Faculty of Resource Science and Technology (FRST)

STB 1083 Biochemistry

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Problem-based Learning 2

G04

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Discussion on PBL 2

Sii Ming Ming

Good afternoon to everyone. Based on the previous discussion, we had found out the facts and ideas according to the trigger. Today, we are going to discuss further about learning outcomes, and actions regarding to each fact and idea. For the first fact “23-years old man developed an irregular heart rhythm”, what is the learning outcomes?

Aneshaa Binti Chandrasekaran

I suggest that the learning issue can be “To discuss symptoms, causes, treatments, and ways to prevent irregular heart rhythm.”

Sii Ming Ming

Ok, how about the actions for the first idea “How to detect and diagnose irregular heartbeat?”.

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Irregular heartbeat can be detected and diagnosed by electrocardiogram, Holter monitor, stress test, and echocardiogram (Arrhythmia, 2020).

Aneshaa Binti Chandrasekaran

Yes, not only that, it can be also detected by the pulse check and smartphone heart rhythm apps (Dix, 2020).

Sii Ming Ming

Let us move to the second idea “What is the health condition of young adult?” Whitney, can you give some suggestion about this idea?

Whitney Shetha Anak Bujang

Young adults are expected to have a healthy heart condition with minimal chances of getting cardiovascular diseases.

Aneshaa Binti Chandrasekaran

The heart of normal young adult should beat with a regular rhythm, consisting of double "ba-bum" beats with even spaces in between each. A normal resting heart rate for adults' ranges from 60 to 100 beats per minute (Newman, 2020).

Whitney Shetha Anak Bujang

However, the range for a healthy resting heart rate varies between individuals.

Keith Isaac Anak Noni@Boni

How to say?

Whitney Shetha Anak Bujang

The fitter a person is accompanied with their lower resting heart rate. For example, olympic athletes will usually have a resting heart rate of less than 60 bpm, because their hearts are highly efficient (Newman, 2020).

Sii Ming Ming

For the third idea "What diseases related to irregular heart rhythm?", Mee Hui can you say something?

Wong Mee Hui

Irregular heart rhythm could be a symptom of heart arrhythmias.

Sii Ming Ming

Not only that, irregular heart rhythm could also be a sign of heart failure.

Whitney Shetha Anak Bujang

When the electrical impulses that coordinate heartbeats do not work properly, it causes heart to beat too fast, too slow, or irregularly. Generally, there are two types of arrhythmias: The first type of arrhythmias is Tachycardia. This refers to a fast heartbeat, which a resting heart rate more than 100 beats per minute. The second type of arrhythmias is Bradycardia. This refers to a slow heartbeat, which a resting heart rate less than 60 beats per minute (Heart arrhythmia - Symptoms and causes, 2020).

Sii Ming Ming

When should we be worried about irregular heartbeat?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

The patients are advised to go immediately for doctor or doing a check-up if they feel a slow or irregular heartbeat or notice pauses between heartbeats.

Aneshaa Binti Chandrasekaran

The patients are encouraged to visit a doctor when they notice the additional symptoms with irregular heartbeat or heart attack such as fainting, dizziness, chest pain, swelling in your leg or shortness of breath.

Sii Ming Ming

What are the causes of irregular heart rhythm?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

There are several causes of irregular heart rhythm such as coronary artery disease. Fat, cholesterol, and calcium build plaques in the arteries. These plaques make it difficult for blood circulation and force too much pressure on the heart. As the heart weakens, irregular heartbeats can develop. Coronary artery disease can cause dangerous arrhythmias like atrial fibrillation. It is a rapid heartbeat, which can lead to heart palpitations, blood clots, heart attack and stroke. Heart surgery also contribute to the irregular heart rhythm. Heart surgeries remove clots and help to save the life of patients. However, it changes the way of heart working, including the way of heart beats. Doctors will often monitor patient's heart after surgery as the risk of arrhythmias increases (AFib and normal sinus rhythm, 2020).

Pauline Poh Swee Ping

Low blood sugar and eating disorder can lead to irregular heart rhythm. Low blood sugar and eating disorder anorexia and bulimia causes electrolyte imbalance and severe malnutrition (Newman, 2020). Electrolytes are small traces of metal that conduct electricity, which allows the heart to beat. The way of heart beats changes when the electrolyte such

as sodium, magnesium, potassium, and calcium are in too high or too low level (AFib and normal sinus rhythm, 2020).

Sii Ming Ming

Unhealthy lifestyle such as stress, drinking alcohols and coffee, smoking, use of illegal drugs such as beta-blockers, amphetamines and cocaine are one of the causes of irregular heart rhythm (Macon, B. L., & Boskey, E. , 2020). They can cause the heart beats in excessive fast rhythm.

