



Rewarding Learning

eGUIDE//

Health and Social Care

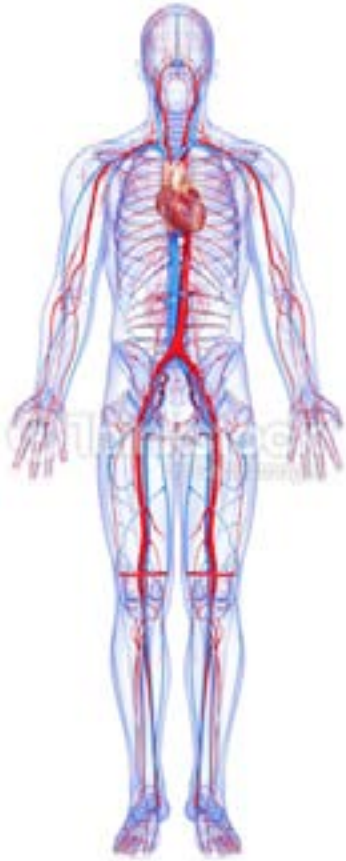
Unit A2 2: Body Systems and Physiological Disorders

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Circulatory and respiratory systems

The circulatory system



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The structure of a body system relates to the component parts of the system and their arrangement within that system. The circulatory system also called the cardio vascular system comprises three components:

- The heart
- Blood vessels
- Blood

The circulatory system comprises two separate circuits:

- The **pulmonary** circuit which carries blood to the lungs to be **oxygenated** and then back to the heart
- The **systemic** circuit carries blood from the heart to the rest of the body delivering oxygen and nutrients to the cells – it then returns **de-oxygenated** blood to the heart.

The heart has four chambers. The two atria collect the blood while the two ventricles pump the blood out of the heart. Valves prevent the blood from flowing backwards. The septum separates the two sides of the heart. The heart is a muscular pump and with each beat it pumps blood to the lungs and around the body. Deoxygenated blood enters the right atrium of the heart and flows through the tricuspid valve into the right ventricle. From there it is pumped through the pulmonary semilunar valve into the pulmonary artery on its way to the lungs. When it gets to the lungs, carbon dioxide is released from



the blood and oxygen is absorbed. The pulmonary vein sends the oxygen-rich blood back to the heart and the cycle continues.

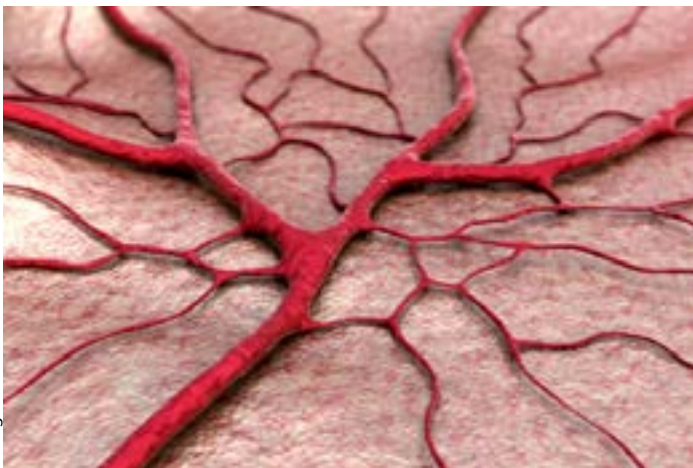
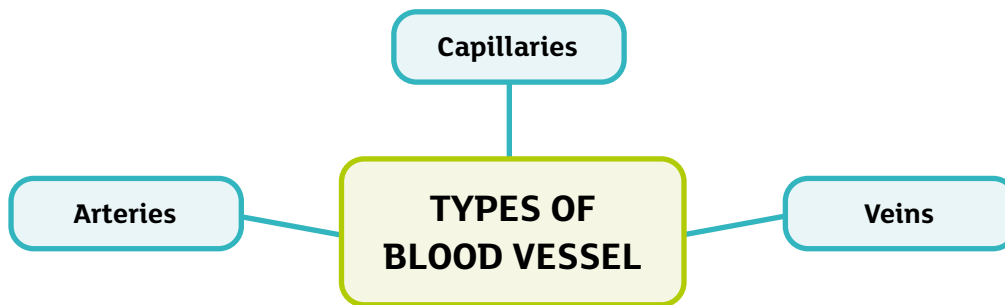
The following you tube video on the circulatory system is enjoyable, informative and relevant to your assignment. Watch out for differences in pronunciation of some key terms! You might want to take some notes for your assignment.

<https://www.youtube.com/watch?v=AiCAF34MPpU>

Activity

Draw and label a basic diagram of the heart. Use red and blue pencils to illustrate oxygenated and deoxygenated blood flow. One or two students can present their diagrams to the class while giving an oral commentary to describe its function.

Three distinct types of blood vessel exist in the circulatory system



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Activity

Conduct research on the structure and function of all three types of blood vessel.

