

Facts	Ideas	Learning issues	Actions
A 23-year old man	<p>The age factor</p> <p>Metabolic rate is influenced by many factors including age, gender, muscle-to-fat ratio, amount of physical activity and hormone function</p> <p>Metabolism slows with age due to loss of muscle tissue, but also due to hormonal and neurological changes</p> <p>Food intake by calories also effect a man metabolism.</p>	<p>1) Do the metabolic rate refers to the amount of energy in human body?</p> <p>2) Is it possible to fix a slow metabolism? If so, what are the ways to treat them?</p> <p>3) Does metabolic rate depend on the amount of physical activities done by a person?</p>	<p>1) Yes, because metabolic rate refers to the total energy expenditure. It describes the speed at which reactions occur and can be expressed in terms of energy use per unit of time. The metabolic rate similar as the amount of energy required to keep your body alive and functioning on a daily basis.</p> <p>2) Yes, it is possible by:</p> <ul style="list-style-type: none"> - Taking a solid 8 hours of sleep. The hormones in the body are well-balanced which in turn increasing the metabolism. Cortisol is decreased whereas testosterone is increased - Drink plenty of water. Metabolic rate can be increased by 30 percent by drinking at least 500 mL of water. Other than that, it helps to increase the lipids mobilization through stimulation of beta-adrenoreceptros. - Meditate. The stress hormone in the body, which is cortisol can be greatly reduced, thus metabolism can be improved in the body since cortisol is responsible in degrading metabolism. <p>3) Yes, because metabolic rate can be defined as how much energy or calories we burn in a day. On top of that, the amounts of kilojoules of your body fats burn at any given time will give effects to the metabolic rates. To have better metabolic rate, cardiovascular activities that will help in expend more energy and calories burning per workout. Therefore</p>
A man developed an irregular heart rhythm	<p>A man faced with heart disease.</p> <p>A man have a weak cardiovascular system</p> <p>A man has unstable blood pressure.</p>	<p>1) What is the normal heart rate?</p> <p>2) What are the factors that cause irregular heart rhythm?</p>	<p>1) The normal heart rate for adults lies around the range of 60 – 100 beats per minute. Lower heart rate is better than high heart rate because it indicates the efficiency of heart function and a good cardiovascular function work well. Apart from that,</p>

		<p>3) What is the medication to treat unstable blood pressure?</p> <p>4) What is the correct blood pressure rate for a healthy heart rate?</p> <p>5) What are the symptoms of irregular heart rhythm?</p> <p>6) What are the potential types of heart disease faced?</p>	<p>Well-trained athlete whose mostly have heart rate around 40-50 beats per minute which consider as good heart rate.</p> <p>2) There are several factors that cause irregular heart rhythm including Coronary artery disease, electrolyte imbalance in blood (like sodium or potassium), change to heart muscle (such as cardiomyopathy), injury from heart attack, diabetes and sleep apnea.</p> <p>-Besides, irregular heart rhythm also develops from different factor. For instance, drinking too much alcohol, drug abuse, smoking, stress or anxiety and genetics.</p> <p>3) There are several types of medication to control this unstable heart rate which is antiarrhythmic drugs, calcium channel blocker, beta blocker and anticoagulants.</p> <p>- Antiarrhythmic drugs Prescribed for patients which have very fast heart rate or called tachycardia. These medication works to correct the rhythm of heart rate as they will restore the heart rate to normal rhythm using electric current that make a changes of heart rate.</p> <p>- Calcium channel blocker These drugs are formulated to dilate the blood vessel so that the blood can flow in high amount to our heart. This condition will decrease our blood pressure to normal then ease the chest pain. As the blood pressure decrease, the heart rate also decreases and finally results in reducing risk of arrhythmia (unstable heart rate).</p> <p>- Anticoagulants this medication helps to reduce the blood clots as this problem also related to arrhythmias.</p> <p>4) The normal blood pressure rate is 120/80 mmHg or less. Elevation in blood pressure diagnoses hypertension.</p>