Whitney Shetha Anak Bujang

The patients who have an external trigger, such as a substance use disorder or an electric shock can be one of the factors of irregular heart rhythm. The electrical impulses do not travel through the heart correctly. This increases the risk of arrhythmia (Newman, 2020).

Sii Ming Ming

What are the treatments of irregular heart rhythm?

Keith Isaac Anak Noni@Boni

There are different types of treatments for different types and situation of irregular hear rhythm.

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Medication can help to treat irregular heart rhythm. For example, antiarrhythmics are drugs that are used to treat abnormal heart rhythms resulting from irregular electrical activity of the heart.

Aneshaa Binti Chandrasekaran

To treat fast heartbeats, cardioversion is a treatment that uses electricity to shock the heart back into a normal rhythm while the patients are anaesthetized or sedated. In addition, implantable cardioverter defibrillator (ICD) is a device similar to a pacemaker that monitors the heart rhythm and shocks the heart back into a normal rhythm whenever this is needed (Arrhythmia, 2020).

Whitney Shetha Anak Bujang

To treat slow heartbeats, implantation of pacemaker to stimulate heart to beat at a steady rate (Macon, B. L., & Boskey, E. , 2020). It is a small device which is usually implanted under the skin of chest or abdomen. If your heart rate is too slow or if it stops, it sends electric pulses to prompt the heart to beat at regular speed (Newman, 2020).

Pauline Poh Swee Ping

Changing the lifestyle, activity level or diet can help to treat the irregular heart rhythm. Eat heart-healthy foods such as vegetables and whole grains, exercise regularly, stress management, quit smoking and drink alcohol in moderation can reduce the effect of irregular heart rhythm (Arrhythmia, 2020).

Sii Ming Ming

Prevent is always better than cure. So, how can we prevent irregular heartbeat?

Keith Isaac Anak Noni@Boni

To prevent heart arrhythmia, it is very important to live a heart-healthy lifestyle to reduce your risk of heart disease. Limiting or avoiding caffeine and alcohol, staying physically active and keeping a healthy weight. Smoking is avoided. Be cautious when using over-the-counter medications such as some cold and cough medication, which contain stimulants that may trigger a rapid heartbeat. Stress management is encouraged to be done regularly because intense stress and anger can cause heart rhythm problems (Heart disease and abnormal heart rhythm (arrhythmia), 2020)

Sii Ming Ming

The second fact that we found in the trigger is “complained lethargy”. The first learning issue is to discuss symptoms, causes, treatments, and ways to prevent lethargy. The second learning issue can be “To differentiate between lethargy and fatigue.” Next, the third learning issue is to understand the relationship between low blood sugar level and lethargy. So, what are the signs of lethargy?

Wong Mee Hui

Lethargy can be diagnosed with several signs such as mood changes, decreased alertness or decreased ability to think, fatigue, low energy, sluggishness, chest pain, dizziness, change in appetite, and sneezing (Nall, 2020).

Sii Ming Ming

The patients may experience the signs of anxiety, shortness of breath, and irregular heart rhythm (Nall, 2020).

Aneshaa Binti Chandrasekaran

People with lethargy may act as if they are in a daze. They may move more slowly than usual.

Sii Ming Ming

But what cause the lethargy in human?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

There are many causes of lethargy. Heart and lung -related problems can be one of the causes of lethargy. Asthma, cardiomyopathy, which resulted from weakened or abnormal heart muscle function, chronic obstructive pulmonary disease (COPD), coronary artery, heart failure, heart valve disease, irregular heartbeat (arrhythmia) and pneumonia cause the lethargy (Staff, 2020).

Whitney Shetha Anak Bujang

Lethargy can also cause by psychosocial or neurological conditions such as depression, decreased motivation, inadequate sleep, overexertion, overworking, stress, and lack of exercise. Alcohol abuse, anxiety disorders, dementia, drug abuse, grief and changing in work shift contribute to the occurrence of lethargy (Staff, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

In some cases, lethargy may be a symptom of a life-threatening conditions and diseases that should be immediately evaluated in an emergency setting (Staff, 2020). These include

anemia, cancer, hemorrhage, leukemia, diabetes, exposure to environmental toxins or poisons, infections, malnutrition, low blood sugar level, kidney diseases and thyroid disorders can lead to lethargy (Staff, 2020).

Sii Ming Ming

Are there any treatments for lethargy?

Keith Isaac Anak Noni@Boni

The treatment for lethargy depends upon its underlying cause. Home remedies can be used as natural treatment for lethargy problems. Practicing healthy habits at home can reduce the fatigue related to lethargy. For example, the patients can drink plenty of fluids, eat a healthy diet, get plenty of sleep, and reduce stress levels (Nall, 2020).