The following websites may be useful:

<http://biology.about.com/od/anatomy/ss/artery.htm>

<http://biology.about.com/od/anatomy/ss/vein.htm>

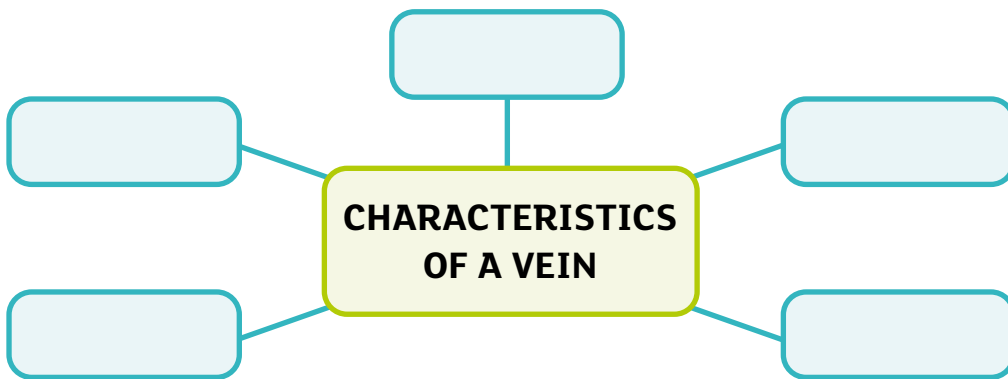
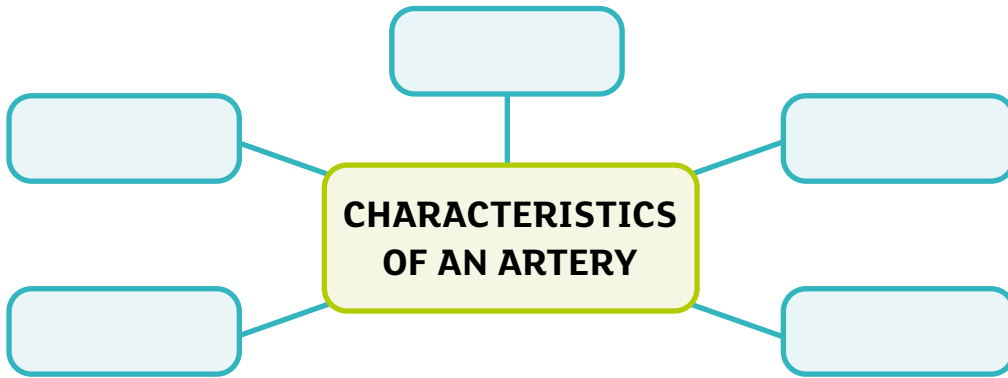
http://www.diffen.com/difference/Arteries_vs_Veins

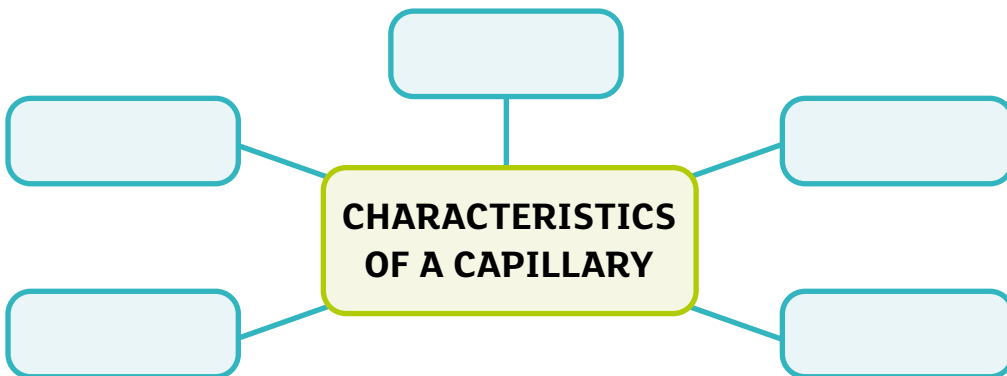
<https://www.khanacademy.org/science/health-and-medicine/human-anatomy-and-physiology/heart-introduction/v/arteries-vs-veins-what-s-the-difference>

<https://www.khanacademy.org/science/health-and-medicine/human-anatomy-and-physiology/heart-introduction/v/arteries-arterioles-venules-and-veins>



1. Following your research, complete (**in your own words**) the following spider diagrams to describe the structure of the blood vessels.





2. Produce illustrated drawings of the structure of the three types of blood vessel.

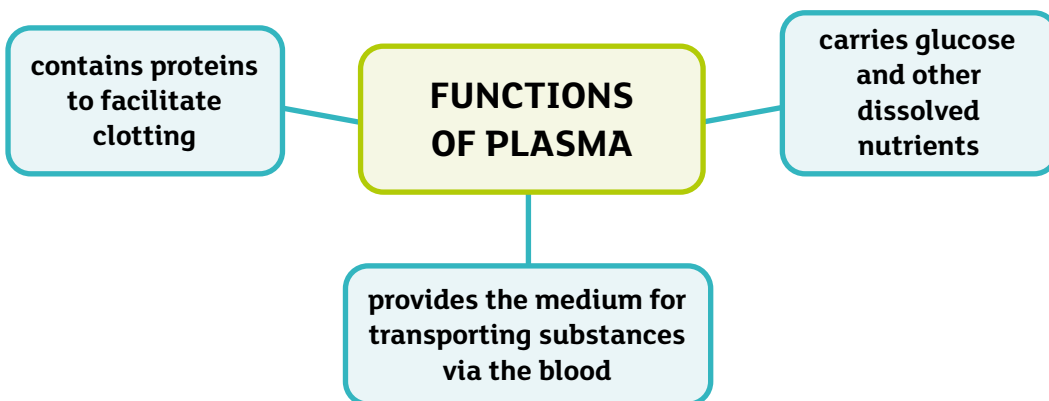
The following websites may be useful:

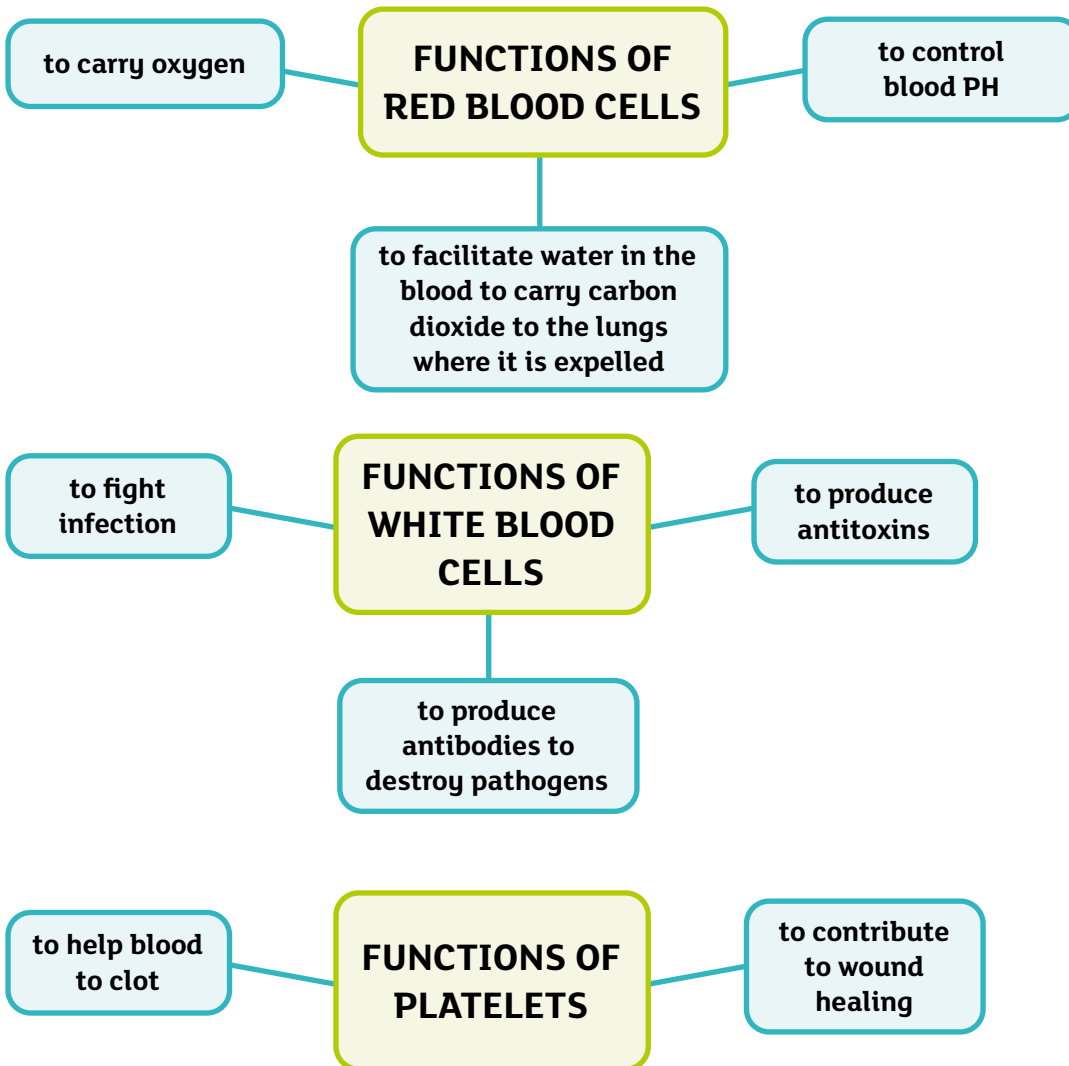
<http://biology.about.com/od/anatomy/ss/artery.htm#step2>

<http://www.majordifferences.com/2013/02/difference-between-artery-and-vein.html>

Blood provides the human body with nutrition and oxygen and it facilitates the removal of waste products such as carbon dioxide. An average adult has five litres of blood which is comprised of:

- Plasma
- Red blood cells
- White blood cells
- Platelets







Activity



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Access the following websites and create a PowerPoint presentation on blood. Your presentation should have no more than six slides and should provide details on the structure and function of the various components of blood.

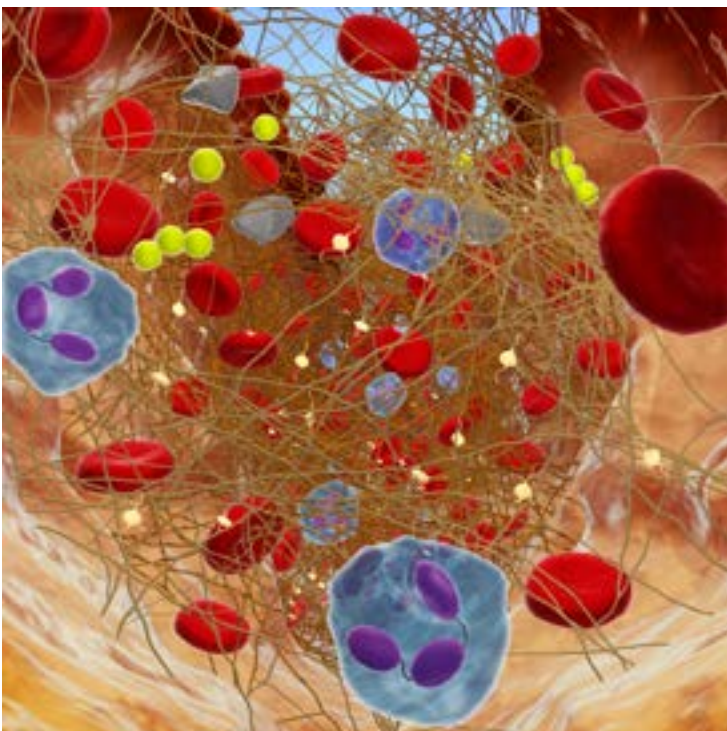
<http://www.healthhype.com/red-blood-cells-functions-size-structure-life-cycle-pictures.html>

