing.

Chest piece: When the stethoscope is placed on skin, sound waves travelling through the patient's body create vibrations that cause the flat surface of the diaphragm to vibrate. Both the bell and diaphragm can be used to hear sounds, although the bell is better at picking up low pitched sounds such as heart murmurs while the diaphragm is better at picking up higher pitched sounds such as normal breath sounds and normal heart sounds. Higher pitched sounds travel at higher frequencies and have a higher number of pressure fluctuations during a given period. Higher pitch sounds directly cause vibrations of the diaphragm. This means that the sound waves caused by air flowing through the trachea are the same sound waves that travel through the stethoscope tubing to the listeners ears.

The bell works slightly differently in that it picks up vibrations in the skin caused by movements. The bell has less surface area than the diaphragm so lower pitch sounds may have a harder time vibrating larger surfaces such as the diaphragm. Lower pitch sounds vibrate the skin as they move away from the body and the skin vibrates the bell.

Tubing: the sound waves travel from the chest piece through the tubing and to the earpieces to be heard. These vibrations are channelled in a specific direction and are directed through the tubes attached to the chest piece. The sound waves bounce and are reflected off the inside walls of the rubber tube eventually reaching the listeners eardrums. Channeling the sound waves through a narrow tube causes more of the waves to reach the eardrum and thus the sounds they are carrying are amplified.

Headset: composed of rubber earpieces and metal tubes that help with sound transfer. The earpieces are made of rubber for both conformity and to help block extraneous noise from the environment.

1.6 Accessibility Statement

Not every disability is visible. We are working on creating inclusive learning environments that embrace diversity, promote equity, and foster a sense of belonging for every student. All students, regardless of their abilities or disabilities, should have equal access to quality education.

Accessibility features implemented in this PDF:

- **Text font:** the font used in this document was designed with the intention of mitigating some of the issues that dyslexics experience when reading by emphasising the parts of characters that are different. Easy to read font has been shown to also help those with ADHD by reducing visual demands.

- **Clear and consistent layout:** clear and consistent layout throughout the PDF, making it easier for users to locate and navigate different sections or pages.

- **Colour contrast:** Care taken to ensure that the colour contrasts between the text and background elements. This ensures that content is legible for users with visual impairments.

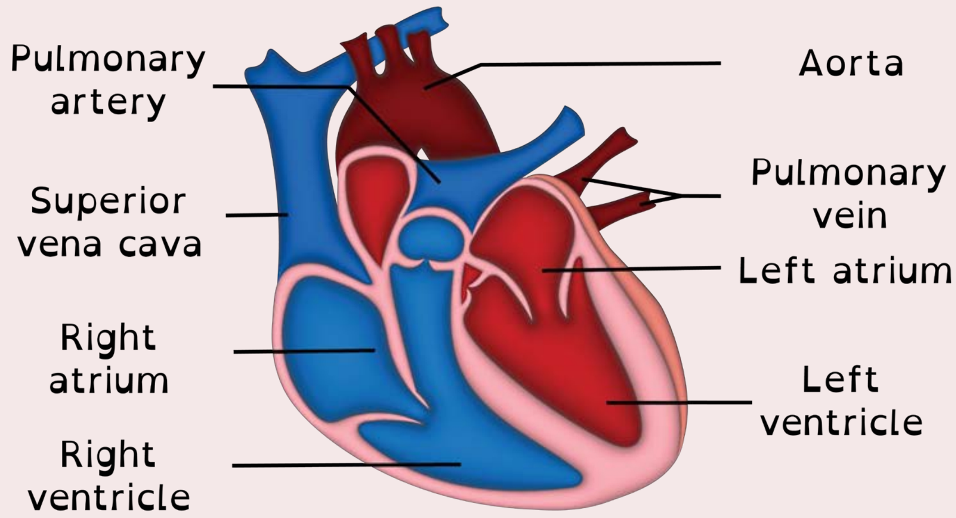
Section 2: Heart

Section contents menu

2.1 Background

The heart is a vital part of the circulatory system that works to pump blood to every part of the body. The internal heart is composed of four distinct chambers. The upper chambers are called the left and right atriums while the lower chambers are called the left and right ventricles. The right side of the heart works to pump deoxygenated blood from veins to the lungs. The left side of the heart works to pump oxygenated blood from the lungs to the rest of the body. The right and left side of the heart is separated by a thin muscular wall called the septum. The atriums and ventricles are separated by valves that control blood flow. The valves open and close with each heartbeat. The atrioventricular valves are the tricuspid valve and the mitral valve. The right side of the heart contains the tricuspid and pulmonary valve while the left side contains the mitral and aortic valve.

Heart Anatomical Landmarks

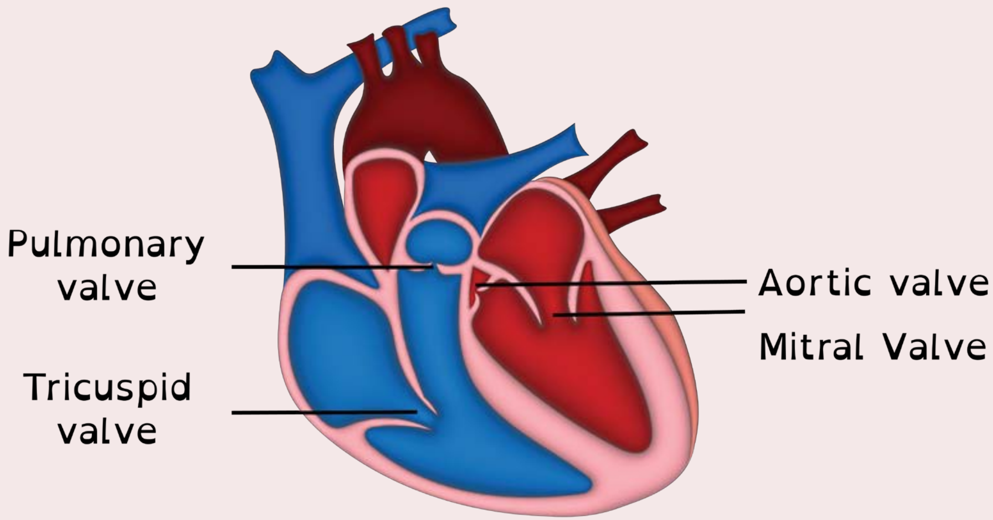


Problems with the heart and circulatory system lead to the system not working properly. Some issues may lead to heart and circulatory diseases which can usually be heard and diagnosed with a stethoscope.

Some heart sound patterns may be described as “crescendo” (increasing intensity), “decrescendo” (decreasing intensity), “crescendo-decrescendo” (increasing then immediate decreasing intensity, also referred to as diamond shaped). “Plateau” (heart sounds of a steady sound volume, also referred to as rectangular.) Heart murmurs may also be described using shapes like diamond and square. This refers to what the sound wave looks like on a phonogram. Diamond shaped murmurs are crescendo-decrescendo in nature.

This section will give you an overview of what a normal heart sound is like as well as the most common heart pathologies.

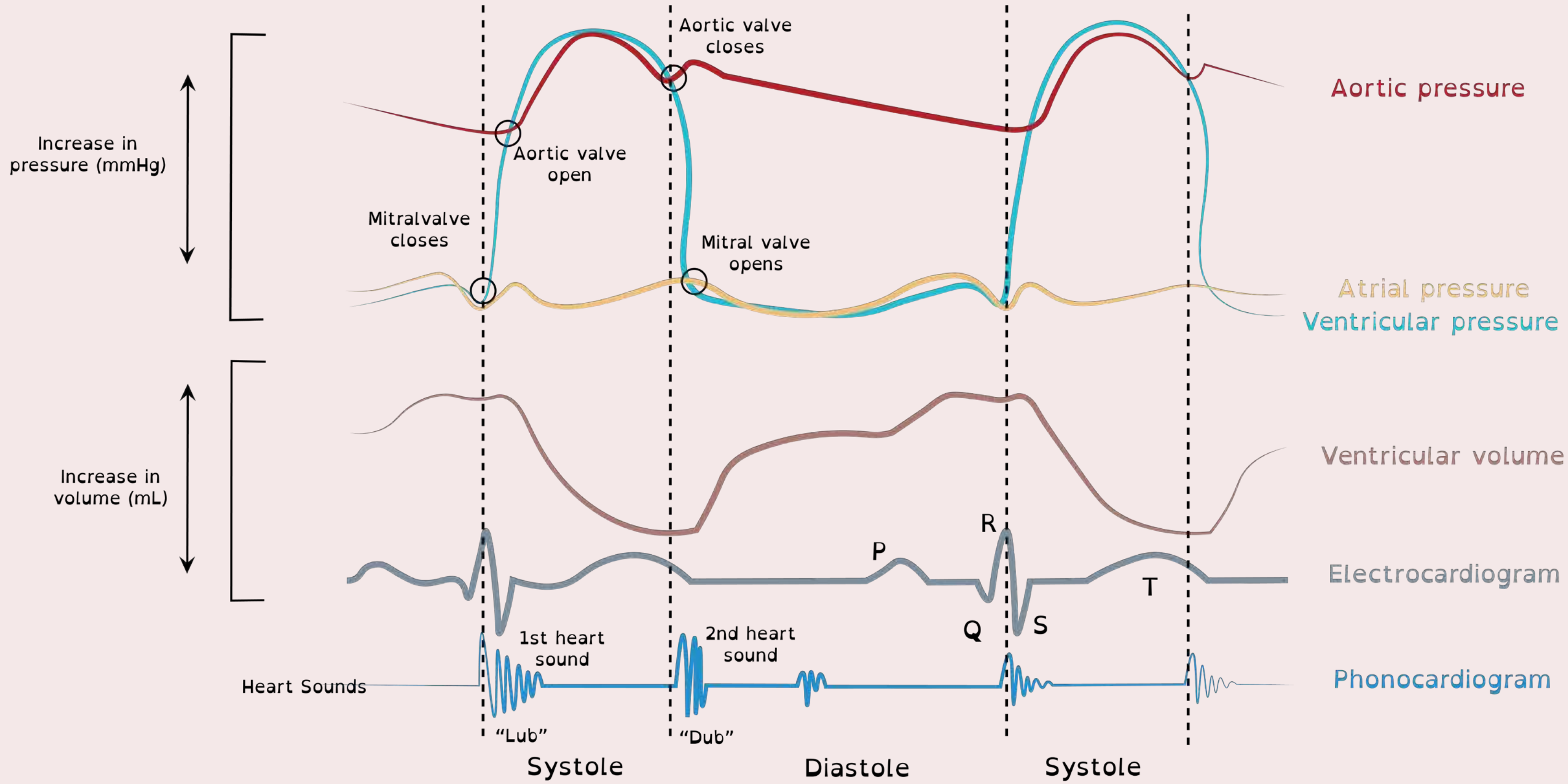
Heart Valves



2.2 The cardiac cycle

The cardiac cycle refers to the sequence of events that occur during one complete heartbeat. It includes both the contraction (systole) and relaxation (diastole) phases of the heart. The cardiac cycle is essential for pumping blood through the circulatory system to provide oxygen and nutrients to the body's tissues. Ultimately, blood flow through the body is a result of pressure changes.