Aneshaa Binti Chandrasekaran

However, make an appointment with your healthcare provider if these healthy habits don't help your symptoms.

Sii Ming Ming

Is there any difference between lethargy and fatigue? How can we differentiate both?

Keith Isaac Anak Noni@Boni

According to Encyclopedia Merriam-Webster, lethargy is a related term to fatigue. People who are experiencing fatigue or tiredness can also be said to be lethargic because of low energy (Stoppler, 2020). Based to Cambridge Dictionary, fatigue is defined as extreme tiredness whereas lethargy is defined as abnormal drowsiness.

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Let me make more explanation about these two. Fatigue is more alike lacking physical energy or stamina.in medical terms, it refers to the state of reduced capacity for work or accomplishment following a period of mental or physical activity (Stoppler, 2020). The inner state of fatigue is that you want to be active, you have no problem starting things, but you quickly run out of energy when there is any repetitively work for an extended period (Fatigue vs lethargy-What's the difference? , 2020). For instance, you are participating a

marathon, but you quickly feel weak and exhausted a few minutes later. Therefore, the feeling of fatigue is “I wish I could, but I feel like I can’t”. However, lethargy is losing of motivational force. The inner state of lethargy is that you have difficulty initiating new activity (Fatigue vs lethargy-What's the difference? , 2020). The associated feeling is “I probably could but I don’t feel like it”.

Sii Ming Ming

When should we seek medical treatment for lethargy?

Pauline Poh Swee Ping

Patients need to seek medical treatment immediately when the symptoms come suddenly, for instance chest pain, unresponsive or minimal responsive, paralyzed on one side of limb or face, disorientation, fast heart rate, loss consciousness, rectal bleeding, severe headache, shortness of breath, and vomiting blood (Nall, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Not only that, the changes in behavior with suicidal thought along with lethargy are serious too. Most importantly, seek immediate medical attention if you are experiencing any thoughts of harming yourself along with lethargy.

Keith Isaac Anak Noni@Boni

If you experience eye irritation and fatigue that lasts longer than two weeks, especially when there are prolonged aches and pain, insomnia, non-tolerant to extreme temperature changes, feeling sad and irritated, swollen neck glands and sudden weight change (Nall, 2020). This is also a sign that body gives you to seek for medical help as soon as possible.

Sii Ming Ming

Therefore, how can we prevent to experience lethargy?

Aneshaa Binti Chandrasekaran

Stress management is very important to prevent lethargy. People can learn to relax and take away the stress and get a high-quality sleep to address mental health. We can introduce relaxing activities such as gym workout, yoga, listening to music or reading and even

spending time with friends to reduce stress. We can try to talk to psychological doctor for counselling or cognitive behavioral therapy (CBT) if facing any difficulties, which cannot be taking away easily. (Cronkleton, 2020)

Wong Mee Hui

Practicing a healthy lifestyle such as eat a balanced diet, get regular exercise, drink more water to get hydrated, ditch the alcohol, address allergies such as seafood, eggs, milks, soy, and flour, sit less, eat iron rich foods, and eat smaller meals than often. All these healthy practices can protect you from lethargy (Nall, 2020).

Keith Isaac Anak Noni@Boni

Even a single 15-minute walk can give you an energy boost, and the benefits increase with more frequent physical activity. People can start with a small amount of exercise and build it up gradually over weeks and months until they reach the recommended goal of 2.5 hours of moderate-intensity aerobic exercise, such as cycling or fast walking, every week (Self-help tips to fight tiredness, 2020). The Royal College of Psychiatrists recommends cutting out caffeine products such as coffee, tea, cola and energy drinks for 3-week period (Self-help tips to fight tiredness, 2020).

Sii Ming Ming

However, I think low blood sugar level is linked to lethargy. How low blood sugar level can lead to lethargy?

Whitney Shetha Anak Bujang

Food, which gives us energy, is broken down by the digestive system. Some elements, such as water, are absorbed through the stomach. The rest are absorbed through the small intestine. The body's preferred energy source is glucose, from carbohydrates. Glucose is delivered to virtually every cell in the body by the bloodstream and is then burned with oxygen to produce energy. Hormones control every step in this process. For example, the pancreas makes the hormone insulin, which helps to control blood sugar levels (Cronkleton, 2020). Insulin helps the body to turn blood sugar into energy. Insulin travels through the

blood to the cells to initiate the opening of cells for absorption of glucose. Once inside, the cells convert glucose into energy or store it to use later (How insulin works, 2020).