<http://biology.about.com/od/cellbiology/ss/white-blood-cell.htm>

<http://study.com/academy/lesson/what-are-platelets-definition-function-normal-range.html>

http://www.platelet-research.org/1/function_hemo.htm

<http://study.com/academy/lesson/functions-of-red-blood-cells-white-blood-cells-platelets.html>



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Control mechanisms



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The heart is controlled by the autonomic nervous system which has two branches – the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system is active when the body is undergoing muscular work, fear or stress. It causes each heartbeat to increase in strength as well as causing an increase in heart rate. The parasympathetic nervous system calms the heart output and is active during resting, peace and contentment. The main parasympathetic nerve is the vagus nerve.

The sympathetic and parasympathetic nervous systems supply a special cluster of excitable cells in the upper part of the right atrium. This is called the sino-atrial node (SA node) referred to as 'the pacemaker'. The SA node sets the rhythm of the heartbeat, but the timings can be altered through the autonomic nervous system and the actions of hormones – for example, the sympathetic nervous system is boosted by the hormone adrenaline during periods of fright, flight and fight.

Without nervous system control, the heart would beat around 100 times per minute. However, when relaxed, the parasympathetic nervous system sets a resting heart beat rate of about 70 beats per minute. On average, an individual's maximum heart rate is 220 beats per minute minus your age. So a 40 year old would have a maximum heart rate of about 180 beats per minute.

Any increase in activity requires the heart to supply extra oxygenated blood to the muscles. This increase is triggered by the sympathetic nervous system. Stimulation of the sympathetic system causes an increase in heart rate and makes the heart muscle contract more forcefully. Factors that alter the pulse rate include emotion, exercise, hormones, temperature, pain, age, drugs and stress.



Activity

Create a PowerPoint presentation of no more than five slides which summarises in your own words the control mechanism of the circulatory system. You can embed clips (for example from You Tube) and images to support your presentation but you **must be able to explain them fully in your own words**.

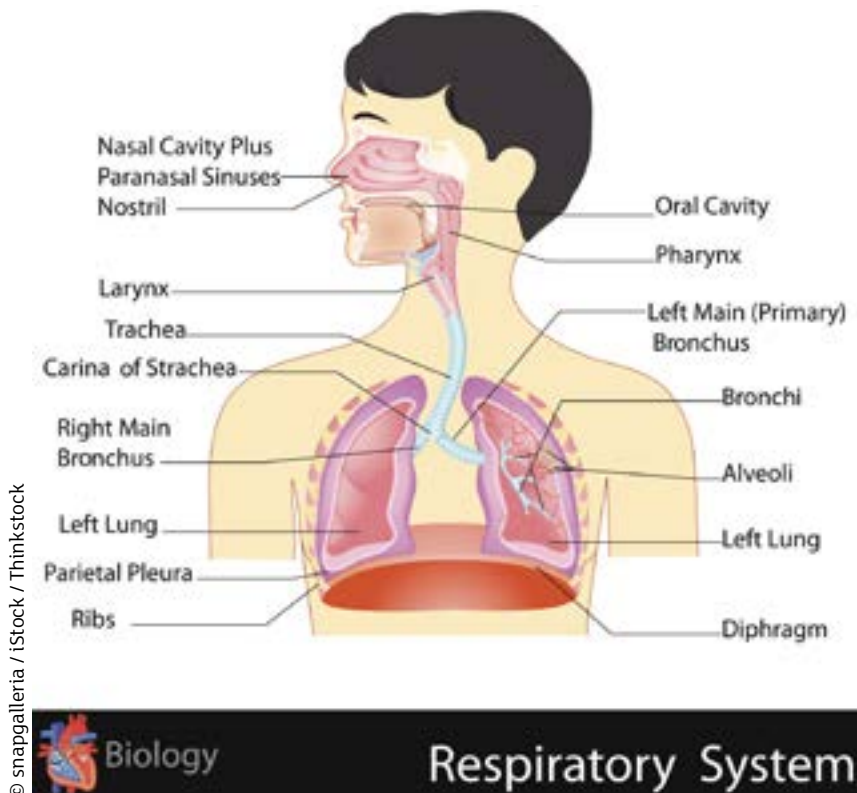
You may find the following links useful:

<https://www.youtube.com/watch?v=6HdXZa3T5JI>

<http://www.ncbi.nlm.nih.gov/books/NBK11075/>

<http://www.livestrong.com/article/422152-how-does-the-nervous-system-control-the-heart-rate-in-exercise/>

The respiratory system



The respiratory system is the system in the human body that enables us to breathe. Breathing or respiration is the inhalation and exhalation of air to facilitate the absorption of oxygen in order to produce energy and release carbon dioxide, the by-product of respiration. The function of the respiratory system is to facilitate this process and it does this through the various component parts which make up the respiratory system.