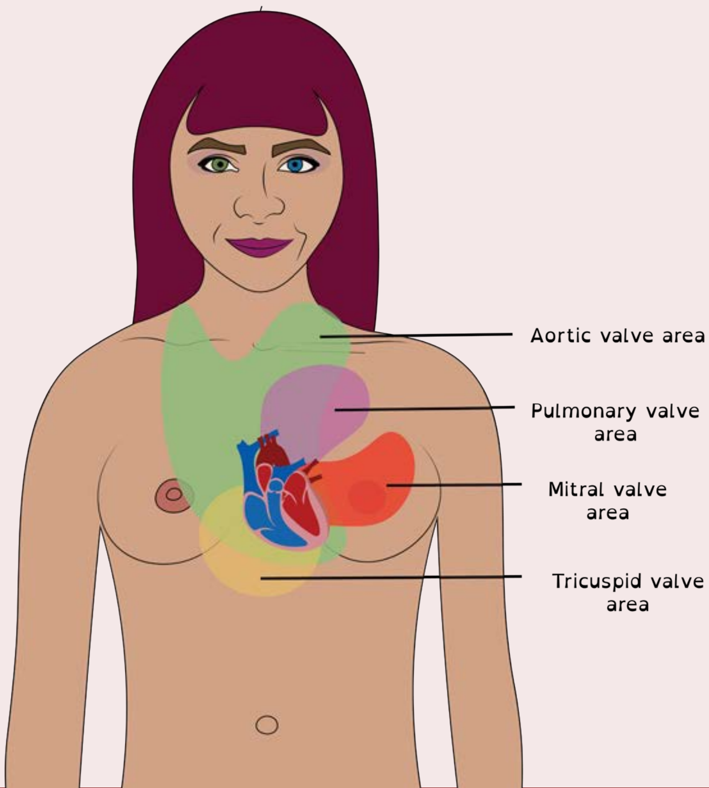
Cardiac Cycle

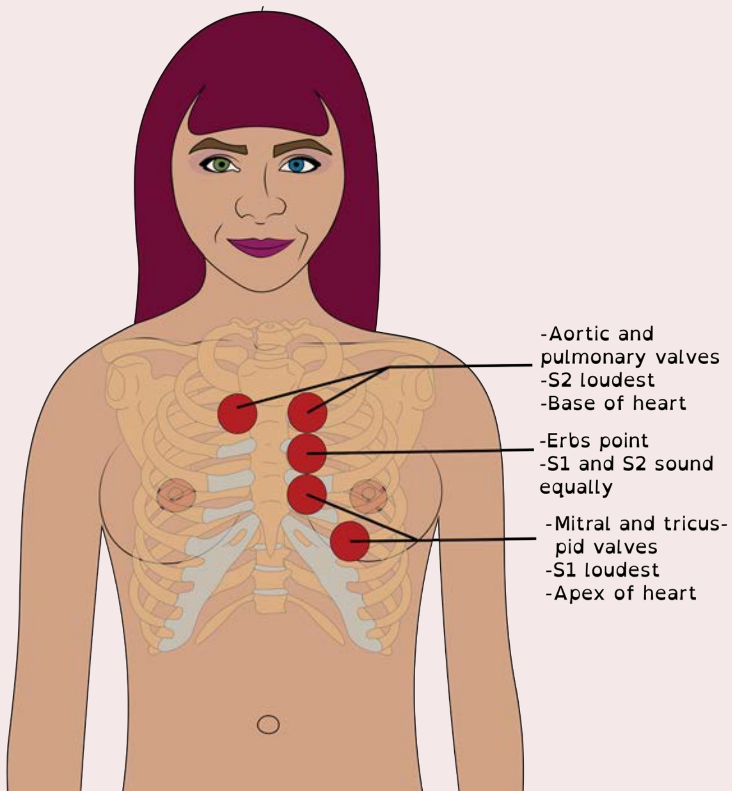


2.3 Sound generation

Normal heart sounds are a result of the movements and vibrations of the heart. Specifically, when heart valves close and heart chambers contract after they fill.

The pressure that forces the valves to close has the most influence on the loudness of the heart sound. Other factors such as the stiffness of the valves, thickness and excursion have less of an effect on intensity of the sound. When a stethoscope is placed on the chest there are four different regions of the heart that correspond to four basic heart sounds that can be heard best.



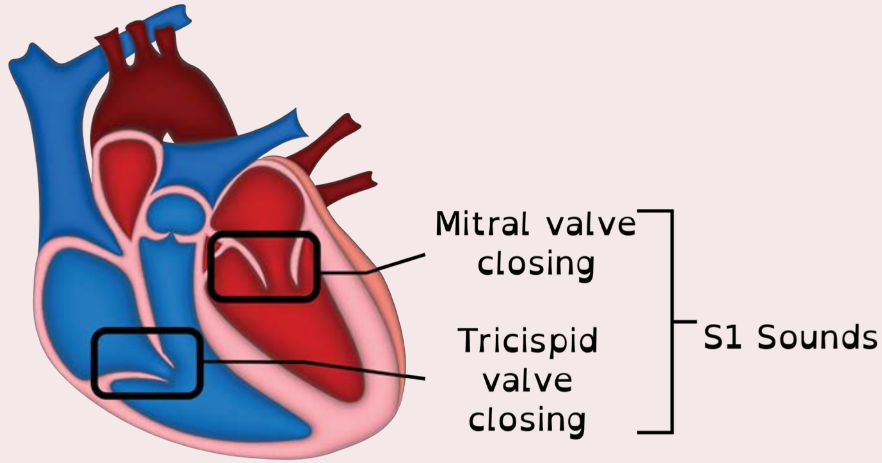


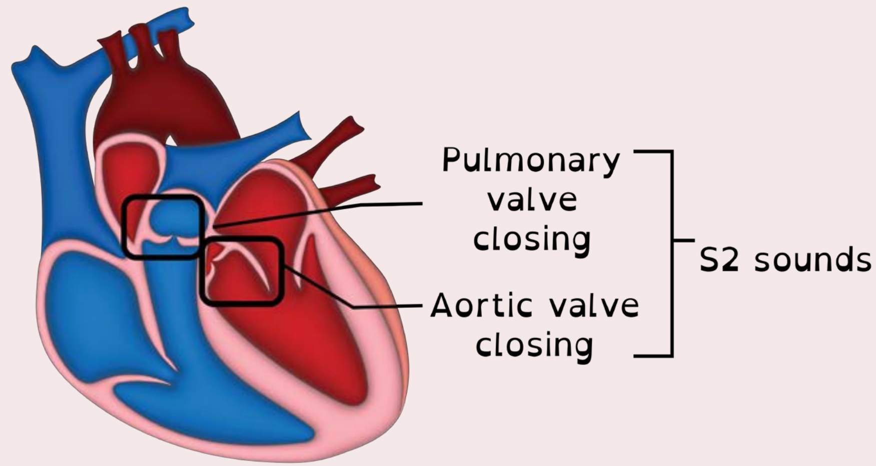
2.4 Normal heart sounds

What is it?

Normal heart sounds have a steady, two-beat rhythm to them often known as the “lub -dub.” The first sound is called S1 or “lub” and occurs due to the closing of the mitral and tricuspid valves. The second sound is called S2 or “dub” and occurs due to the closing of the aortic and pulmonary valves.

S1 and S2 Sounds





Listen

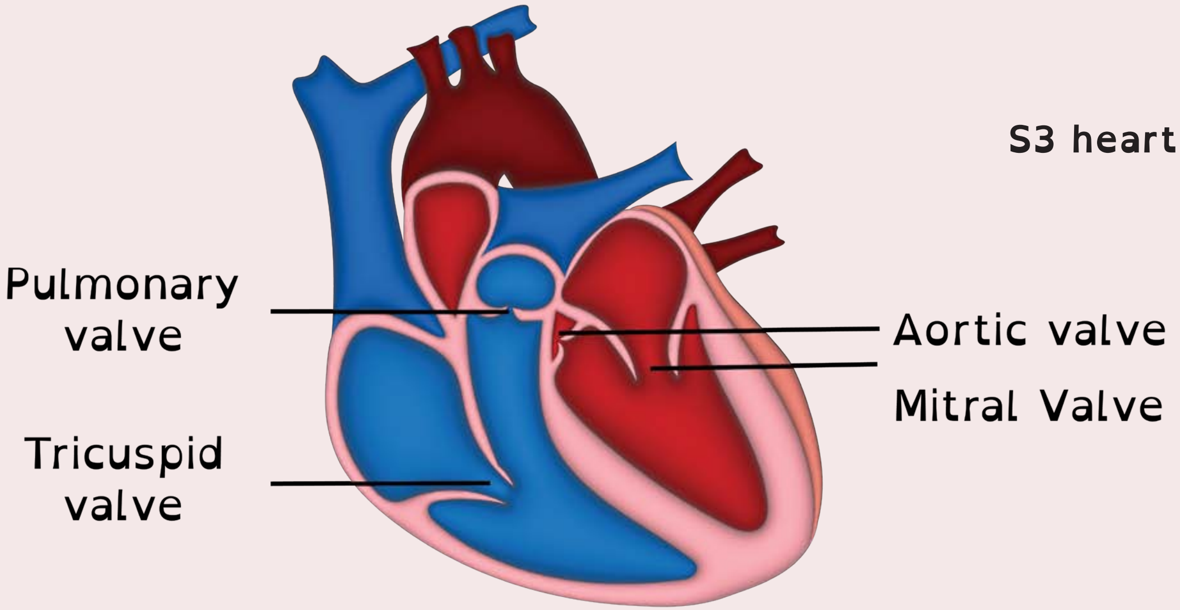
Normal heart sounds have a steady, two-beat rhythm to them. The first sound is called S1, or a lub. The second sound is called S2, or a dub.

Normal S1, S2

Abnormal S3 and S4:

An extra heart sound, S3 occurs in a ventricular gallop. It is a low-pitched sound that can follow S2. An extra heart sound S4 occurs in an atrial gallop. It is produced by the atria contraction that pushes blood into a stiff ventricle.

Heart Valves



S3 heart sound

S4 heart sound

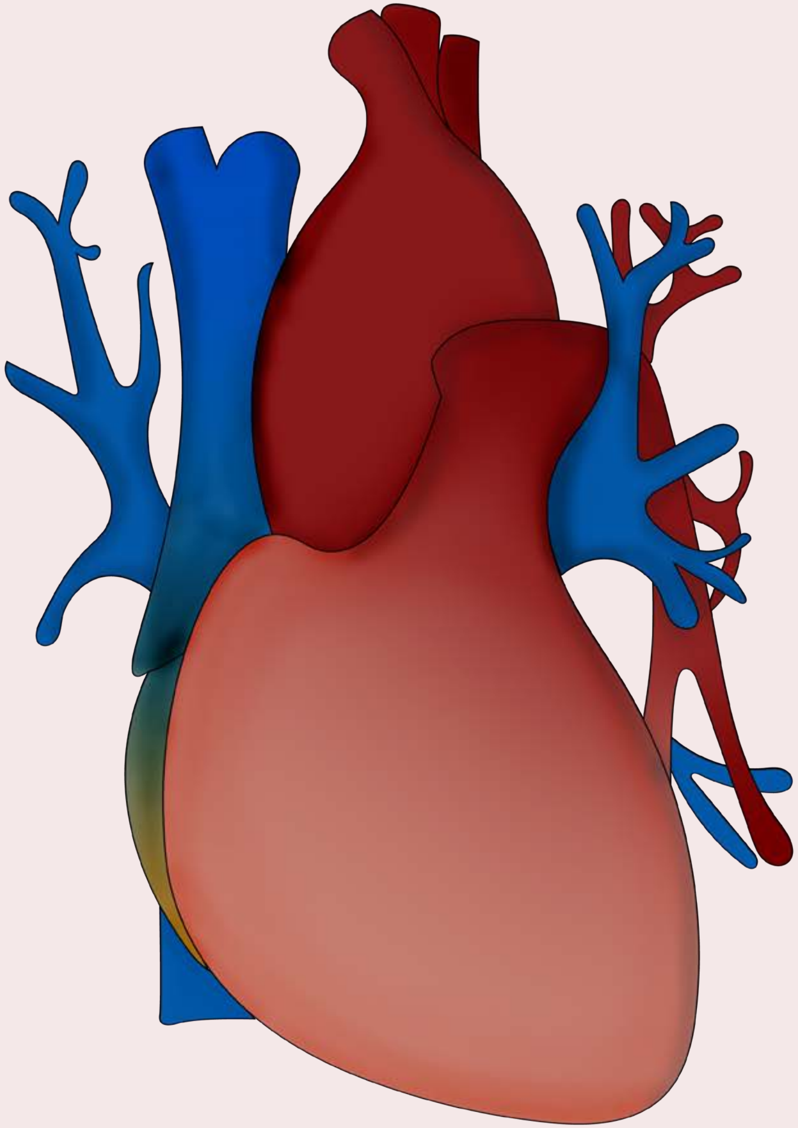
2.5 Heart murmurs

Cardiac murmurs are a direct result of blood flow turbulence. The amount of turbulence and therefore the intensity of the murmur are dependent on the size of the vessel, the pressure difference of the gradient and the blood flow volume across the site. Heart sounds heard best, close to the point of origin. The frequency of a cardiac murmur is proportional to a pressure difference or gradient across a narrowing.

Systolic murmurs begin or follow S1 and end before S2. Some subclassifications of systolic murmurs are: holosystolic murmurs, ejection murmurs, early systolic murmurs and mid to late systolic murmurs.

Diastolic murmurs occur during diastole. Diastole is silent under normal circumstances because there is little turbulence when there is low pressure flow. Some subclassifications of diastolic murmurs are early diastolic murmurs, mid diastolic murmurs, and late diastolic murmurs.

Innocent murmurs are produced by normal blood flow and are usually found in children. A change in position will change the flow and is helpful to define the murmur. Innocent murmurs are not covered in this guide.