Sii Ming Ming

Skipping meals, some diabetes medications and poor nutrition can lower blood sugar. When the blood sugar level drops, the pancreas release glucagon. Glucagon instructs the liver to release glucose, which causes blood sugar to rise to normal (Carter, 2020). People on stronger diabetes medication such as insulin, may also experience lethargy as a symptom of low blood glucose levels. This is due to the reason that having too much insulin in blood can lead to having too little glucose (Story, C. M., & Llitsky, R. , 2020). When the cells do not take in enough glucose, the cells do not get enough glucose to produce energy for regular functioning. Therefore, the person will experience fatigue, weakness, and eventually lethargy because of low blood sugar level.

Sii Ming Ming

Well, let us proceed to fact 3 “tremor of hands and arms”. From the ideas, we can find that the learning issue of this fact is to analyze the tremor disease on young adult. Not only that, but we also discuss the symptoms, causes, treatments, and ways to prevent tremor of hands and arms. Furthermore, the medical science on tremor of hands and arms also being learnt. Therefore, what are the causes of tremor of hands and arms?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Generally, tremor is caused by a problem in the deep parts of the brain that control movements. Most types of tremor have no known cause, although there are some forms that appear to be inherited and run in families. Tremor can occur on its own or be a symptom associated with several neurological disorders such as multiple sclerosis, stroke, traumatic brain injury and neurodegenerative diseases that affect parts of the brain.

Keith Isaac Anak Noni@Boni

Movement disorder such as essential tremor and dystonic tremor can cause tremor of hands and arms. Based to Barrell (2020), essential tremor is the most common movement disorders. The tremor usually both sides of the body, but It may be more noticeable in the

dominant hand. It tends to occur when the person is moving as well as when standing still. However, dystonic tremor occurs when the brain sends incorrect messages, which resulting in overactive muscles, abnormal postures and sustained undesired movements (Barrell, 2020).

Wong Mee Hui

The use of certain medicines such as particular asthma medication, amphetamines, caffeine, corticosteroids, and drugs used for certain psychiatric and neurological disorders can cause tremor of hands and arms (Tremor Fact Sheet, 2020).

Aneshaa Binti Chandrasekaran

Shaky hands can also be caused by seizure, overactive thyroid, caffeine overdose, alcohol abuse or withdrawal, which related to addiction and also low blood sugar level (Essential tremor, 2020).

Sii Ming Ming

Therefore, what is the treatment of tremor of hands and arms?

Aneshaa Binti Chandrasekaran

Tremor of hands and arms can be treated by taking medications. According to the National Tremor Foundation, the most prescribed medications for treating shaky hands of an essential tremor are propranolol and primidone (Melinosky, 2020). Not only these medicines, but beta-blockers such as metoprolol and atenolol, antiseizure medications such as gabapentin and topiramate, anti-anxiety medication such as alprazolam, and Botox also can be taken as effective treatment for essential tremor (Melinosky, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Botox? I thought Botox is just used in reduce skin wrinkles.

Aneshaa Binti Chandrasekaran

Yes, Botox shows promise as a treatment for essential tremor in the hands. However, since it is a drug that weakens or paralyzes muscles when injected, so be sure to talk with doctor

about the potential risks and benefits. The benefits from a successful injection can last up to 3 months.

Keith Isaac Anak Noni@Boni

When people do not respond to drug therapies or have a severe tremor that significantly impacts their daily life, a doctor may recommend surgical interventions such as deep brain stimulation (DBS) or very rarely, thalamotomy (Melinosky, 2020). A surgeon will place electrodes in the brain that receive an electronic signal that interferes with the brain activity responsible for the tremor during DBS operation. The signal is transmitted from a device that's implanted under the skin of the upper chest (Melinosky, 2020). During thalamotomy, surgeon use radiofrequency sound waves to make a permanent lesion at very minute area of thalamus and this interrupt the brain's normal electrical activity and reduces or stops the tremor (Melinosky, 2020).

Sii Ming Ming

Lifestyle changes such as using the hand less affected by tremor more often. Find ways to avoid writing with the hand affected by tremor, such as using online banking and debit cards instead of writing checks. In addition, conducting a physical therapy can improve muscle control, functioning, and strength while enhancing coordination and balance (Barrell, 2020). By using a wider and heavier writing tools, wrists weights, heavier glasses and utensils can train the muscle coordination (Sampson, 2020).

Sii Ming Ming

Does tremor only occur on hands and arms?

All

No!!!

Whitney Shetha Anak Bujang

They can occur in head, vocal cords, torso, and legs (Barrell, 2020). They can occur in almost any part of the body but occurs most often in the hands (Essential tremor, 2020). Tremor can be classified into two main categories, which are resting tremor and action

tremor. Resting tremor occurs when the muscle is relaxed, such as when the hands are resting on the lap. With this disorder, a person's hands, arms, or legs may shake even when they are at rest. Action tremor occurs with the voluntary movement of a muscle. Postural tremor, kinetic tremor, intention tremor, task-specific tremor and isometric tremor are subcategories of action tremor (Tremor Fact Sheet, 2020).