The upper and lower respiratory system, collectively, are comprised of three major component parts:

- the trachea, (which includes the nose mouth, pharynx, larynx, trachea, bronchi, and bronchioles)



- the lungs
- the respiratory muscles

Activity

Visit the following websites and investigate the structure and function of the component parts of the respiratory system.

http://www.teachpe.com/anatomy/respiratory_system.php
<http://schoolworkhelper.net/the-respiratory-system-structure-and-function/>
<https://www.youtube.com/watch?v=lr5dDmTASos>
<http://www.healthline.com/human-body-maps/respiratory-system>
<http://www.md-health.com/Function-Of-Organs-In-Respiratory-System.html>
<http://www.newhealthadvisor.com/Anatomy-of-Respiratory-System.html>
<http://www.nursingtimes.net/clinical-subjects/respiratory/the-respiratory-system-part-1-nose-pharynx-and-larynx/203216.fullarticle>
https://www.youtube.com/watch?v=kZzn_8ztPMA
https://www.youtube.com/watch?v=GD-HPx_ZG8I

Now complete the following table – you can extend it as necessary

Part of respiratory system	Structure	Function
Nasal cavity		
Pharynx		
Epiglottis		
Larynx		
Trachea		
Lung		
Bronchi		
Bronchioles		

Now use the information in your table to create a power point presentation which describes the **structure and function** of the respiratory system. Use a maximum of eight slides and remember to **use your own words**.



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Control mechanism for respiration

Breathing is an involuntary process controlled by a region of the brain called the medulla.

The control of respiration is partly chemical and partly nervous.

The respiratory centre within the medulla transmits regular nerve impulses to the diaphragm and intercostal muscles to cause inhalation. Stretch receptors in the alveoli and bronchioles detect inhalation and send inhibitory signals to the respiratory centre to cause exhalation. This negative feedback system is continuous and prevents damage to the lungs. The main chemical factors that influence the respiratory centre in the brain are amount of CO_2 and O_2 in the blood. Within the carotid artery in the neck there are cells called chemoreceptors which are sensitive to excess carbon dioxide and a lack of oxygen. When these cells are stimulated, messages are sent to the respiratory centre in the medulla oblongata to stimulate breathing. The rate of cellular respiration varies with level of activity. Vigorous exercise can increase by 20 to 25 times the demand of the tissues for oxygen. This is met by increasing the rate and depth of breathing. The most important stimulus to respiration is when there is too much CO_2 in the blood.

Activity

Create a PowerPoint presentation of no more than five slides which explains in your own words the control mechanism of the respiratory system. You can embed clips from you tube or elsewhere and images to support your presentation but you **must be able to explain them fully in your own words.**

You may find the following links useful:

<http://www.nursingtimes.net/clinical-subjects/respiratory/physiology-for-practice-the-mechanisms-controlling-respiration/205048.fullarticle>

<https://www.youtube.com/watch?v=9j6BpanhpKY>

https://www.youtube.com/watch?v=_BFDgTci0ck

https://www.youtube.com/watch?v=GD-HPx_ZG8I



How behaviours can help maintain the health of these two body systems

Healthy behaviours are very important in maintaining the health of the circulatory and respiratory systems. To this end, individuals are advised to avoid drinking too much alcohol, smoking and taking drugs. They are also advised to have a healthy diet and to exercise regularly in order to maintain a healthy body mass index.

Activity

Individually, research the potential impact of an unhealthy lifestyle on the circulatory and respiratory systems. For example, how does smoking affect the two body systems? Share your information in a group



Monitoring physiological status

Use the Fact File – A2 9 Body Systems and Physiological Disorders

Complete the activities in the Fact File and discuss your results with your teacher.

Physiological disorders

Physiology refers to tissue, organ and cellular functioning within the human body. A healthy body has normal physiology, whereas human disease manifests in a deviation of normal physiology – this is where some aspect of the body fails to function as it should. Normal physiology can be disrupted in a number of ways and for a number of reasons and when it happens – the result is disorder.

In this unit you are required to provide a written report, based on individual research, of a physiological disorder, using primary and secondary sources or secondary sources only.

Task E. You are required to describe the physiological disorder and the methods used to diagnose it, analyse the treatments available, the care pathways and practitioners involved and discuss the limitations of the diagnostic process and treatment (1200 words)

Task F. analyse the possible effects of the disorder on individuals (1000 words)

When selecting a physiological disorder to examine you need to consider that the disorder has sufficient depth in order for you to address all relevant assessment tasks.

The following links may be useful to assist with the selection of a physiological disorder for investigation including the tests conducted to confirm a diagnosis of the disorder.

<http://www.parkinsons.org.uk/content/about-parkinsons>

<https://www.mssociety.org.uk>

<https://www.stroke.org.uk/>

<http://www.nhs.uk/conditions/stroke/Pages/Introduction.aspx>

<http://www.epilepsysociety.org.uk/>

<http://www.cancerresearchuk.org/>

<http://www.nhs.uk/>

<http://www.crohnsandcolitis.org.uk/about-inflammatory-bowel-disease/crohns-disease>

<http://www.nhs.uk/conditions/brain-tumours/pages/introduction.aspx>

<http://www.cancerresearchuk.org/about-cancer/type/brain-tumour/>

<http://www.nhs.uk/Conditions/Kidney-disease-chronic/Pages/Introduction.aspx>

<https://www.diabetes.org.uk/>

<http://www.nhs.uk/Conditions/Diabetes/Pages/Diabetes.aspx>

<http://www.arthritisresearchuk.org/arthritis-information/conditions/arthritis.aspx>



<http://www.nhs.uk/Conditions/Arthritis/Pages/Introduction.aspx>
<http://www.cancerresearchuk.org/about-cancer/type/bowel-cancer/>
<http://www.nhs.uk/conditions/Cancer-of-the-colon-rectum-or-bowel/Pages/Introduction.aspx>

Diagnostic techniques

Following examination by a medical professional, a number of diagnostic techniques may be conducted to confirm a suspected disease. For example, a doctor may request a magnetic resonance imaging (MRI) scan. This type of scan, which uses a combination of magnetic fields and radio waves to produce detailed images of the selected body organ in superb detail, can be used on any part of the body including the liver, kidneys, breasts, brain bones and even blood vessels.