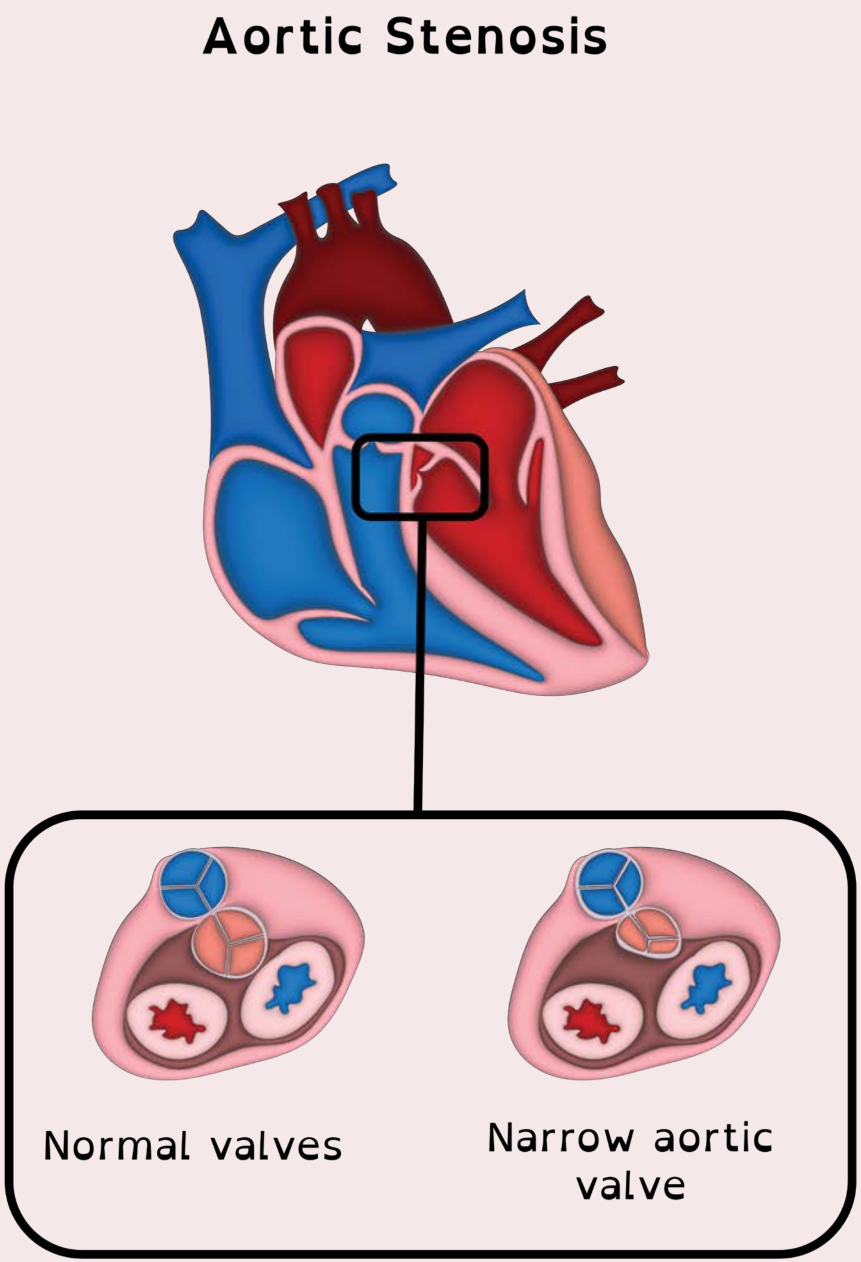


2.6 Aortic stenosis

Valve is too tight / narrow

What is it?

Aortic stenosis is a heart valve disorder characterised by the narrowing (stenosis) of the aortic valve, which is the valve that regulates blood flow from the left ventricle to the aorta. Most commonly, aortic stenosis is caused by age-related degeneration of the aortic valve. Over time, calcium deposits can accumulate and cause the valve leaflets to become stiff and less flexible, impeding their ability to open fully. Aortic stenosis restricts the normal flow of blood from the heart, forcing the heart to work harder to pump blood to the body's organs and tissues. The left ventricle wall tends to be thicker in cases when aortic stenosis is present compared to a normal heart. As the condition worsens, the murmur frequency increases creating a louder and higher pitched sound and systolic murmur lasts longer into systole.



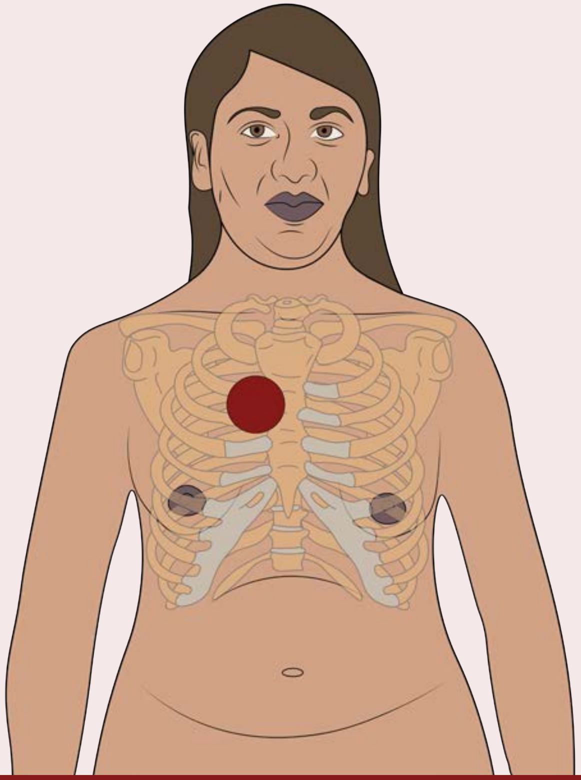
Listen

The murmur is usually best heard over the heart’s upper right sternal border, which is the area where the aortic valve is located. The murmur occurs during systole, specifically after the first heart sound (S1) and before the

What does it sound like?

High-pitched, diamond shaped, crescendo-decrescendo. The first heart sound remains normal while the second heart sound is split. During the second heart sound the aortic component of the sound is louder than usual. The aortic ejection click that can be heard in mild cases of valvular aortic stenosis is absent. A fourth heart sound can be heard in late diastole that is caused by left ventricular wall thickness and stiffness.

Aortic stenosis



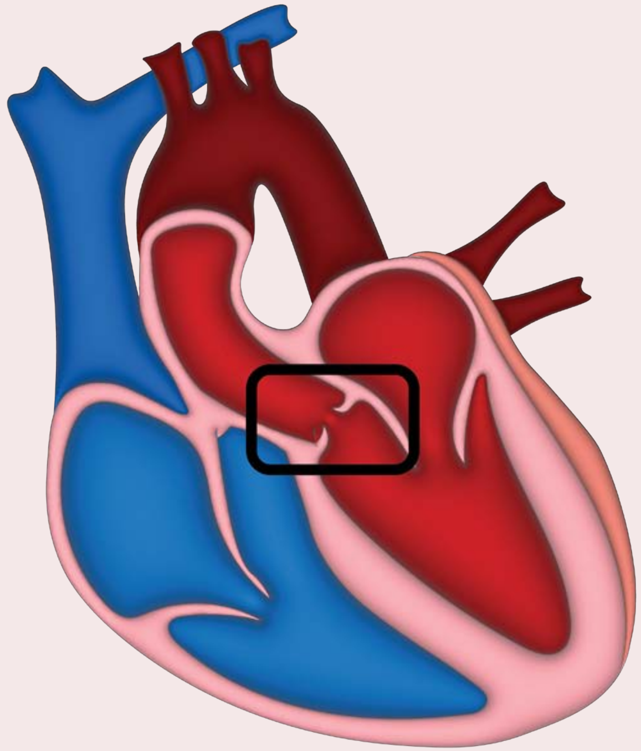
2.7 Aortic incompetence

Valve is too loose / leaky

What is it?

Aortic incompetence, also known as aortic regurgitation, is a heart valve disorder characterised by incomplete closure of the aortic valve. This results in the backward flow of blood from the aorta back into the left ventricle during diastole, the relaxation phase of the cardiac cycle. When the aortic valve fails to close properly, blood that has already been pumped out of the heart leaks back into the left ventricle, leading to a reduced efficiency of the heart's pumping function. This murmur is caused by the thickening of the bicuspid valve and the associated sound is created by turbulent blood flow from the aorta into the left ventricle during early diastole. The first heart sound is diminished due to premature closure of the mitral valve leaflets.

Aortic incompetence



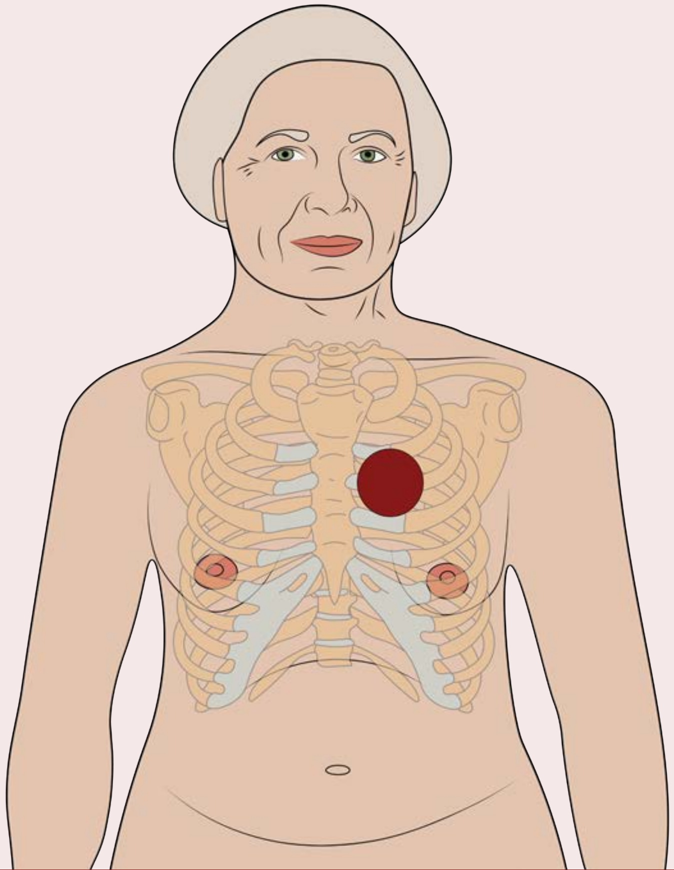
Listen

Best heard at Erb's point - over the heart's upper right sternal border, using the diaphragm of a stethoscope. Ideally the patient is sitting up and leaning forward holding their breath after expiration.

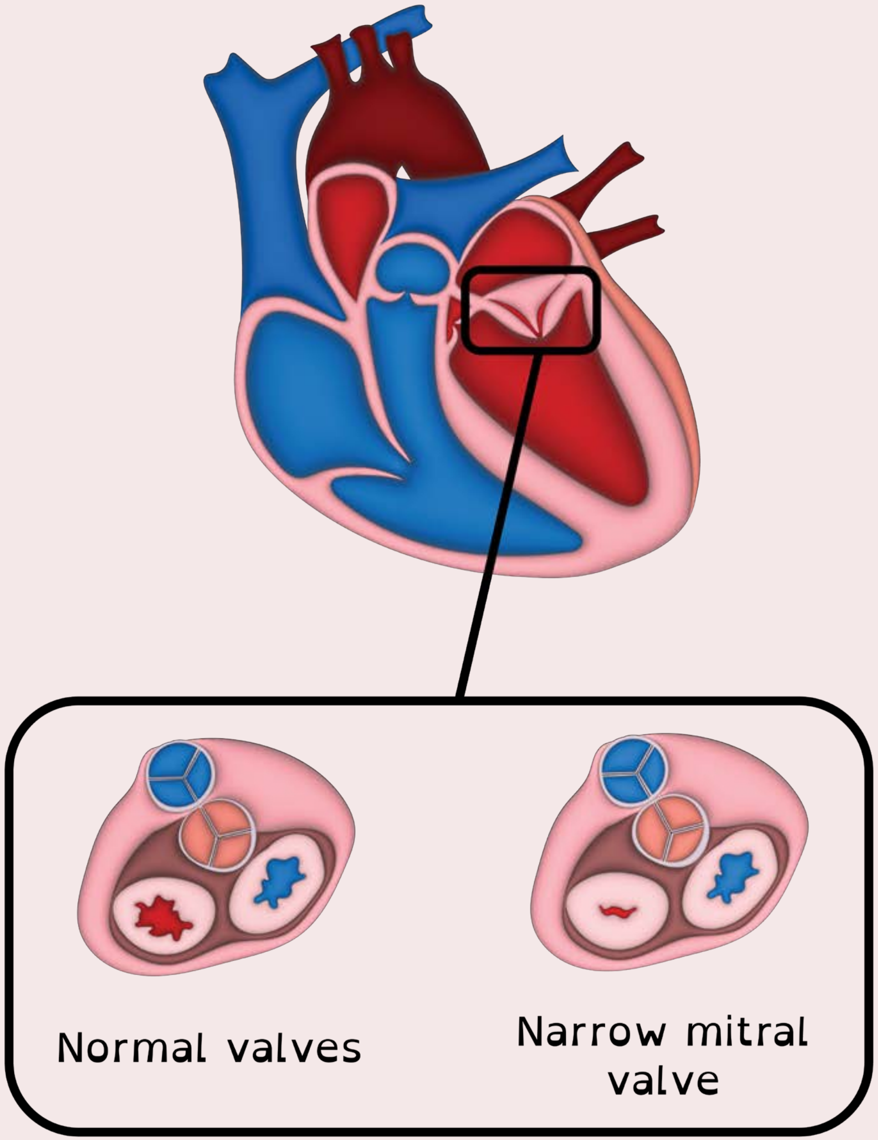
What does it sound like?