Sii Ming Ming

Is it normal for young adult to experience tremor of hands and arms?

Keith Isaac Anak Noni@Boni

Normal. For example, dystonic tremor usually appears in young or middle-aged adults and can affect any muscle in the body.

Whitney Shetha Anak Bujang

Physiologic tremor occurs in all healthy individuals. It is rarely visible and typically involves a fine shaking of both hands and the fingers. It is not considered a disease but is a normal human phenomenon that is the result of physical properties in the body (Tremor Fact Sheet, 2020).

Sii Ming Ming

What is the science behind tremor of hands and arms?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

The tiny muscle fibers in your hands and arms constantly contract and relax at random, and sometimes there is an imbalance between muscle groups, which causes the timing of these contractions to be off (Shaky hands-normal or not?, 2020).

Pauline Poh Swee Ping

Neurological problems on certain area on the brain that control movements or metabolic problems and toxins that could affect the brain and central nervous system (Stoppler, 2020) (Stöppler, 2020). In some cases, it can run in the families.

Keith Isaac Anak Noni@Boni

It has been proposed that physiological tremor is caused by oscillatory reflex loops which induce synchronous motor unit activity (Lippold, 1970; Christakos et al. 2006) or by the force fluctuations produced when the incompletely fused twitches of just-recruited motor units are low-pass filtered by the elastic properties of the muscle (Allum et al. 1978; Christakos et al. 2006).

Sii Ming Ming

How to prevent tremor of hands and arms?

Pauline Poh Swee Ping

At the meantime, there is not much of preventive measures that can be done, due to the underdeveloped studies on the cause of tremor. However, it can be prevented by preventing the underlying illness that can cause tremors. As for genetic diseases, patients should be expecting it and receive an early treatment for that.

Keith Isaac Anak Noni@Boni

Stress management is important in treatment and prevention. Stress and anxiety tend to make tremors worse and being relaxed may improve tremors. Although we cannot eliminate all stress from our life, but we can change how we react to stressful situations using a range of relaxation techniques, such as massage or meditation (Essential tremor, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Tremor of hands and arms can be prevented by limiting or avoiding substances that can cause tremors such as caffeine and amphetamines. Caffeine and other stimulants can increase the risk of tremor. Eating a balanced diet can prevent tremor of hands and arms as low blood sugar will trigger the body's natural stress response and makes the person shaky.

Sii Ming Ming

Let us move to the fact 4 "anxiety". There are 3 learning issues in this fact, which are " to identify the different types of anxiety", "to analyze either anxiety whether related to mental

illness", and "to discuss symptoms, causes, treatments, and ways to prevent anxiety". Firstly, what are the symptoms of anxiety?

Pauline Poh Swee Ping

Apprehension, confusion, on edge, a sense of helplessness, repeated negative thoughts, muscle tension, palpitations and difficulty breathing are the symptoms of anxiety (Chan, 2020).

Wong Mee Hui

According to (The link between low blood sugar and anxiety, 2020), the symptoms of anxiety are restlessness, fatigue, difficulty concentrating, irritability or explosive anger, muscle tension, sleep disturbances and personality changes, such as becoming less social. Some studies show that anxiety can interrupt working memory, a type of memory responsible for holding short-term information. This may help explain the dramatic decrease in performance people often experience during periods of high anxiety.

Whitney Shetha Anak Bujang

People who experiencing anxiety can be indicated by excessive worrying and agitated feeling (Julson, 2020). The worrying associated with anxiety disorders is disproportionate to the events that trigger it and typically occurs in response to normal, everyday situations. When they are feeling anxious, part of their sympathetic nervous system goes into overdrive. This kicks off a cascade of effects throughout the body, such as a racing pulse, sweaty palms, shaky hands, and dry mouth (Julson, 2020). These symptoms occur because the brain believes they have sensed danger, and it is preparing their body to react to the threat. Their body shunts blood away from their digestive system and toward the muscles in case they need to run or fight (Julson, 2020).

Sii Ming Ming

What are the contributing factors of anxiety?

Aneshaa Binti Chandrasekaran

The causes of anxiety are not fully understood yet, however it is believed that traumatic events, medication-induced, or some underlying issues such as medical problems like thyroid problems and drug misuse (Anxiety disorder, 2020). This anxiety problem can also run hereditarily within the family.