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Complained lethargy, tremor of hands and arms	Most common occur among middle-aged and older adults, although it can occur at any age	<p>1) What causes lethargy and tremor?</p> <p>2) Does lethargy affect the heart rhythm, and does it associate with metabolism?</p> <p>3) Why does the tremor of hands and arms happen?</p> <p>4) How does tremor is identified?</p>	<p>1) Lethargy: Many kinds of illnesses can lead to lethargy which include flu or stomach virus.</p> <p>-Other physical or medical conditions can cause lethargy such as carbon monoxide poisoning, dehydration, fever, hyperthyroidism, hypothyroidism, brain swelling, kidney failure, Lyme disease, meningitis, nutrition deficiencies, sleep apnea and stroke.</p> <p>- Lethargy also can be the result of mental health condition which include in major depressive disorder, postpartum depression and premenstrual syndrome. Taking certain medication for example narcotics also can be the causes of lethargy.</p> <p>Tremor: -Tremor is an involuntary, somewhat rhythmic, muscle contraction and relaxation involving oscillations or twitching movements of one or more body parts.</p> <p>- Tremors can be caused by a variety of things such as prescription medications, diseases, injuries, and caffeine. The most common causes of tremors are muscle fatigues, ingesting</p>

			<p>too much caffeine, stress, aging and low blood sugar levels.</p> <p>-Some tremors can cause by medical conditions such as stroke, traumatic brain injury, Parkinson's disease whereas it is a degenerative disease caused by loss of dopamine-producing brain cells, multiple sclerosis, alcoholism and hyperthyroidism which is a condition that our body produces too much thyroid hormone.</p> <p>2) Yes, because extreme fatigue feeling also can be relate to the heart problem in which leads to a condition where the heart is not function well and distract the pumping blood progress. It also called coronary artery disease. Slower metabolism also can cause lethargy.</p> <p>-If our thyroid gland is underactive, the metabolism may slow down so much that our body does not burn fat fast enough to give us energy. This is the common condition, but it also can happen after radiation therapy to the lymph nodes in the neck.</p> <p>3) Tremor of hands and arms happen when an involuntary, rhythmic muscle contraction causes the shaking. Tremors can also occur in arms, head, vocal cords, torso, and legs. A person may have difficulty in holding using utensils. Resting tremors occur when muscles relax, such as when hands are resting on the lap.</p> <p>4) -Doctors will observe the affected area. Tremors are apparent upon visual inspection. However, the cause of the tremor can't be diagnosed until further tests performed such as requesting patient to write or hold an object to evaluate the severity of his tremor.</p> <p>- Other than that, blood and urine samples are collected to check for signs of thyroid disease or other medical conditions.</p>
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			-The doctor may order a neurological exam. This exam will check the functioning of your nervous system. It will measure tendon reflexes, coordination, posture, muscle strength, muscle tone, and ability to feel touch.