Aortic incompetence typically has a blowing, high-pitched, or decrescendo quality. Typically, the first heart sound is diminished and followed by an aortic ejection click after ~75 milliseconds. The second heart sound is normal and followed immediately by a high-pitched decrescendo murmur during the first half of the diastole. Systole is silent.

Aortic incompetence



Mitral Stenosis



What is it?

Mitral stenosis is a heart valve disorder characterised by the narrowing (stenosis) of the mitral valve, which is the valve located between the left atrium and left ventricle of the heart. The mitral valve and leaflets become thickened but remain mostly mobile. The left atrium tends to become enlarged. Turbulent blood flow is created from the left atrium into the left ventricle leading to a louder first heart sound. This narrowing restricts the normal flow of blood from the left atrium to the left ventricle.

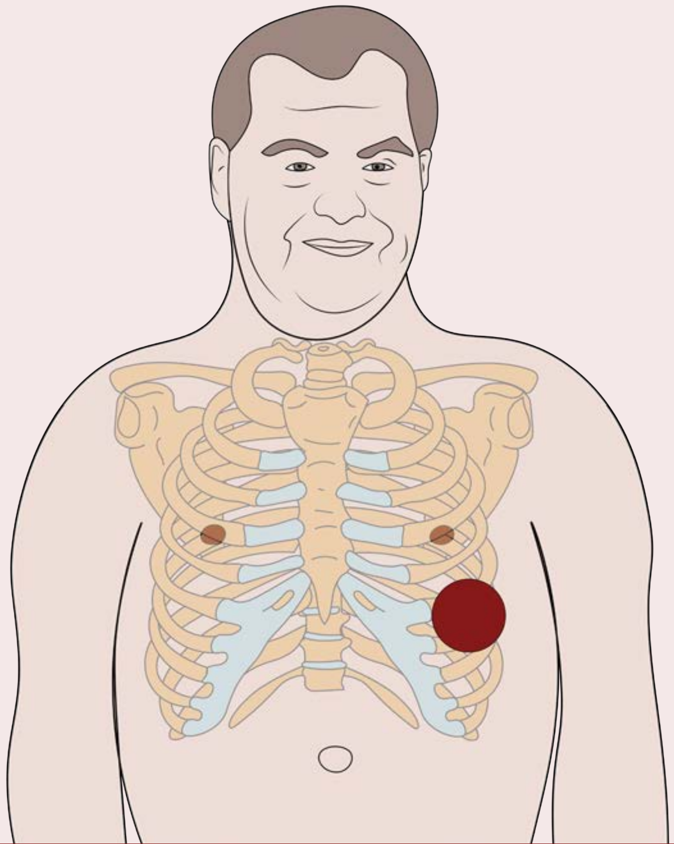
Listen

Best heard at the apex at end-expiration using the bell of the stethoscope when the patient is in the left lateral decubitus position.

What does it sound like?

S1 is loud followed by an opening snap and a low pitched crescendo-decrescendo diastolic rumble.

Mitral stenosis



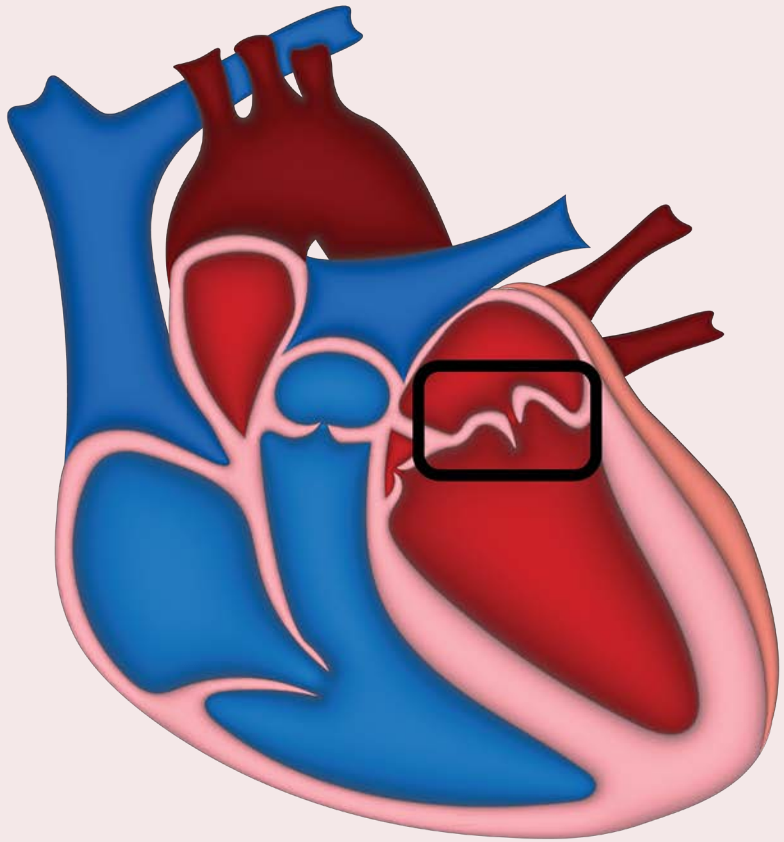
2.9 Mitral incompetence

Valve is too loose / leaky

What is it?

Mitral incompetence, also known as mitral regurgitation, is a heart valve disorder characterised by the incomplete closure of the mitral valve. This results in the backward flow of blood from the left ventricle to the left atrium during systole, the contraction phase of the cardiac cycle. When the mitral valve fails to close properly, blood leaks back into the left atrium instead of being pumped forward into the systemic circulation. This can lead to a reduced efficiency of the heart's pumping function and an increased workload on the heart. The extra effort leads the left ventricle and the left atrium to become enlarged.

Mitral Incompetence



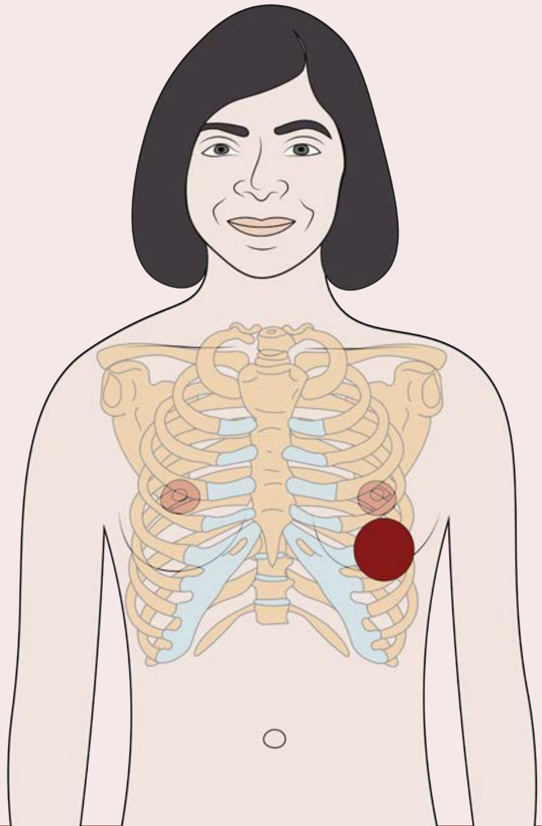
Listen

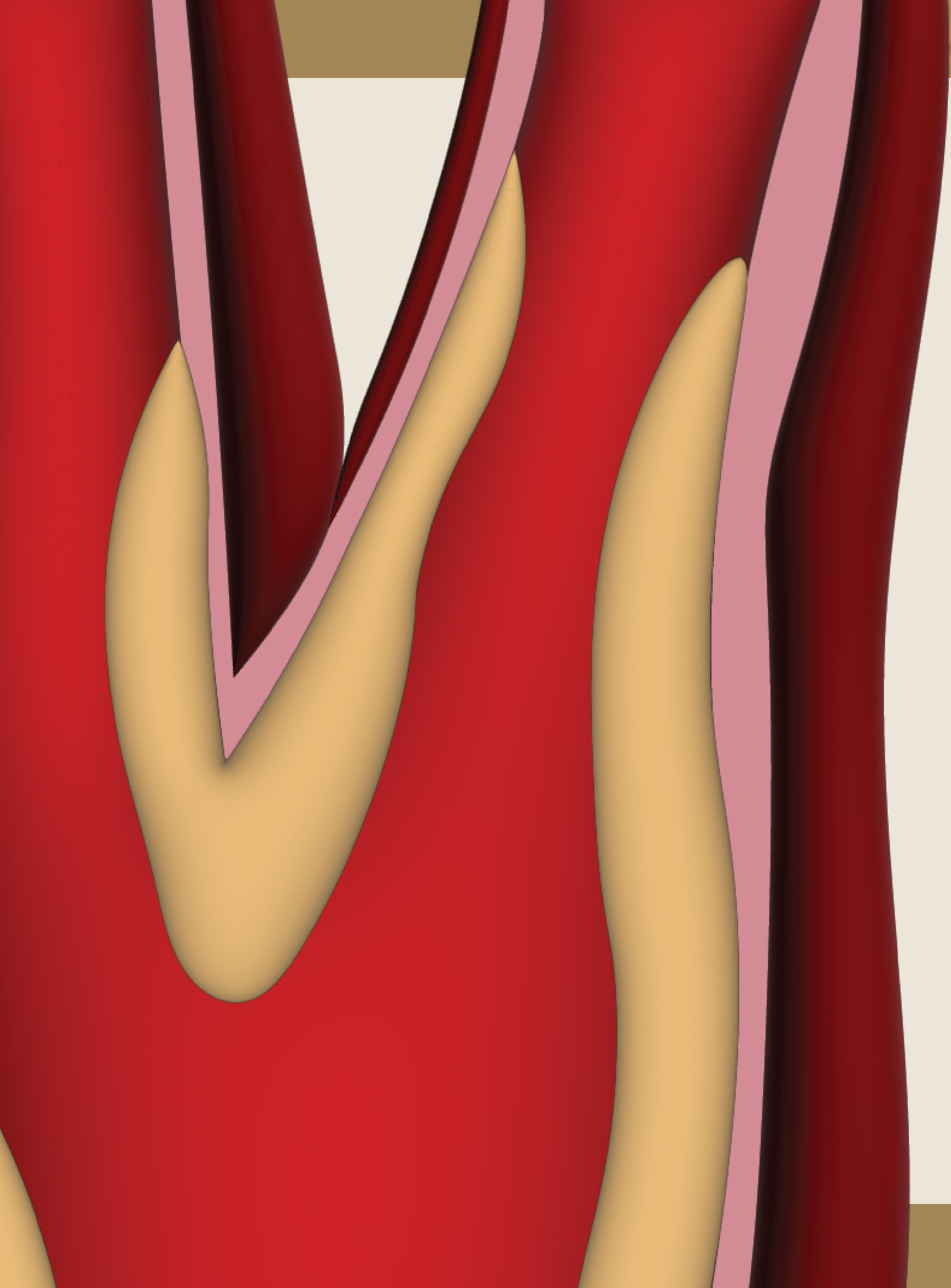
Best heard at the apex with the diaphragm of the stethoscope when the patient is in the left lateral decubitus position.

What does it sound like?

Often described as a “blowing,” “pansystolic,” or “holosystolic” murmur. It may have a mid to high-pitched frequency and plateaus in amplitude making it a rectangular murmur. It occurs when blood flows backward from the left ventricle to the left atrium during ventricular contraction. It is usually heard during systole, after S1 and before S2. S1 is normal, S2 is not split and there is a third heart sound gallop in the diastole.