Sii Ming Ming

Underlying health issues such as heart disease, diabetes, thyroid problems, such as hyperthyroidism, respiratory disorders such as chronic obstructive pulmonary disease (COPD), chronic pain or irritable bowel syndrome and asthma can cause anxiety. Drug misuse or withdrawal, withdrawal from alcohol, anti-anxiety medications (benzodiazepines) or other medications can lead to anxiety also (Anxiety disorder, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Anxiety can be caused by the stress due to an illness. Having a health condition or serious illness can cause significant worry about issues such as the treatment and the future. In addition, a big event or a buildup of smaller stressful life situations may trigger excessive anxiety. For example, a death in the family, work stress or ongoing worry about finances can be the incidents that trigger the anxiety.

Sii Ming Ming

What is the treatment for anxiety?

Keith Isaac Anak Noni@Boni

Self-treatment can be undergone to treat anxiety. In some cases, a person can manage anxiety at home without clinical supervision. However, this may be limited to shorter and less severe periods of anxiety. Doctors recommend several exercises and techniques to cope with brief or focused bouts of anxiety, including stress management, relaxation techniques such as long baths, yoga, and meditation, exercises to replace negative thoughts with positive ones and supporting network with family members and friends (Anxiety/stress, 2020).

Sii Ming Ming

Exercise can help to reduce stress and enhance your overall sense of well-being. It helps produce neurotransmitters known as endorphins (Exercise for stress and anxiety, 2020). These neurotransmitters are your body's natural painkillers and can also improve your sleep quality. The ADAA reports that even short exercise sessions for about 10 minutes at a time are effective in helping lift your mood. Next, sipping chamomile tea or taking a chamomile supplement might help to ease anxiety symptoms. A 2016 double-blind study published in the Phytomedicine journal focused on individuals with generalized anxiety disorder (Exercise for stress and anxiety, 2020). The study found that study participants who took 500-milligram chamomile supplements three times per day daily reported a reduction in moderate to severe generalized anxiety. Then, smelling diluted aromatherapy oils such as lavender, neroli and chamomile can help to reduce anxiety (Exercise for stress and anxiety, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Standard treatment for anxiety involves psychological counselling and therapy. This might include psychotherapy, such as cognitive behavioral therapy (CBT) or a combination of therapy and counseling. CBT aims to recognize and alter the harmful thought patterns that can trigger an anxiety disorder and troublesome feelings, limit distorted thinking, and change the scale and intensity of reactions to stressors. This helps people manage the way their body and mind react to certain triggers (Anxiety disorder, 2020).

Aneshaa Binti Chandrasekaran

Psychotherapy is another treatment that involves talking with a trained mental health professional and working to the root of an anxiety disorder. Sessions might explore the triggers of anxiety and possible coping mechanisms (Julson, 2020).

Wong Mee Hui

Medications typically used to treat anxiety by using antidepressants and sedatives. They work to balance brain chemistry, prevent episodes of anxiety, and ward off the most severe symptoms of the disorder (Holland, 2020).

Sii Ming Ming

How to prevent anxiety?

Pauline Poh Swee Ping

Anxiety can be prevented by avoiding anxiety inducer, such as caffeine. Alcohol might reduce the feeling of anxiety. However, the effect is temporary, and once the effect wears off, the anxiety would be more serious, due to the change in levels of serotonin and neurotransmitter. Expert also suggested that patient can calm themselves down by writing out their insecurities or by talking to someone else. Fragrance such as lavender also can help together with meditation (Thomas, F., & Legg, T. , 2020).

Aneshaa Binti Chandrasekaran

Talk to someone can help to prevent someone from suffering anxiety. Tell friends and family you are feeling overwhelmed and let them know how they can help you. Do not be shame to talk to a physician or therapist for professional help.

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

To prevent anxiety, always get enough sleep. Lacking sleep can increase feelings of restlessness and anxiety. If you have trouble sleeping, see your doctor for help. Besides of that, stick to a healthy diet. Always eat plenty of fruits, vegetables, whole grains, and lean protein such as chicken and fish because malnutrition and low blood sugar level can contribute to anxiety (Julson, 2020).

Keith Isaac Anak Noni@Boni

Avoid alcohol or drug use is one of the ways to prevent anxiety. Alcohol and drug use can cause or worsen anxiety. If the patients are addicted to any of these substances, quitting can make them anxious.

Sii Ming Ming

There are many types of anxiety. Can each of you state at least one type of anxiety?

Keith Isaac Anak Noni@Boni

Sure. Post-traumatic stress disorder (PTSD) is an anxiety disorder that can develop after exposure to a terrifying event or ordeal in which grave physical harm occurred or was

threatened. Traumatic events that may trigger PTSD include violent personal assaults, natural or human-caused disasters, accidents, or military combat ((DCD), 2020).