Complained about anxiety, sweating and hunger	<p>A man faced with serious health problems</p> <p>Anxiety disorders form a category of mental health diagnoses that lead to excessive nervousness, fear and apprehension</p>	<p>1) Why does the anxiety occur with the other symptoms?</p> <p>2) How does metabolism cause hunger?</p>	<p>1) Mainly associates with an acute increase in epinephrine which contributes to neuropsychiatric symptoms including anxiety and symptoms associated with anxiety such as shakiness, sweating, and heart palpitations. The lack of tyrosine and tryptophan leads to deficiencies of the respective neurotransmitters and has been associated with psychiatric disturbances</p> <p>2) -Insulin is produced by the pancreas where it functions to maintain energy balance and is extremely sensitive to dietary sugar and carbohydrate consumption. When we eat, the digestive systems will play the role to break down the carbohydrates into glucose, but when do not consume food, low blood sugar and low insulin levels stimulate hunger.</p> <p>-As we eat, insulin levels rise signaling the body that energy in the form of glucose is available. The body's cells absorb glucose from the blood stream. Excess glucose is converted to fat and stored as body fat. When insulin levels are high, dietary fat and cholesterol are also stored.</p>
Biochemical investigation on blood revealed blood sugar levels is 2.7 mmol/L.	<p>Normal blood sugar level is from 4.0 to 7.8 mmol/L</p> <p>Activity of the sympathetic nervous system occurs in response to a fall in blood sugar</p> <p>An abnormally low blood sugar level (glucose) is called as Hypoglycemia</p>	<p>1) What are the normal blood sugar level?</p> <p>2) What are the symptoms of low blood sugar?</p> <p>3) How to maintain optimum blood sugar level?</p> <p>4) What are the processes of metabolism?</p>	<p>1) Normal blood sugar levels are between 4.0 to 5.4 mmol/L (72 to 99 mg/dL) when fasting and up to 7.8 mmol/L (140 mg/dL) 2 hours after eating.</p> <p>2) Symptoms of hypoglycaemia are hunger, rapid heartbeat, sweating, sudden nervousness and anxiety and shaking.</p> <p>3) It is recommended to divide a normal food plate (23cm in diameter)</p>

	<p>Hypoglycemia is not a disease, but it can indicate a health problem.</p> <p>The chemical process in the body leads to the normal functioning of people metabolism</p>	<p>5) How does hypoglycaemia occur?</p> <p>6) What are the processes involved in glycolysis?</p> <p>7) What are the processes that occurs in Krebs cycle?</p> <p>8) What are the processes involved in electron transport system?</p>	<p>into a quarter of rice (carbohydrates), a quarter of meat (protein) and a half plate of vegetables. A quarter portion will be equivalent to each person's palm size. This is a stable diet and is suitable for everyone.</p> <p>-For those who need to control their weight, it must be tailored to cut down on sugars and carbohydrates. Apart from that, exercise helps control body weight. Hence, there's less of an issue with insulin resistance. An ideal body weight helps control blood sugar levels better. Exercise 150 minutes per week and ensuring adequate daily vegetable and fruit intake is necessary.</p> <p>- Take three servings of fresh fruit each day, preferably not juice but whole fruits with different colours and types of vegetables and fruits.</p> <p>4) Functions of metabolism can be divided into four basic functions which includes in obtaining energy for the cell, converting nutrients into macromolecules, assembling macromolecules into cellular structures, and degrading macromolecules as for biological functions.</p> <p>-They are divided into two categories namely catabolism and anabolism. Catabolism refers to the breakdown of molecules to obtain energy whereas anabolism refers to the synthesis of all compounds needed by the cells.</p> <p>-Enzymes are vital in metabolic pathways and was used to produce a specific product through its series of connected enzymatic reactions in sequential steps.</p> <p>-Organelles are used to compartmentalize metabolic pathways allowing different metabolic pathways to occur in specific locations. thermodynamics also plays a big role in metabolism as they predict if a process is possible. They also provide</p>