Mitral incompetence





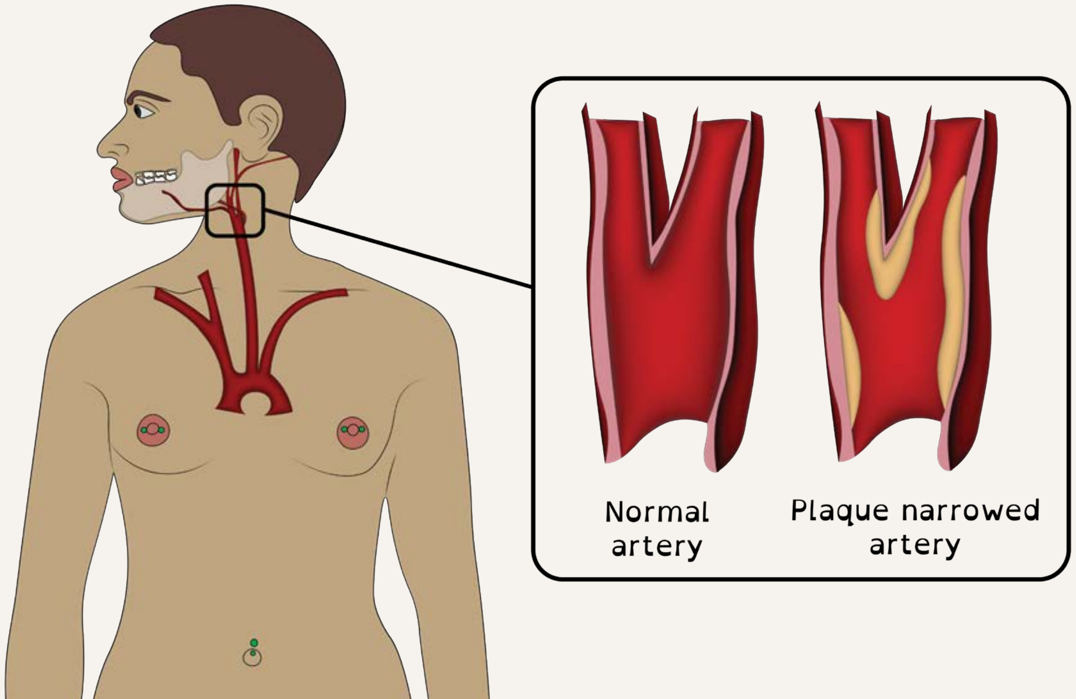
Section 3: Bruit

Section contents menu

3.1 Background

A **bruit (brew-ee)** is an abnormal sound heard during auscultation that is caused by turbulent blood flow within a blood vessel. Bruits are often associated with narrowed or blocked blood vessels, which can result from the build-up of plaque in the artery, arterial stenosis, or other vascular abnormalities.

Bruits can occur in various blood vessels throughout the body, but they are mostly associated with large arteries. The presence of a bruit may indicate an increased risk of vascular conditions, such as arterial disease or blockages. It can also be a sign of compromised blood flow to certain organs or tissues. However, the presence of a bruit does not necessarily imply a serious condition, and further evaluation is needed to determine the underlying cause and appropriate treatment.



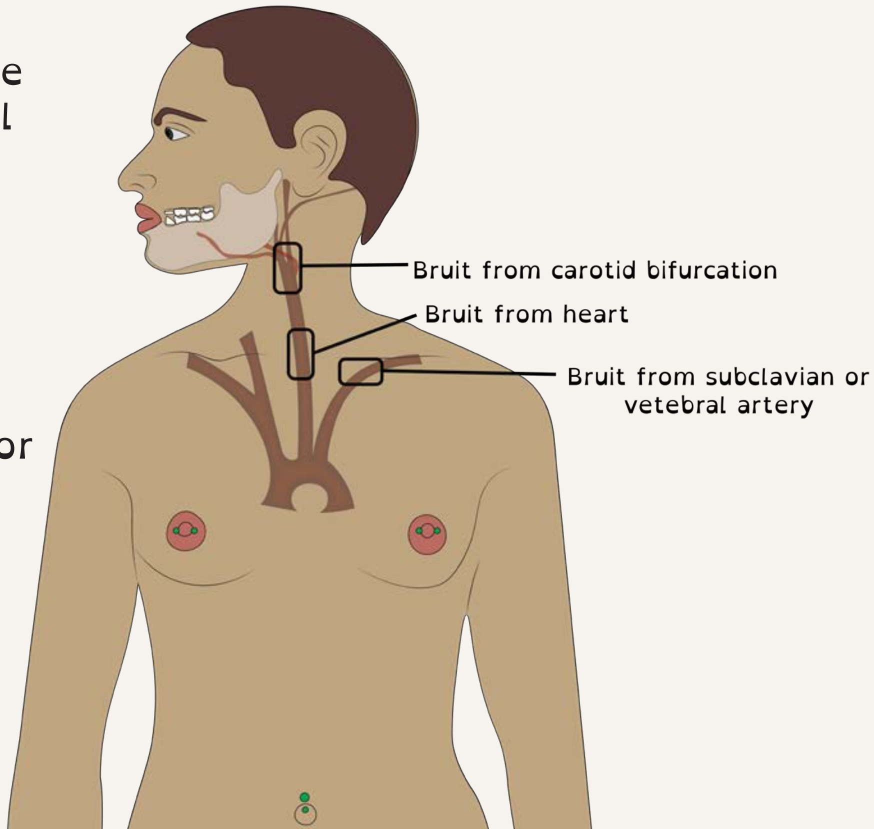
3.2 Bruit

What is it?

Carotid bruit sounds are easily confused with a basal heart murmur. If the intensity of sound is greater above the clavicle, it is a carotid bruit. If it is louder below the clavicle, it is a heart murmur. Bruits can be heard over various blood vessels in the body, including the carotid arteries in the neck, abdominal aorta, renal arteries, femoral arteries in the groin, and others. The specific location of the bruit can provide information about the underlying condition or affected artery.

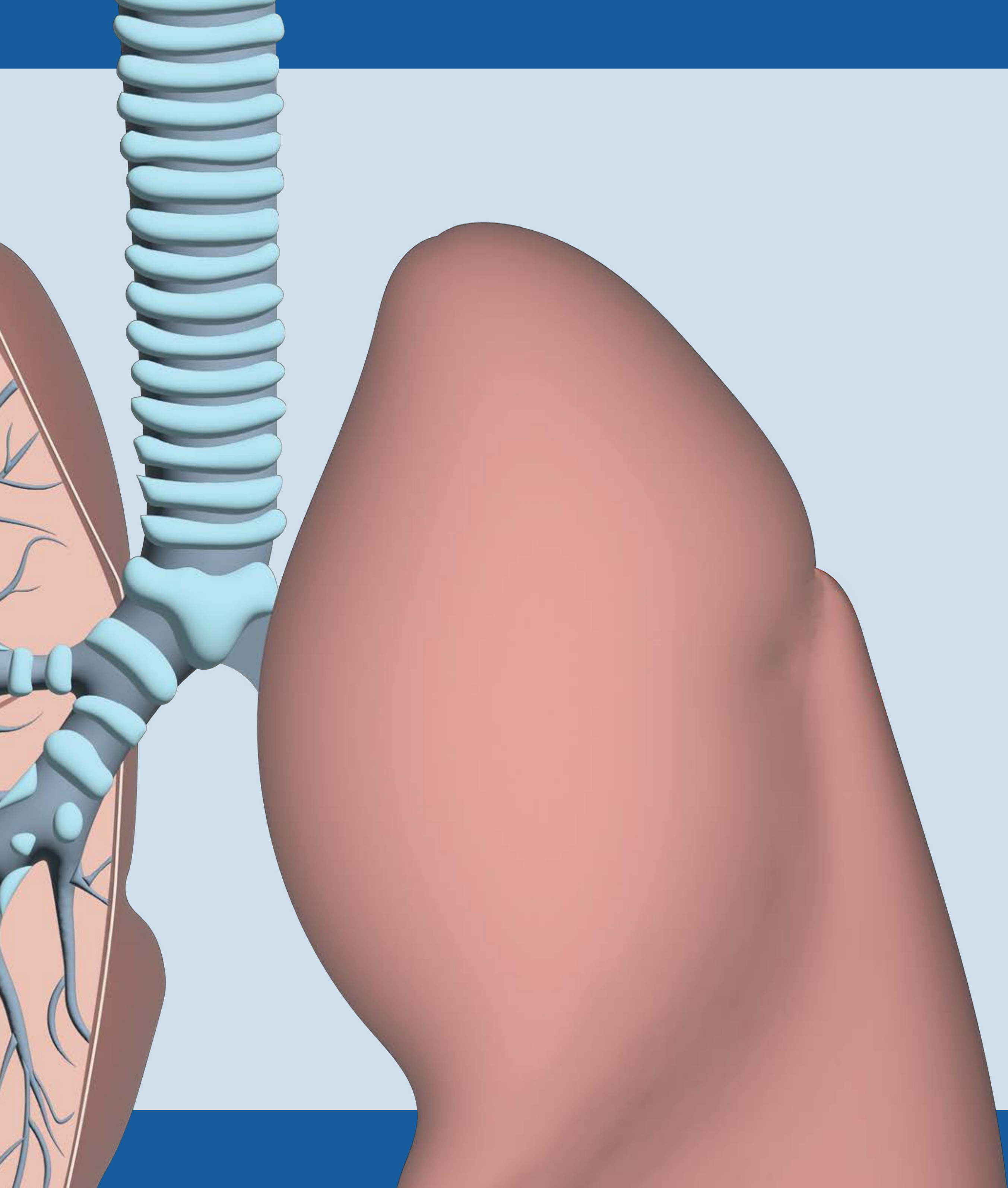
Listen

Best heard over the artery using either the bell or the diaphragm. Carotid artery bruits are best heard just lateral to the Adam's apple.



What does it sound like?

The pitch of a bruit can range from low to high, depending on the locationand severity of the underlying condition. Usually characterised as a vascular, whooshing, or swishing sound. As blood flow velocity increases, the amplitude of the bruit also increases.



Section 4: Airways and lungs

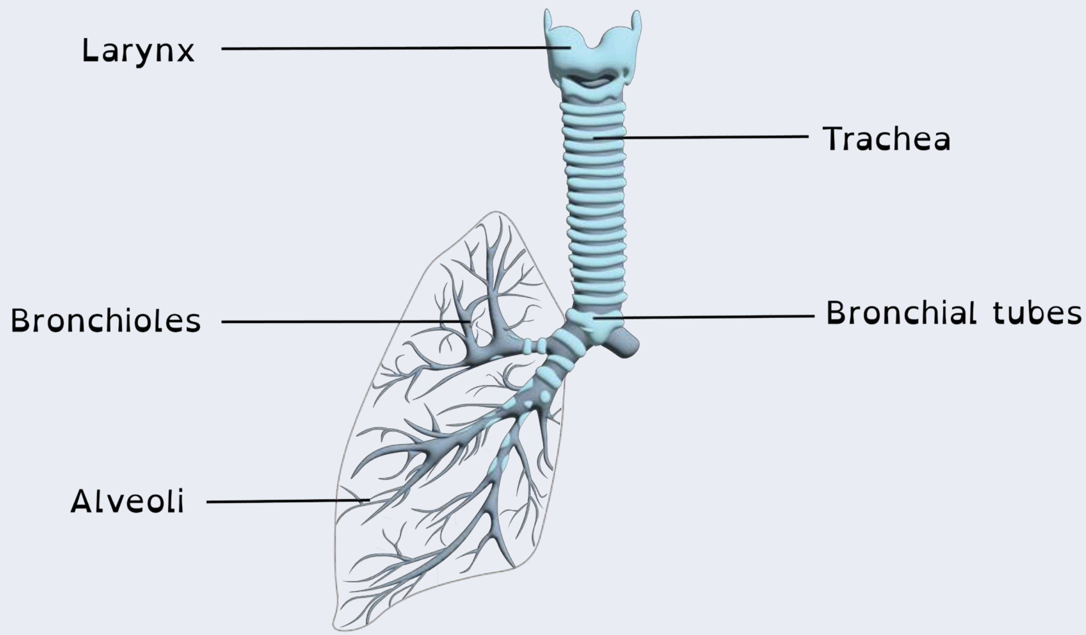
Section contents menu

4.1 Background

What is it?

The lungs and airways play vital roles in the respiratory system, which is responsible for the exchange of oxygen and carbon dioxide in the body. Some of the other important tasks of the lungs and airways include air intake and filtration, gas exchange, oxygen transport and regulation of pH levels in the body. The seven main components to the airways and lungs are the nasal cavities, pharynx, larynx, trachea, bronchi, bronchioles, alveoli.

Lung sounds, also known as breath sounds or respiratory sounds, are the noises produced by the movement of air through the lungs during breathing. These sounds can be heard with a stethoscope during auscultation and provide valuable information about the health and function of the respiratory system.



The lungs and airways play vital roles in the respiratory system, which is responsible for the exchange of oxygen and carbon dioxide in the body. Some of the other important tasks of the lungs and airways include air intake and filtration, gas exchange, oxygen transport and regulation of pH levels in the body. The seven main components to the airways and lungs are the nasal cavities, pharynx, larynx, trachea, bronchi, bronchioles, alveoli.

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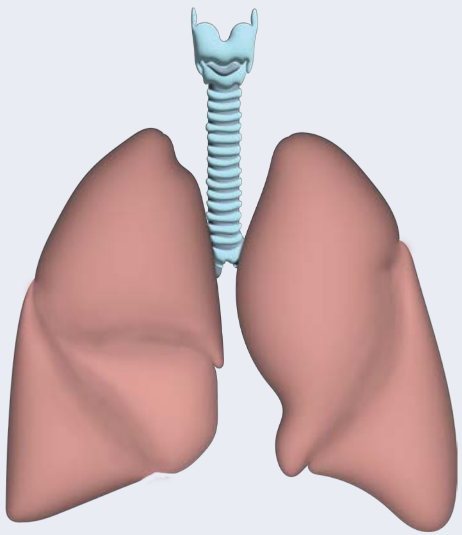
Normal breath sounds, also known as vesicular breath sounds, are the sounds produced by the movement of air through the lungs during normal, quiet breathing. These sounds are indicative of healthy lung function and can be heard during auscultation using a stethoscope. There are three primary types of breath sounds: vesicular, bronchial, and bronchovesicular.