Whitney Shetha Anak Bujang

Social anxiety disorder, which also called social phobia is an anxiety disorder when the patients feel overwhelming worry and self-consciousness about everyday social situations. They are obsessively worry about others judging you or being embarrassed or ridiculed (All about anxiety disorders: From causes to treatment and prevention., 2020).

Wong Mee Hui

Panic disorder is one of the types of anxiety. Patients experiencing recurring panic attacks at unexpected times (Holland, 2020). Patients feel sudden, intense fear that brings on a panic attack. During the panic attack, they may break out in sweat, have chest pain, and have a pounding heartbeat (palpitations). A person with panic disorder may live in fear of the next panic attack (Holland, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

People who have agoraphobia have a fear of certain places or situations that make them feel trapped, powerless, or embarrassed. These feelings lead to panic attacks. For example, they may panic or feel anxious when on an airplane, public transportation, or standing in line with a crowd (All about anxiety disorders: From causes to treatment and prevention., 2020). People with agoraphobia may try to avoid these places and situations to prevent panic attacks.

Sii Ming Ming

Generalized anxiety disorder (GAD) patients experience constant anxiety and worry about activities or events, even those that are ordinary or routine. The worry is greater than it should be given the reality of the situation. The worry causes physical symptoms in the body, such as headaches, stomach upset, or trouble sleeping (Anxiety disorder, 2020).

Aneshaa Binti Chandrasekaran

Obsessive-Compulsive Disorder (OCD) is an anxiety disorder and is characterized by recurrent, unwanted thoughts and repetitive behaviors (What causes anxiety?, 2020). Repetitive behaviors such as hand washing, counting, checking, or cleaning are often performed with the hope of preventing obsessive thoughts or making them go away (What causes anxiety?, 2020). They will try to relieve their anxiety by performing certain rituals or behaviors and not performing them markedly increases anxiety.

Pauline Poh Swee Ping

Substance-induced anxiety disorder is characterized by symptoms of intense anxiety or panic that are a direct result of misusing drugs, taking medications, being exposed to a toxic substance or withdrawal from drugs (Staff M. C., 2020).

Sii Ming Ming

Can anxiety have categorized as mental illness?

Pauline Poh Swee Ping

Yes. Mild anxiety is normal which is part of a neurological functioning. However, severe anxiety can be categorized as mental illnesses (Rauch, 2020). Experiencing occasional anxiety is a normal part of life. However, people with anxiety disorders frequently have intense, excessive, and persistent worry and fear about everyday situations. Anxiety disorders involve more than temporary worry or fear. These feelings of anxiety and panic interfere with daily activities, are difficult to control, are out of proportion to the actual danger and can last a long time (Anxiety disorder, 2020).

Sii Ming Ming

For the fact 6 “sweating”, there are 3 learning issues based on the ideas, which are “to analyse the process of human sweating”, “to discuss the relationship of sweating symptoms to anxiety” and “to know the disease related to sweating.” Therefore, the first ideas “what metabolism related to human sweats?”, who can make more explanation about this idea?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

When the body temperature rises, the sympathetic nervous system stimulates the eccrine sweat glands to secrete water to the skin surface, where it cools the body by evaporation. Thus, eccrine sweat is an important mechanism for temperature control. The eccrine sweat glands are located all over the body and produce a lightweight, odorless sweat (Roth, 2020). In extreme conditions, human beings may excrete several liters of such sweat in an hour. Human eccrine sweat is essentially a dilute sodium chloride solution with trace amounts of other plasma electrolytes. In a person unused to heavy sweating, the loss of sodium chloride during a period of heavy labor or high temperatures may be great, but the efficiency of the gland increases with use, and in acclimatized persons the salt loss is decreased.

Pauline Poh Swee Ping

The sweat glands will reabsorb sodium chloride to maintain the electrolyte concentration in the body, including bicarbonate to maintain acid-base balanced. Sweating can reduce minerals, vitamins, and other constituent content in our body (Baker, 2019).

Aneshaa Binti Chandrasekaran

The apocrine sweat glands are concentrated in the hair follicles of the scalp, armpits, and groin. They continuously secrete a concentrated fatty sweat into the gland tube (Roth, 2020). Emotional stress stimulates contraction of the gland, expelling its contents. Skin bacteria break down the fats into unsaturated fatty acids that possess a pungent odor. Autonomic nervous system controls the sweating function, without person's conscious control.

Sii Ming Ming

For the mechanism of sweating, Whitney can you make more explanation about it?