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			<p>a mean to quantitatively describe energy changes in biological reactions where the thermodynamic parameter used is free energy (ΔG).</p> <p>5) - Generated by mechanisms directly related to an increase in insulin secretion, by metabolic disorders that require increased glucose consumption or by a deficient metabolic production of glucose by the body.</p> <p>-Hypoglycaemia can also occur in nondiabetic and diabetic person.</p> <p>- For nondiabetic person, hypoglycaemia is occur due to our bad habit. For instance, the chronic and excessive intake of alcohol produces metabolic alterations in the liver that lead to decrease the synthesis and release of glucose from the liver to the blood and therefore a decrease in blood sugar.</p> <p>- For diabetic person, hypoglycaemia is the common for type 1-diabetes and type-2 diabetes. One of the most common causes of hypoglycemia in diabetics occurs as a result of the excess administration of insulin or oral hypoglycemic drugs.</p> <p>- Patients suffering from diabetes mellitus type 1 and whose treatment is based on the exogenous administration of insulin must previously corroborate the level of glycaemia and then adjust the amount of hormone to be consumed, considering that 100% of the dose which is approximately half of it is used to immediately regulate the metabolism of carbohydrates and the other half is to cover the metabolism at night or fasting hours.</p> <p>-Therefore, the amount of insulin provide is higher than required, and if the necessary precautions are not taken, there is a high probability that the dose provided will produce a strong</p>
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		<p>hypoglycemia, especially during sleep hours, known as the Somogyi effect.</p> <p>6) Glycolysis is the metabolic pathway that converts glucose $C_6H_{12}O_6$, into pyruvate.</p> <ul style="list-style-type: none"> - The free energy released in this process is used to form the high-energy molecules ATP (adenosine triphosphate) and NADH (reduced nicotinamide adenine dinucleotide). Glycolysis is a determined sequence of ten enzyme-catalyzed reactions. The intermediates provide entry points to glycolysis. - Glycolysis is an oxygen independent metabolic pathway, meaning that it does not use molecular oxygen such as atmospheric oxygen for any of its reactions. However, the products of glycolysis (pyruvate and NADH and H^+) are sometimes metabolized using atmospheric oxygen. When molecular oxygen is used for the metabolism of the products of glycolysis the process is usually referred to as aerobic, whereas if no oxygen is used the process is said to be anaerobic. - The glycolysis take place in the cytosol of the cell. - Hexokinase: Inhibited by glucose-6-P (product inhibition) -Phosphofructokinase: Inhibited by ATP and citrate, which signals the abundance of citric acid cycle intermediates. It is also inhibited by H^+, which becomes important under anaerobiosis, the lactic fermentation produces lactic acid, resulting on a lowering of the pH. Probably this mechanism prevents the cell from using all its ATP stock in the phosphofructokinase reaction, which would prevent glucose activation by hexokinase. It is stimulated by its substrate of fructose-6-phosphate, ADP, which signal the lack of available energy.
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			<ul style="list-style-type: none">-Pyruvate kinase: Inhibited by ATP, alanine, free fatty acids and acetyl-CoA. Activated by fructose-1,6-bisphosphate. - Firstly, it starts with the molecule of glucose that enter the cytosol. This reaction takes place from the conversion of glucose into glucose-6-phosphate. The enzyme that catalyses this reaction is hexokinase. - Hexokinase transfer a molecule of phosphate from ATP to glucose and convert glucose into glucose-6-phosphate. In this reaction ATP is converted into a molecule of ADP. Hence, it utilizes one molecule of ATP. - Fructose-1,6-bisphosphate is split into two which is glyceraldehyde-3-phosphate and dihydroxyacetone-phosphate. - Glyceraldehyde-3-phosphate and dihydroxyacetone-phosphate that actually isomers and can be converting into each other by the enzyme called as isomerase. The glyceraldehyde-3-phosphate is further utilized in this process of glycolysis that equilibrium of this isomerization reaction is always to a glyceraldehyde-3-phosphate. - The molecule of glyceraldehyde-3-phosphate is converted into 1-3-bisphosphoglycerate. This involve the addition of phosphate group at the first position of the phosphoglycerate. - The coenzyme of NAD is reduced to NADH which is further utilize in the electron transport chain to produce more energy also this reaction utilizes a molecule of inorganic phosphate (PO₄). - Then the 1-3-bisphosphoglycerate is then converted into 3-phosphoglycerate by the enzyme of phosphoglycerate kinase.