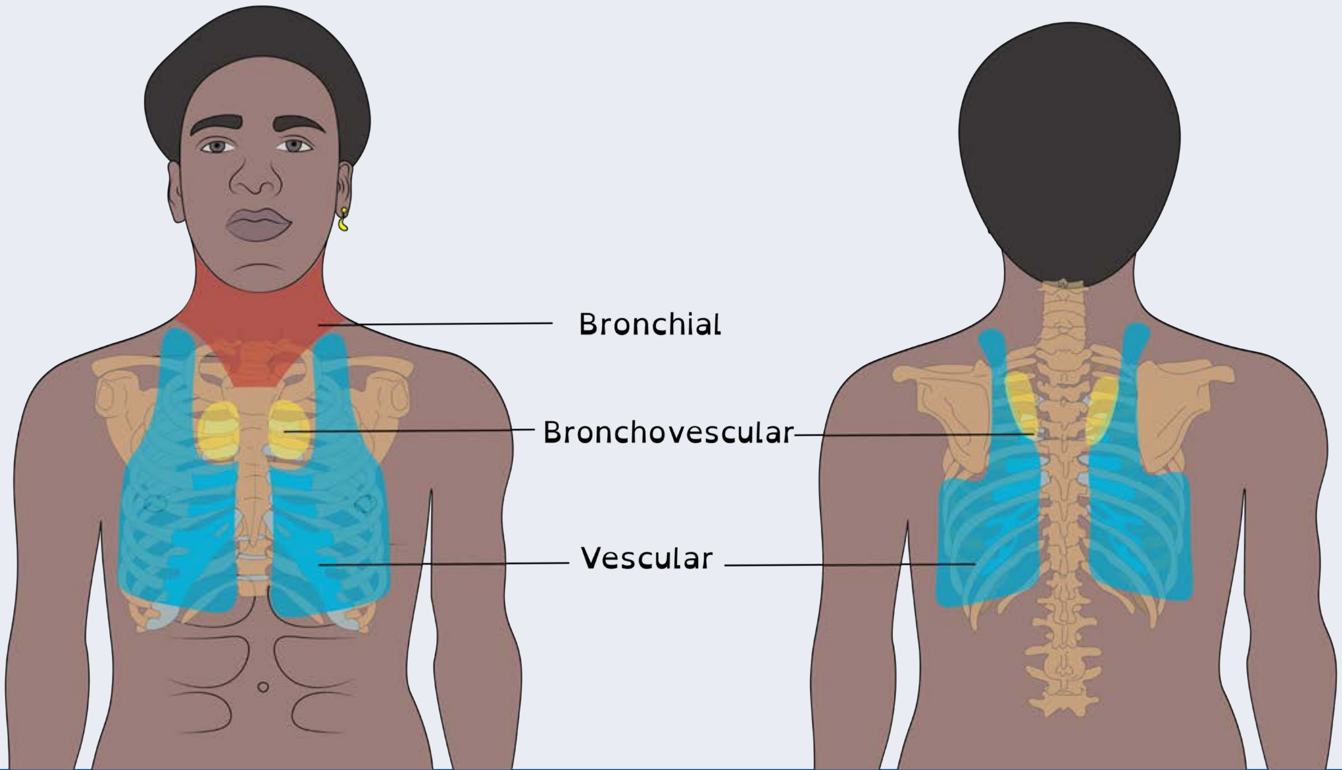
Abnormal breath sounds, also known as ‘adventitious’ breath sounds, are sounds that indicate underlying respiratory conditions or diseases. Some examples of abnormal breath sounds include crackles or rales, wheezing, and rhonchi.

Adventitious sounds are abnormal respiratory sounds that are superimposed on normal breathing sounds. These sounds can be broken down even further into two categories: continuous and interrupted sounds. Interrupted or discontinuous sounds last for 25ms or less and include fine and coarse crackles. Continuous adventitious sounds last more than 250 ms and include wheezes and rhonchi.



The listening region for breath sounds tends to be larger than for other regions. It is important to listen to different regions and both sides of the lungs to note the difference between both sides. When listening for breath sounds it is typical practice to start with the diaphragm then switch to the bell to hear lower-pitched sounds. Note that the intensity of a breathing sound can become diminished due to several factors such as impaired transmission or weak sound generation caused by shallow breathing, airway obstruction, pneumothorax, pleural effusion or thickening and obesity. The lungs are divided into several lobes, and it's important to listen to each area individually. The anterior chest typically corresponds to the upper and middle lobes, while the posterior chest corresponds to the lower lobes. It is best to auscultate each region systematically.

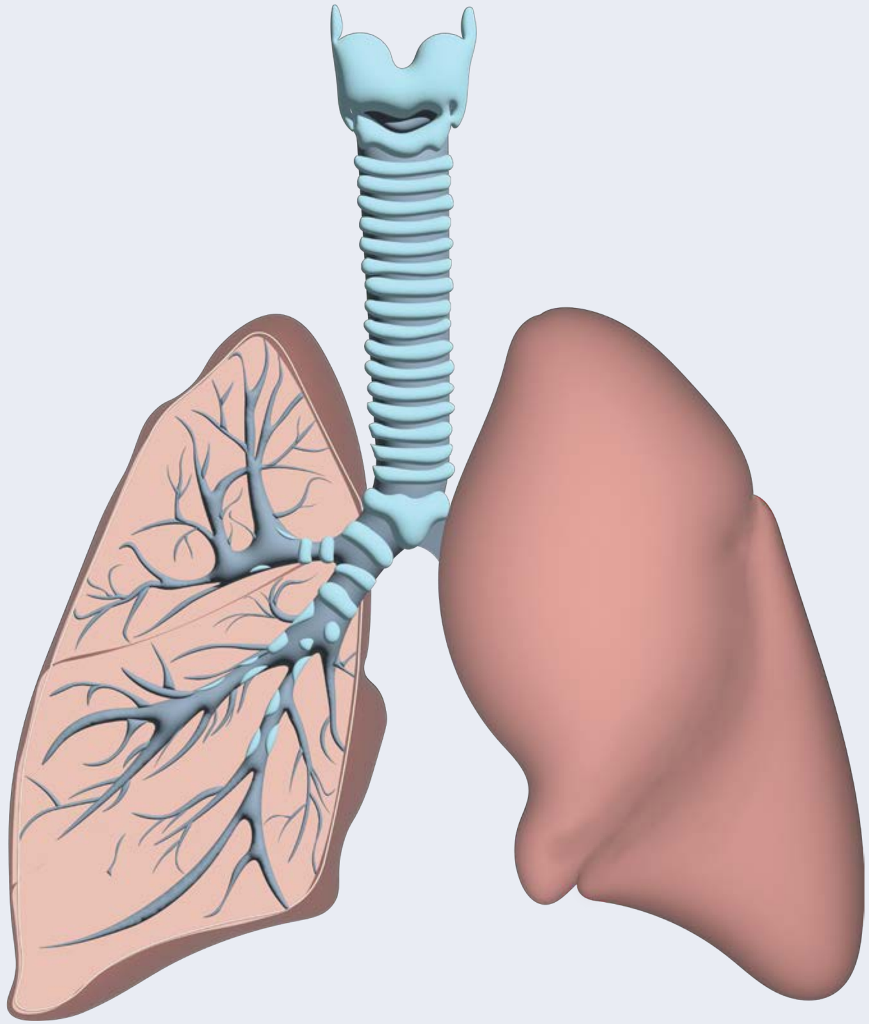
Where to listen to normal breathing pattrens



4.2 Bronchial breath sounds

What is it?

Normal breathing sounds refer to the normal cycle of inspiration and expiration are heard from various locations over the chest. Normal breathing sounds are classified by location: vesicular, bronchial, bronchovesicular and tracheal sounds. Duration, intensity, pitch, and timing are all important classifications that vary based on the origin region of the sound.



Listen

Varying auscultation points of the lungs produce different normal sounds. Typically, normal lung sounds are soft and hollow and heard upon inhalation.

Bronchial breath sounds are best heard over the trachea and are also present over the large airways in the anterior chest near the 2nd and 3rd intercostal spaces during tidal breathing.

What does it sound like?

Bronchial breath sounds: loud, high-pitched over the trachea, more tubular and hollow sounding than vesicular sounds, but not as harsh as tracheal breath sounds. Expiratory sounds last longer than inspiratory sounds or duration are the same. Intensity of inspiration and expiration is the same. There is a short gap between inspiration and expiration.

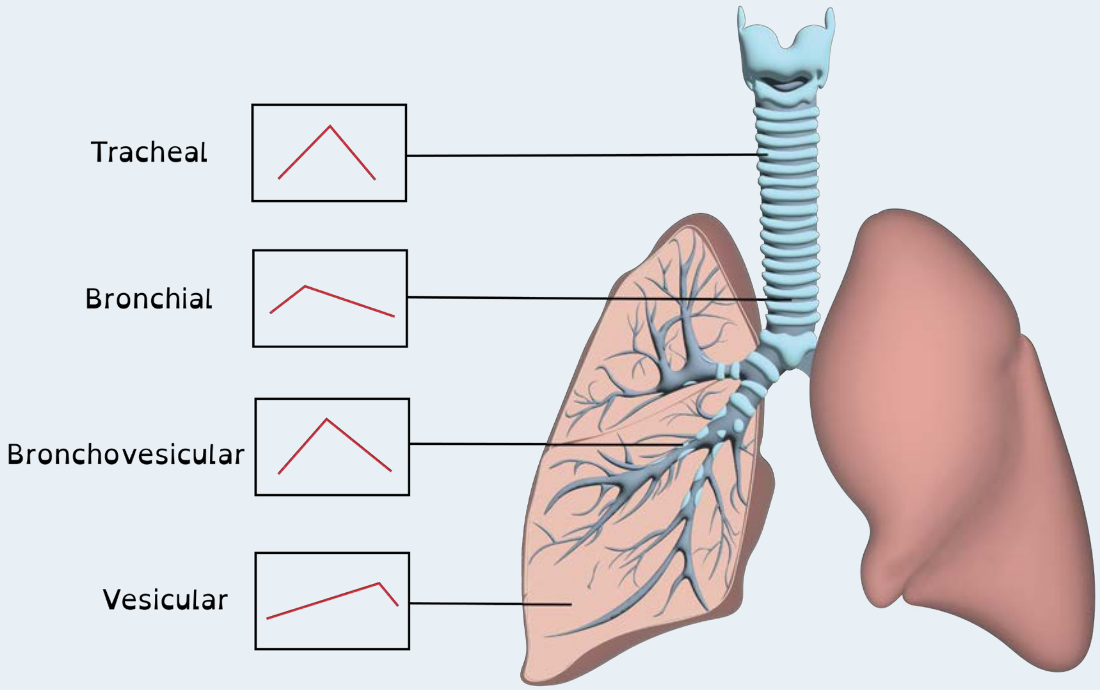
Bronchial

4.3 Tracheal and Vesicular sounds

Tracheal and vesicular sounds are two types of normal breath sounds that can be auscultated using a stethoscope.

Tracheal breath sounds are the normal sounds produced by the movement of air through the trachea or windpipe. Tracheal breath sounds are quite loud and have a harsh or tubular quality to them. They may be compared to the sound of air rushing through a hollow tube. Tracheal breath sounds can be heard clearly during both phases. They are best heard when the stethoscope is placed directly over the trachea in the neck region.

Tracheal



Vesicular sounds are the normal breath sounds heard over the smaller airways, specifically the alveoli. They are softer, low-pitched, and resemble a gentle rustling, sighing sound that is low pitched. Vesicular sounds are heard throughout the lung fields but are more prominent in the peripheral areas of the chest. During auscultation, vesicular sounds are typically heard louder during inspiration and softer during expiration. Vesicular breath sounds are best heard over most of the peripheral lung fields.

Vesicular

4.4 Wheezes

What is it?

Wheezes are adventitious lung sounds often associated with secretions, obstructions, tumours, or airway compression. The proportion of the respiratory cycle that is occupied by the wheeze is dependent on the amount of airway obstruction. A wheeze is typically loudest on breathing out (expiration) Wheezing is a common effect of asthma, especially those experiencing an asthma attack. In asthmatic patients, bronchioles will constrict, and mucous production is increased.

Wheezes can be broken down into two subcategories polyphonic and monophonic. Polyphonic wheezing occurs when airflow obstruction is all over the lungs such as asthma or bronchitis. Monophonic occurs when the airflow obstruction is localised, as in foreign body or tumour obstruction. Obstruction or compression of the airway creates increased turbulence leading to the highly audible wheezing sound.