If this diagnostic technique can be used to diagnose the physiological disorder you have selected then you can visit the following website to find out more about how an MRI scanner works to provide the information needed for a diagnosis.

<http://www.nhs.uk/conditions/mri-scan/pages/introduction.aspx>

Results of diagnostic techniques are used by comparing what is normal with the result obtained and this then facilitates a diagnosis. For example when blood is tested for the presence of sugar, the normal range is considered to be 4.0 to 5.9 millimoles of glucose per litre of blood (mmol/L) therefore, results outside this range may indicate a possible diagnosis of diabetes which is a condition characterised by an inability to regulate blood sugar levels.

Find out more about how blood tests are used to diagnose diabetes by clicking on the link below.

<https://www.diabetes.org.uk/Guide-to-diabetes/Monitoring/Testing/>

An Electro Cardio Gram (ECG) produces a tracing of the heart beat and can be used by doctors to help diagnose cardiac conditions such as coronary heart disease or arrhythmias. The tracing can reveal where the heart's blood supply is blocked or interrupted due to the build-up of fatty substances or where a heartbeat is too fast or too slow. ECGs are often used in conjunction with other tests to diagnose cardiac abnormality.

Find out more about how ECGs are used to diagnose cardiac problems by clicking on the link below

<http://www.nhs.uk/Conditions/electrocardiogram/Pages/Introduction.aspx>



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Urine tests are very useful in assisting in the diagnosis, monitoring and treatment of a wide range of physiological disorders.

Urine can be tested while you wait in a doctor's surgery and although it is normally sterile, bacterial or yeast infections may be detected in a urine sample. Results of urinalysis can show a range of abnormal products including sugar, protein, or blood. Even the appearance of the urine, such as cloudiness or colour, or its smell, can give information to health professionals about a wide range of health problems.

A urine test is quick to administer and is a relatively cheap test which provides potentially significant information for doctors. For example a urine test which shows blood in the urine may indicate the presence of disease in the urinary system, while sugar in the urine may be an indicator of diabetes. The presence of protein in the urine may be an indicator of the early signs of kidney damage as a result of chronic diabetes. More detailed laboratory biochemical analysis of urine can assist in the diagnosis of kidney stones, myeloma and bladder cancer.

Depending on what the urine is being tested for the sample may need to be collected at a certain time e.g. first thing in the morning alternatively it may be necessary for a whole day's urine to be collected, measured and tested.

Find out more about what urine can tell doctors by visiting the following websites
<http://www.netdoctor.co.uk/procedures/examinations/a3028/urine-test/>
<https://labtestsonline.org/understanding/analytes/urinalysis/tab/test>
<https://www.diabetes.org.uk/Guide-to-diabetes/Monitoring/Testing/>

Treatment

The treatment for any physiological disorder is dependent on a number of factors including the age, gender and general health status of the individual. Treatment for a disorder should, as far as possible, take into consideration the holistic well-being of the individual. For example, the treatment for type 1 diabetes should include insulin medication, regular monitoring of blood sugar levels as well as education on lifestyle changes.

The following websites may be useful in supporting your understanding of the treatment available for the physiological disorder you have selected.

<http://www.cancerresearchuk.org/about-cancer/cancers-in-general/treatment/>



<http://www.nhs.uk/Conditions/Diabetes-type1/Pages/Treatment.aspx>
<http://www.nhs.uk/Conditions/Crohns-disease/Pages/treatment.aspx>
<http://www.arthritisresearchuk.org/arthritis-information/conditions/arthritis/treatments.aspx>
<http://www.nhs.uk/Conditions/Epilepsy/Pages/Treatment.aspx>
<http://www.nhs.uk/Conditions/Stroke/Pages/treatment.aspx>
<http://www.cancerresearchuk.org/about-cancer/type/brain-tumour/treatment/>
<http://www.nhs.uk/conditions/Multiple-sclerosis/Pages/Treatment.aspx>
<https://www.mssociety.org.uk/what-is-ms/treatments-and-therapies>
<http://www.parkinsons.org.uk/content/treatments-and-therapies-parkinsons>

Care pathways

A care pathway can be described as the care required by an individual or a group of individuals with a specific disorder over a specific time period. The aim of a care pathway is to ensure the provision of quality care by improving outcomes, promoting safety, increasing service user satisfaction, and maximising available resources.

Care pathways involve clearly identified practitioners from the primary, secondary and tertiary care sectors as well as services provided by the statutory, private, voluntary and informal sectors.

Care pathways for dealing with all physiological disorders are identified by NICE. You can find out about the appropriate care pathway for the disorder you have selected by clicking on the link below and then select your disorder. You should investigate the process involved in the diagnosis, treatment and management of the physiological disorder you have selected. You can use this information to help you to identify all practitioners involved in the care pathway relevant to your selected disorder.