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		<p>and yields one ATP for every succyl-CoA.</p> <p>-Fumerate is produced from succinate by succinate dehydrogenase and FAD⁺ is reduced to FADH₂. Succinate dehydrogenase is electron carrier II and linked to electron transport chain.</p> <p>-Fumerate is converted into malate by hydration of enzyme fumarase. Malate is then converted into oxaloacetate by malate dehydrogenase and NADH is the byproduct.</p> <p>8) Electron transport chain is the chain of enzyme, which is located in the inner mitochondrial membrane also the main source of energy in an aerobic pathway energy chain reaction.</p> <p>- The inner mitochondria membrane contains 4 set of enzyme complexes which are indicate as I, II, III, IV. The matrix of the mitochondria also contains numerous other cycles like Kreb cycle and beta-oxidation.</p> <p>- In the cycle of kerb cycle and beta-oxidation, the cycle will produce reducing molecules of NADH and FADH₂. These reducing molecules contain electron, which are donated to electron transfer chain (ETC) set of enzyme complexes.</p> <p>-The electron then travels from the first (I) to the fourth (IV) enzyme complexes. And in this movement, energy is generated. This energy is utilised in coupling hydrogen ion into the intermembrane space from the matrix of mitochondria.</p> <p>- This continuous coupling of hydrogen ion into the intermembrane space causes the generation of higher concentration of hydrogen ion in the intermembrane space as compared to the matrix of the mitochondria. This generates the positive charge in the intermembrane space and the negative charge in the matrix of mitochondria.</p>
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		<p>-The hydrogen ions cannot cross against the electrochemical gradient because the inner mitochondrion membrane is non-permeable to ions. Thus, it requires a special transporter. The enzyme ATP synthase are come to play. That enzyme transport the hydrogen ions into the matrix of the mitochondria and uses the energy generated from the flow of hydrogen ion to phosphorylate adenosine diphosphate (ADP) to adenosine triphosphate (ATP).</p> <p>- The complex I of the ETC are known as NADH dehydrogenase complex also known as NADH Oxido-reductase. The first complex is the L shaped protein complex which is present in the inner mitochondria membrane. It has two arms where the vertical arm are located inside the inner mitochondria membrane while the horizontal arm is located inside the matrix of the mitochondria.</p> <p>- The complete way is the NADH Dehydrogenase complex because the meaning of dehydrogenase is the removal of hydrogen. Thus, the hydrogen removes from the NADH. It is called as complex because it contains (Flavin mononucleotide) FMN and (iron sulphur) FE.S. compound. It also called as oxidoreductase because dehydrogenation is an example of oxidation-reduction reaction. The main job of this complex is to receive electron from NADH at transport at further to the electron transport chain.</p> <p>- The complex II are known as succinate dehydrogenase complex. It is called as dehydrogenase because it remove the hydrogen from compound. In this case, it will remove hydrogen from the succinate and oxidize into fumarate which is the step of kerb cycle and similarly called as complex because it contains SDH and FE.S</p>
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		<p>clusters in addition to the succinate dehydrogenase.</p> <p>-The second complex is about of kerb cycle which catalyses the reaction from oxidation of succinate to fumarate. In this reaction the reducing FADH₂ is produced which is utilise for the electron in the electron transport chain.</p> <p>-The complex III in the electron transport chain is called as cytochrome reductase which also known as Q-cytochrome C oxidoreductase. The cytochrome are the group of protein, which have 'heme' as their complexes, iron core in which the ion exist in oxidize and reduce from the iron itself. The complex III contains three types of cytochrome, which are cytochrome B, C1 and C. The major role of the complex III is to accept electron from the electron transport chain and then transport it to the cytochrome C.</p> <p>-The cytochrome C then transport this electron to the complex IV of electron transport chain. The complex IV is called as cytochrome C oxidase. It is a 'heme' and copper units containing complex where the main job is to oxidize the cytochrome C that is to receive electron and then use the electron for the reduction of oxygen to water. Hence, it is called as cytochrome C oxidase.</p> <p>- Coupling between the oxidation of nutrients and the synthesis of high-energy compounds, particularly ATP, which works as the main chemical energy carrier in all cells.</p> <p>- ATP synthase complex synthesizes ATP, through which H⁺ protons return to the mitochondrial matrix.</p> <p>- Firstly, oxidative phosphorylation, the process by which ATP is synthesized from ADP and inorganic phosphate (Pi) that takes place in mitochondrion and second is the substrate-level phosphorylation, in</p>
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			<p>which ATP is synthesized through the transfer of high-energy phosphoryl groups from high-energy compounds to ADP. For overall, the transformation of the chemical energy of molecules into useful energy is strictly regulated, and several factors control the use of glucose, fatty acids, and amino acids by the different cells.</p>
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