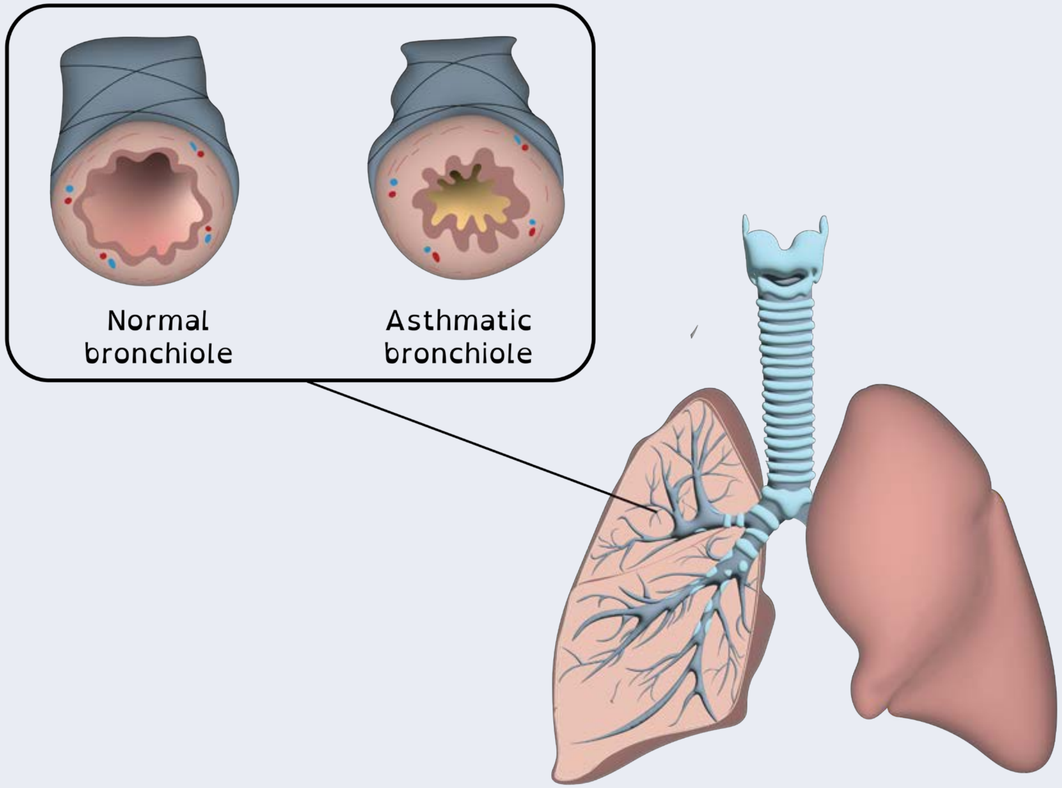
Listen

Wheezes are typically louder than other underlying breath sounds. It can be audible from a distance when the patient's mouth is open or by auscultation over the trachea during the expiry phase and in cases of severe obstruction, during the inspiratory phase. In asthmatic patients, the airway is chronically obstructed, and wheezes can be heard all over the chest.

What does it sound like?

Continuous sounds that have a musical and high-pitched quality. High-pitched wheezes tend to have a squeaking quality, while low-pitched wheezes have snoring or moaning tone.

Wheezes

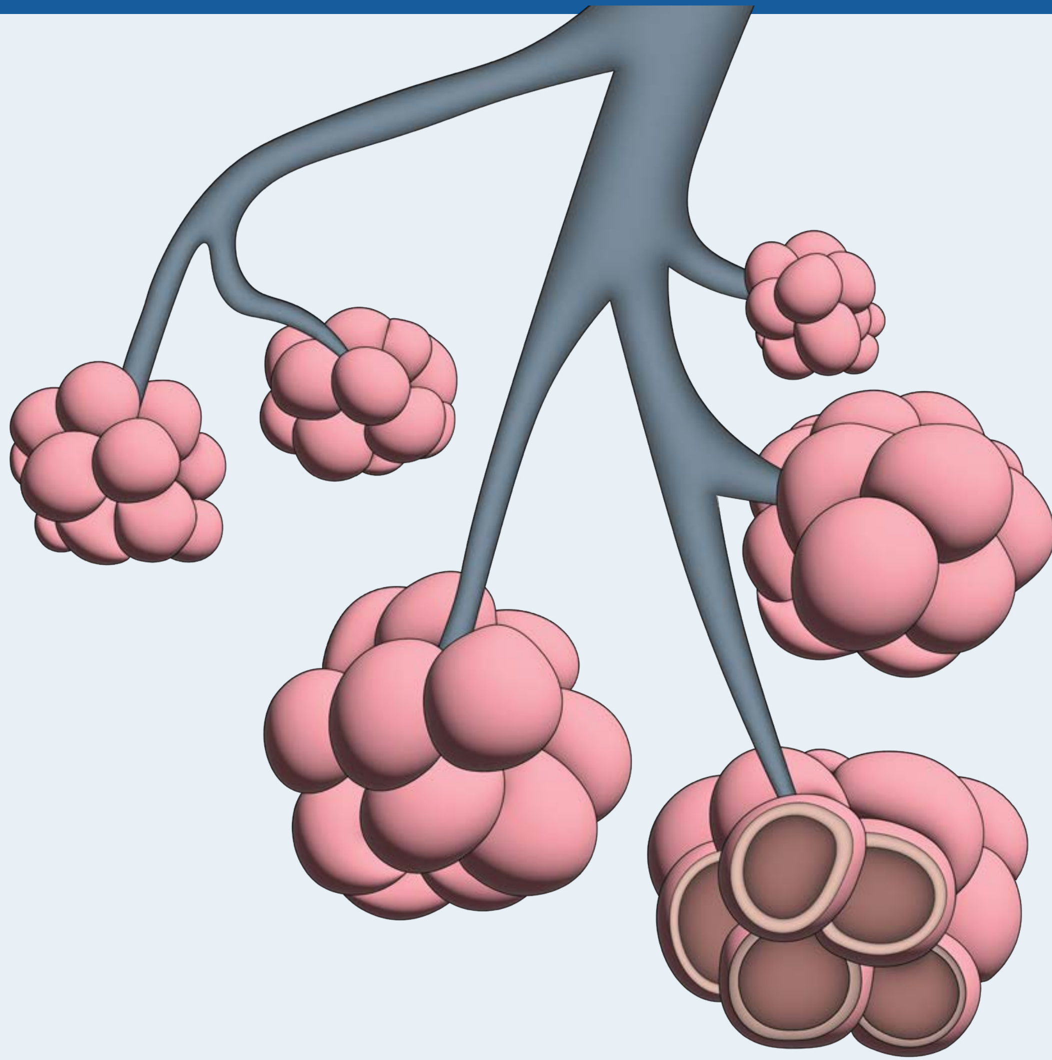


4.5 Crackles

What is it?

Crackles, also known as rales, are abnormal, discontinuous lung sounds that can be heard during auscultation of the respiratory system. They are characterised by discrete, discontinu-ous, and non-musical sounds. Crackles are usually classified into two categories as fine and coarse crackles based on their duration, loudness, pitch, timing in the respiratory cycle, and relationship to coughing and changing body position.

Fine crackles are produced within the small airways. These crackles have a short explosive that is produced by sudden changes in the gas pressure rapidly opening closed small airways. Coarse crackles are often caused by small bub-bles of gas popping.



Listen

Crackles are best heard in the lower lung bases. These sounds are usually heard in inspiration but can sometimes be heard during expiration.

What does it sound like?

Fine crackles are brief, discontinuous, popping, high-pitched breath sounds. They are often described as resembling the sound of hair being rubbed between the fingers near the ear or the sound of Velcro being pulled apart.

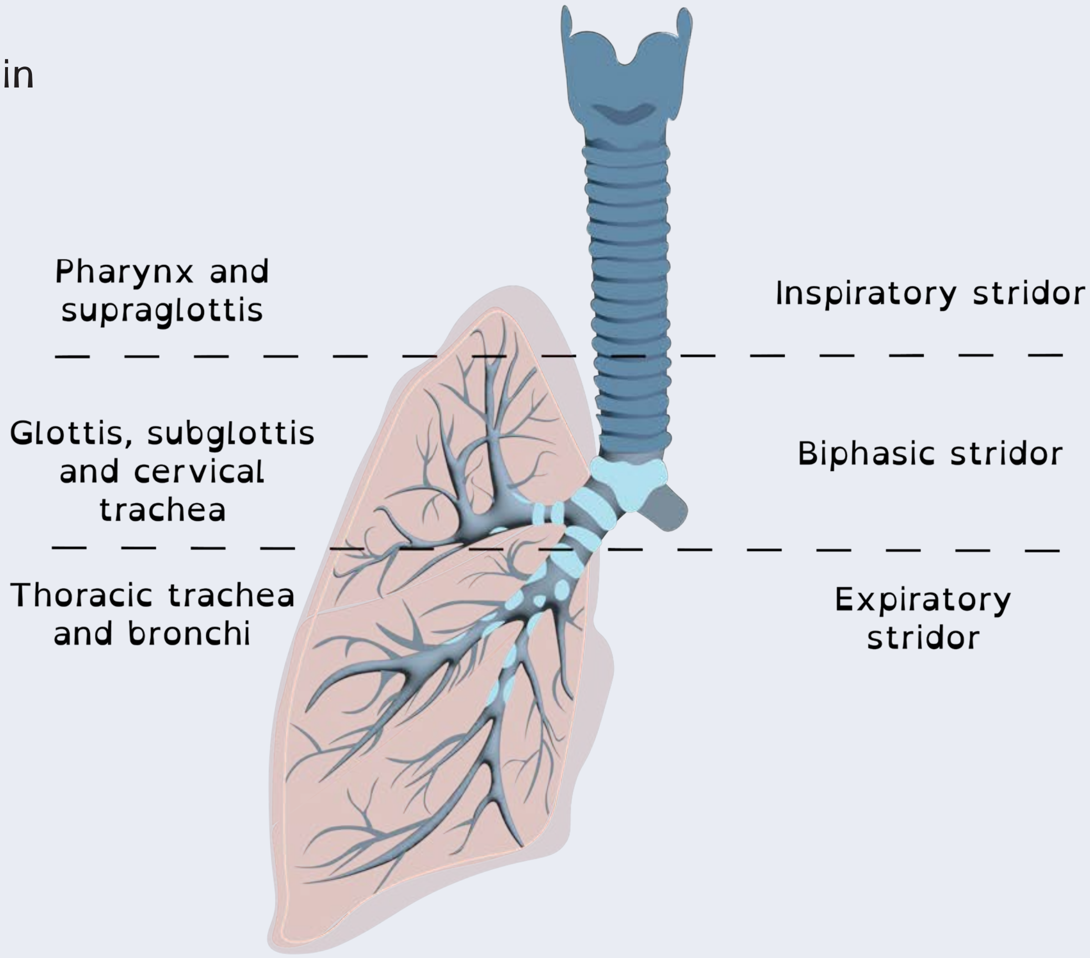
Coarse crackles are discontinuous, popping, or bubbling breath sounds that are louder, lower in pitch, and of longer duration than fine crackles. Can be described as like the sound of bubbles blown through a straw into water.

Fine crackles **Coarse crackles**

4.6 Stridor

What is it?

Stridor is an abnormal sound, not abnormal lung sound. If it is heard in both phases it can indicate significant, life threatening stenosis. The sound is caused by turbulent airflow due to partial obstruction of the upper airway, usually in the region of the larynx or the trachea. It is different from a stertor which is a noise originating in the pharynx.