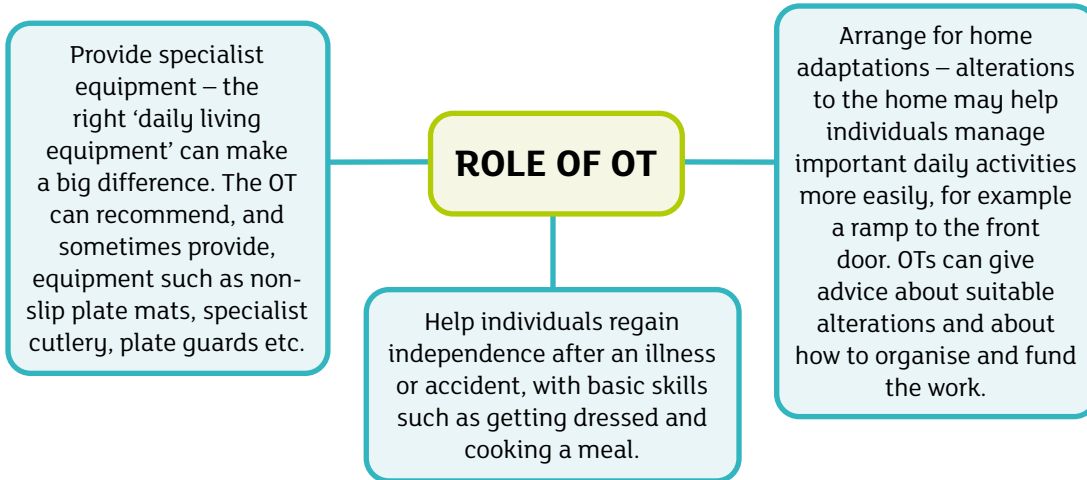
<https://pathways.nice.org.uk/>

Practitioners

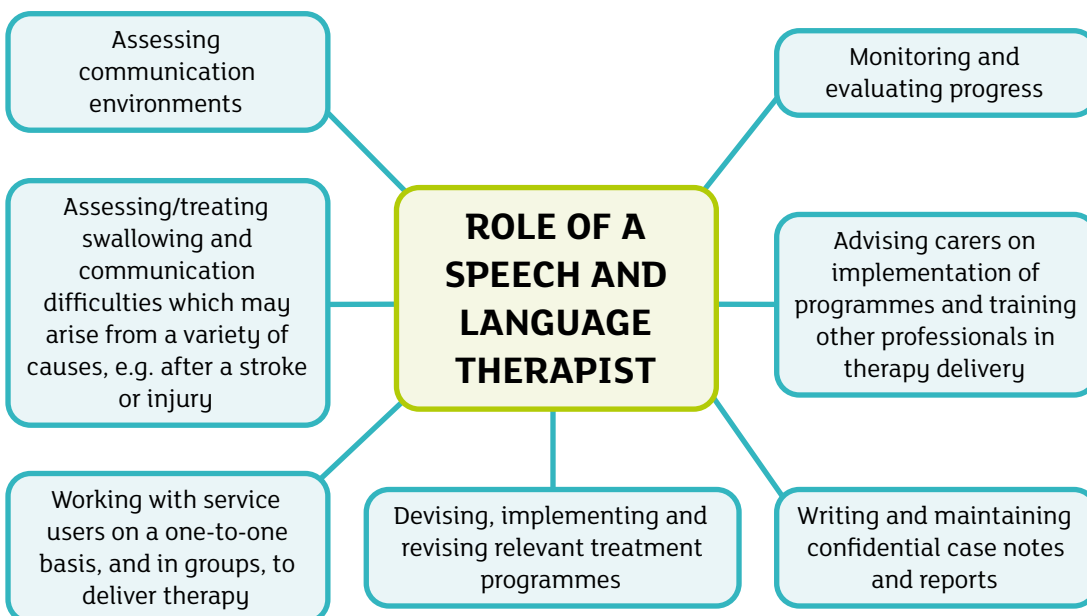
A wide range of health and social care practitioners provide invaluable care and support for the whole range of service user groups. The role they play is crucial in supporting service users to maintain their independence, preserve their dignity and meet their physical, intellectual, emotional and social needs. The roles and responsibilities of professionals vary widely and it is important to understand the role they play in supporting service users.

Some of the practitioners who support service users.

Occupational Therapists (OTs) can visit service users in their own homes to look at problems they may be experiencing in the home and to help find solutions. They are trained to help find different, easier ways of doing things. OT's also;



Speech and language therapists (SLTs) work closely with those who have various levels of speech, communication or swallowing difficulties perhaps as a result of stroke or brain injury. The SLT assesses needs and identifies problems before developing individual treatment programmes to enable maximum benefit for a service user. Treatment plans also involve those with whom the service user has a close relationship, including family and carers. A speech and language therapist usually works as part of a multidisciplinary team, alongside other health professionals, such as doctors, nurses, physiotherapists and occupational therapists.





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Activity

This activity is designed to support your understanding of the roles and responsibilities of a range of health and social care practitioners and ways they support a service user with the disorder you have selected.

Log on to the following website to investigate the range of careers relevant to working in the health and social care sector.

<http://www.nidirect.gov.uk/careers-in-health-and-social-care>

Create a spider diagram for each practitioner involved in the care pathway for an individual diagnosed with the disorder you have selected. The spider diagrams should explain how the practitioner supports the individual.

Activity

For a selected physiological disorder create your own spider diagrams to address the following questions in relation to the disorder selected.