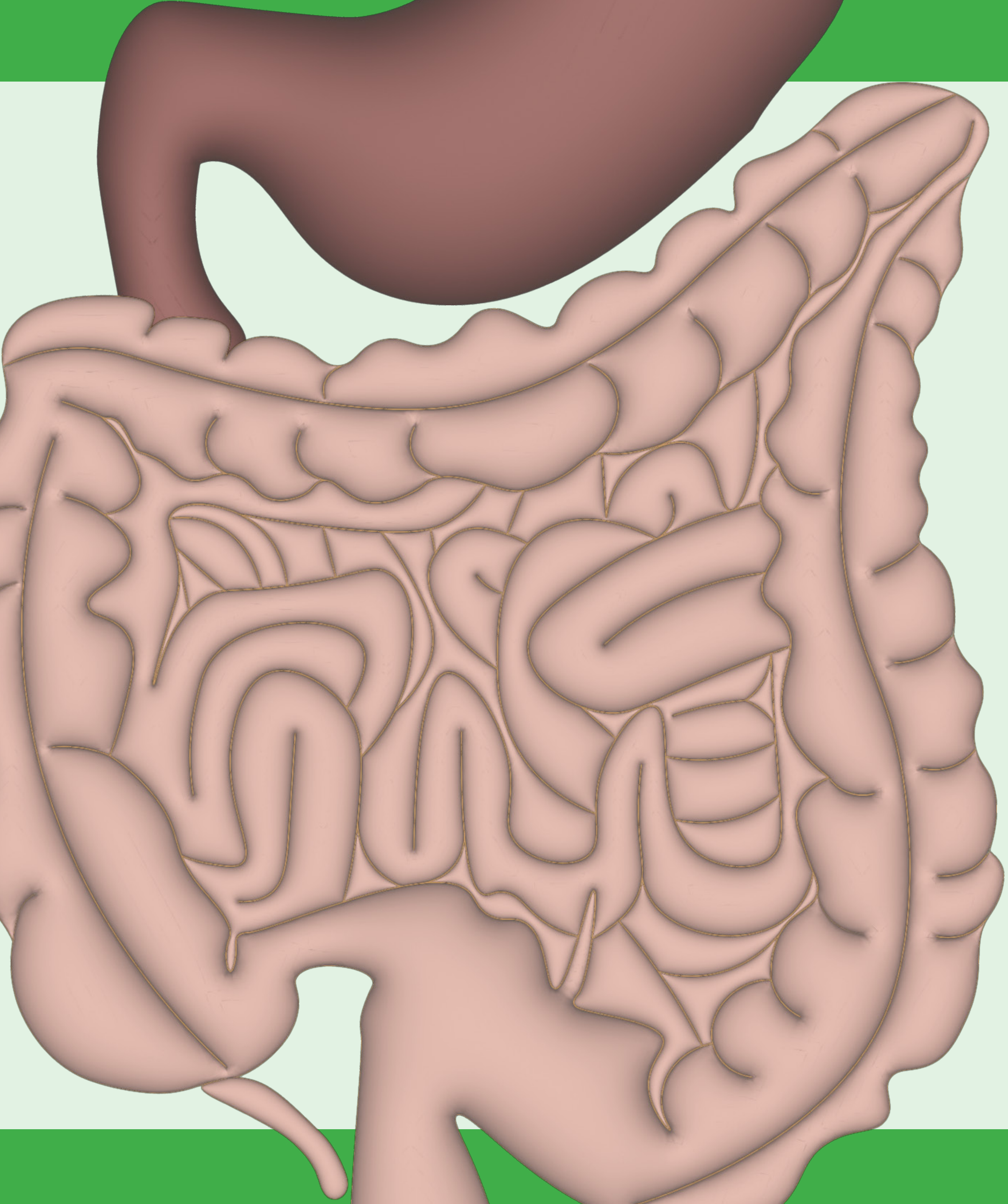
Listen

Stridor is a low-pitched, harsh, inspiratory ‘crowing’ sound heard best over the larynx and neck region.

What does it sound like?

Stridor is an abnormal, low-pitched, harsh, crowing sound. You can differentiate stridor from a wheeze: A wheeze is high pitched, with a musical quality and heard best over the lung fields.

Inspiratory stridor



Section 5: Bowel sounds

Section contents menu

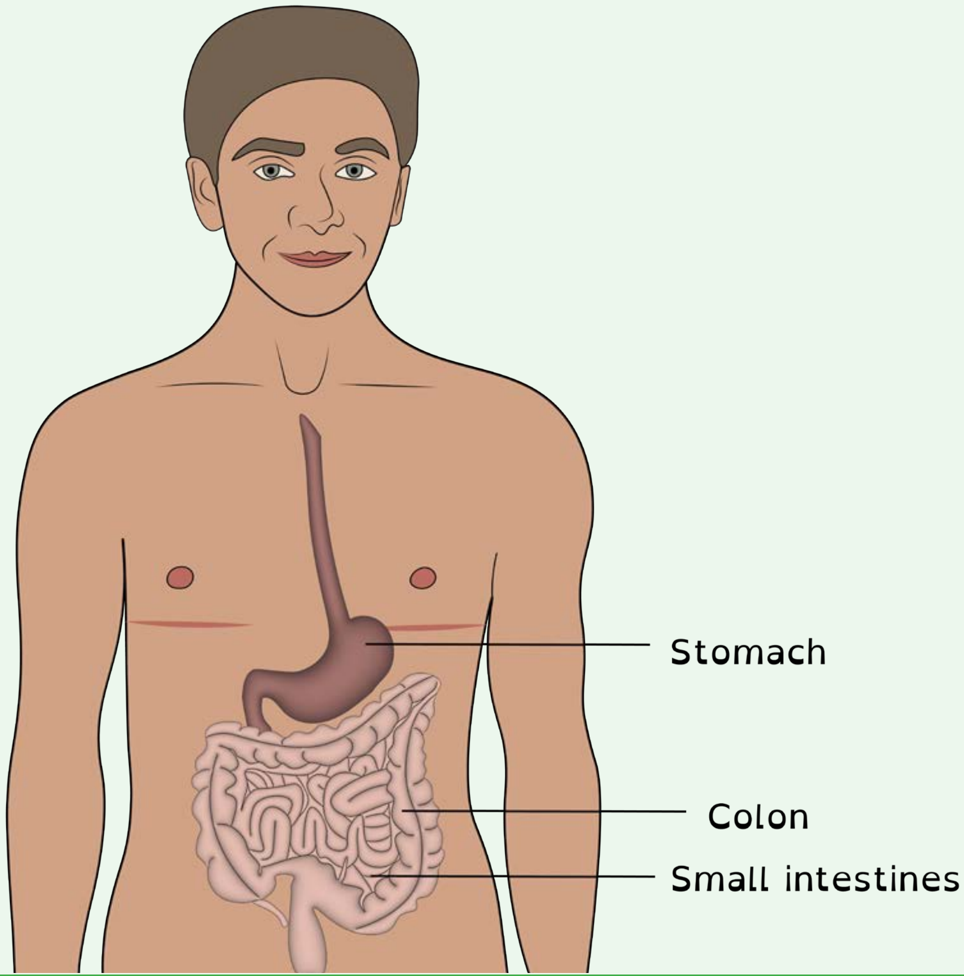
5.1 Background

The term “bowels” refers to the intestines, specifically the small intestine and the large intestine (colon). The bowels play a crucial role in the digestive system, where food is broken down and nutrients are absorbed.

Bowel sounds refer to the noises generated by the movement of the digestive tract, particularly the small and large intestines. These sounds can be heard using a stethoscope. Bowel sounds are a normal part of the digestive process and indicate that the intestines are actively functioning. Bowel sounds are typicallyheard as a series of intermittent, gurgling, or rumbling noises. The frequency can vary among individuals, but in a healthy person, bowel sounds are generally heard every 5 to 15 seconds.

Bowel sounds can change depending on various factors, such as the phase of digestion, the presence of gas or stool, and individual differences. For example, after a meal, bowel sounds may become more active as the digestive system processes the food.

Anatomical bowel landmarks



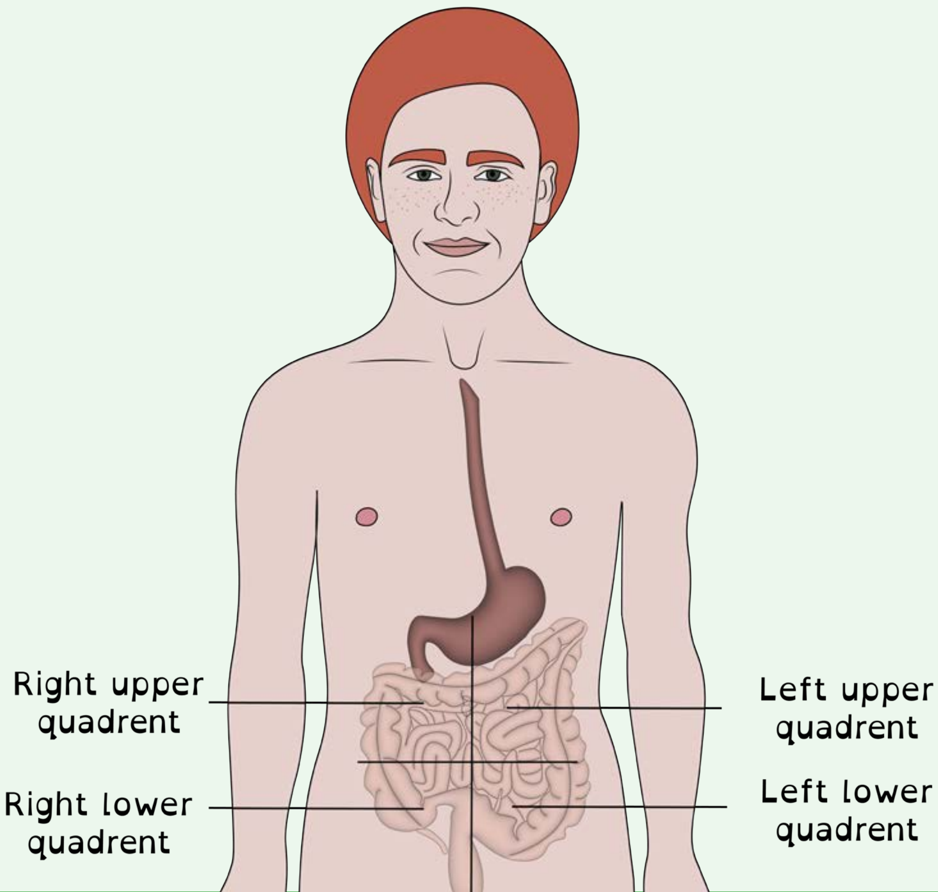
5.2 Normal bowel sounds

What is it?

Normal bowel sounds refer to the sounds produced by the movement of the intestines during digestion. These sounds are often described as soft, intermittent, and relatively quiet. Normal bowel sounds are a sign that the digestive system is functioning properly.

Peristalsis is responsible for the rumbling sound you hear after eating. It can occur several hours after eating and even at night when you are trying to sleep. Abdominal sounds may either be classified as normal, hypoactive, or hyperactive.

The abdominal quadrents



Listen

Bowel sounds are usually heard in all four quadrants of the abdomen. However, they may be more prominent in the lower left quadrant, where the sigmoid colon is located. Listen for presence of any bowel sounds and how frequently or not bowel sounds are heard as well as for any distinctive characteristics or abnormal sounds.

What does it sound like?

Bowel sounds are low pitched, gurgling or growling sounds that occur every five to ten seconds. In healthy patients the sounds should be occurring intermittently through the day.

Normal bowel sounds

5.3 Abnormal bowel sounds

What is it?

Bowel sounds are generally considered a normal finding; however, the absence or abnormal pattern of bowel sounds may indicate an underlying issue. Here are a few examples:

- Absent Bowel Sounds: Complete absence of bowel sounds may suggest a condition called ileus, which is a disruption in the normal movement of the intestines. It can be caused by factors such as surgery, inflammation, or obstruction.

- **Increased Bowel Sounds:** Excessively loud or hyperactive bowel sounds can occur in conditions such as diarrhoea, gastroenteritis, or bowel obstruction.

- **Absence of Bowel Sounds**: in aspecific area if bowel sounds are absent or significantly reduced in a specific area of the abdomen, it may indicate a localised problem, such as an intestinal blockage or inflammation.

It's important to note that interpreting bowel sounds requires clinical judgement and should be considered in conjunction with other clinical findings and symptoms.

Section 6: No sounds in health

6.1 No sounds in health

What is it?

The absence of normal body sounds, also known as absent or diminished physiological sounds, can be an important clinical finding that may indicate an underlying medical condition or potential issues with specific organs or systems. Here are some examples of the absence of normal body sounds and their possible implications:

- **Absent bowel sounds:** The absence of normal bowel sounds upon auscultation of the abdomen can be a sign of decreased or absent intestinal motility, known as “bowel ileus” or “paralytic ileus.” This condition can be caused by various factors, including abdominal surgery, inflammation, infection, or certain medications. It is essential for healthcare professionals to investigate further to determine the underlying cause and provide appropriate treatment.

- **Absent lung sounds:** The absence of normal breath sounds during auscutation of the lungs can indicate conditions such as pneumothorax (collapsed lung), pleural effusion (accumulation of fluid in the space around the lungs), or severe asthma exacerbation. In these cases, the affected lung area may not be expanding and allowing air to flow, leading to the absence of breath sounds.

- **Absent heart sounds:** The reduction of normal heart sounds (lub-dub) upon auscultation may be a sign of serious conditions like cardiac arrest or heart failure. It may also occur in certain types of arrhythmias, pericardial effusion, pericardial thickening or when there is reduced blood flow through the heart.

Section 7: Further resources

7.1 Shortened interactive PDF

https://indd.adobe.com/view/fd63cb15-2388-428f-a7e5-e8c54a30e18b

7.2 Print version

https://indd.adobe.com/view/6d51c8cb-adbf-43ed-aad9-6eb4c7b143e8

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