- Symptoms of disorder
- Tests to diagnose disorder
- Treatments available for disorder
- Care pathway for the disorder
- Professionals involved in care pathway
- Support services available for individuals with this disorder

You should then create a PowerPoint presentation using not more than 10 slides which briefly describes:



- the physiological disorder;
- the tests conducted to confirm the diagnosis showing normal/ abnormal results;
- treatments available;
- care pathways;
- professionals involved and
- support services available.



Effects of the disorder or illness on individuals



The way in which a physiological disorder impacts upon individuals is dependent on a wide range of factors including age, gender, extent and severity of disorder and level of support available. The diagnosis of a physiological disorder can be extremely difficult for some people while others appear to take it in their stride. More often than not, the diagnosis of any physiological disorder will mean at least some, which again will vary depending on factors such as those identified previously i.e. work, income, leisure, diet, education and relationships.

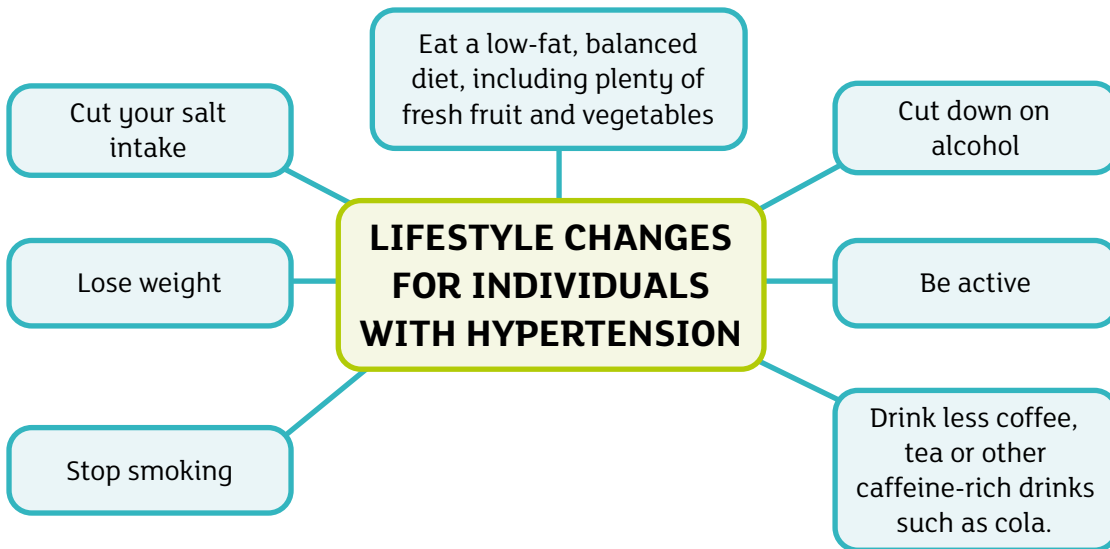
Activity

Visit the following web page

<http://www.nhs.uk/Conditions/Kidney-disease-chronic/Pages/Peters-story.aspx>

and read Peter's story. Create a spider diagram showing the potential effects of Peter's diagnosis, using some of the examples listed in the unit specification.

Lifestyle choices such as dietary habits can be affected by the diagnosis of a physical disorder such as hypertension. Individuals who are diagnosed with hypertension will be given medication but they will also be advised to make the following lifestyle changes.



Some or all of these changes may be difficult for an individual to achieve and often success in implementing such changes is influenced by other factors including personality type, the level of support available from family and professionals and the motivation and determination of the individual. The ability to make long term lifestyle changes varies from person to person. Some individuals will undoubtedly have greater success in making changes than others. For example being diagnosed with diabetes in early childhood may mean that lifestyle choices are appropriately directed from an early age and so the young child may adjust very well whereas those who are diagnosed with diabetes as teenagers or adults may find lifestyle changes very difficult to make due to the habits they have developed. Similarly, individuals diagnosed with CHD may find lifestyle changes such as incorporating exercise into their lives or reducing intake of saturated foods very challenging.

Activity

Consider the physiological disorder that you have selected and identify how an individual is likely to be affected. The following prompts may be useful;

- Is the individual's ability to **work** affected by the diagnosis of the disorder selected? If so, why is this case? Is it due to the disorder itself or linked to medication or treatments? How might this affect their **income**?
- Are **leisure activities** affected? Will there be changes in where, when, or how the individual socialises? Is going on holiday affected by being diagnosed with this disorder? Will individuals diagnosed with this disorder need to make changes in their lifestyle to incorporate exercise?
- Will the individual need to make changes to his or her **diet** as a result of the diagnosis?
- **Education** – How might **education** be affected? Consider absence from school or university and how this might impact on the individual
- **Relationships** – how might a diagnosis impact on **relationships** with others? Consider how family relations might be affected including relationships between children and parents and between partners. Does the disorder impact on emotional well-being and does this in turn impact on relationships like friendships? Is there a risk of them becoming withdrawn?
- Will an individual have to make other changes like giving up smoking or alcohol as a result of a diagnosis of the selected disorder?
- Is the individual's affected more if he or she lives alone with little support? Is it easier for those who live with a significant other or as part of a family to make adjust?

**Top tip**

You may find that websites you accessed earlier (when describing the disorder and explaining the treatment available) are useful in helping you to understand the impact of the selected disorder on individuals.

For example the following web page provides information on the impact of a diagnosis of chronic kidney disease, such as Peter's in the case study earlier.

<http://www.nhs.uk/Conditions/Kidney-disease-chronic/Pages/living-with.aspx>