Whitney Shetha Anak Bujang

Yes. The neural pathway from the brain to sweat gland is started by efferent signals from the pre-optic hypothalamus travelling through the tegmentum of the pons and the medullary raphe regions to the intermediolateral cell column of the spinal cord. In the spinal cord, neurons emerge from the ventral horn, pass through the white ramus communicans, and then synapse in the sympathetic ganglia. Postganglionic non-

myelinated C-fibers pass through the gray ramus communicans, combine with peripheral nerves and travel to sweat glands, with these nerve fibers “entwined around” the periglandular tissue of the eccrine sweat gland (Shibasaki, M. & Crandall, C. G., 2010).

Sii Ming Ming

The neural impulse due to the activated axon terminal is thought to travel antidromically to a branch-point, and then travel orthodromically to other nerve terminals, capping in the release of acetylcholine (Shibasaki, M. & Crandall, C. G., 2010). Thus, not only the central drive from thermoregulatory center but also local mechanisms can contribute to the modulation of sweating.

Keith Isaac Anak Noni@Boni

Acetylcholine released from cholinergic nerves is rapidly hydrolyzed by acetylcholinesterase. Thus, acetylcholinesterase is capable of modulating sweat rate during low to moderate sweating activity, but its effectiveness is greatly reduced when sweat rate is substantially increased. Elevations in sweat rate occur earlier with exogenous methacholine than with acetylcholine administration, given the reduced cholinesterase susceptibility of methacholine (Shibasaki, M. & Crandall, C. G., 2010).

Sii Ming Ming

After understanding the mechanism of sweating, why human sweats during anxiety?

Wong Mee Hui

During anxiety, the body releases stress hormones such as adrenaline and cortisol, which cause our heart to pound fast. Our body not only alert those eccrine glands, they also alert the apocrine glands which are located in your armpits and crotch to react instantly (Heyden, 2020).

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

When the patients faced with nervous excitement, nerves trigger the flight-or-fight response of the sympathetic nervous system and speeds up the breathing and heart rates, as the body tries to direct more blood away from the extremities and toward its vital organs.

It turns on apocrine glands, which mentioned by Mee Hui just now, to produce anxiety sweat, which physically different than heat sweat.

Keith Isaac Anak Noni@Boni

Yes, the body's panic response is installed to produce excess perspiration if something threatens us. Our brain scans reveal that sniffing someone else's panic-induced sweat lights up regions of the brain that handle emotional and social signals. So, this sweating is an evolved behavior that makes others' brains more alert and primed for whatever it is that's making us anxious (Davies, 2020) .

Sii Ming Ming

Is there other diseases related to over-sweating?

Pauline Poh Swee Ping

Hyperhidrosis. However, there are two types of hyperhidrosis. For primary focal hyperhidrosis, the cause is hereditary. As for secondary hyperhidrosis, which is less common, it is caused by medical condition such as diabetes, thyroid problems, cancer, nervous system disorders and infections (Staff M. C., Hyperhidrosis - Symptoms and causes. , 2020).

Aneshaa Binti Chandrasekaran

Profuse sweating can signal hypoglycemia or low blood sugar (Hunter, 2020). Low blood sugar can trigger an adrenaline release, making you sweat more. The nervous system's trigger for sweating can be signaled by low blood sugar levels. (Thorpe, 2020). It can be related to drugs addiction such as morphine and synthetic thyroid hormones. Next, excessive sweating can be symptoms of social anxiety and generalized anxiety disorder (GAD), which is more likely to develop as a secondary symptom of hyperhidrosis. It can develop over time when the patients worry about excessive sweating. They might find themselves concerned about sweating all the time, even on days when they are not sweating (Cherney, 2020).

Whitney Shetha Anak Bujang

Not only hypoglycemia, but sweating is also related to endocarditis, heart attack, heart exhaustion, leukemia, and malaria.

Sii Ming Ming

For the fact 7 “hunger”, based on the ideas, what are the learning issues?

Pauline Poh Swee Ping

The first learning issue can be “To discuss the relationship between hunger symptoms to anxiety.” and the second learning issue is “To discuss the metabolic pathways, occur in body when hungry.”

Sii Ming Ming

Ok, how hunger links to anxiety?

Wong Mee Hui

Skipping meals causes a drop in the body's blood sugar levels. If prolonged, this drop may lead to increased feelings of anxiety and irritability (Landau, 2013). During anxiety, cortisol, the hormone which increases appetite is released by the adrenal glands due to persistent stress. If the stress is prolonged, cortisol may stay elevated due to stress, contributes excessive hunger (Majumdar, 2020).

Aneshaa Binti Chandrasekaran

Yes, I agree with Mee Hui. Without enough sugars and nutrients in your blood, your body becomes stressed, and anxiety is often the result. That is why many people find eating a protein bar or getting some food in the body often appears to take the anxiety away (Can hypoglycemia promote anxiety? , 2020).

Pauline Poh Swee Ping

Besides of stress, hormones also promote hunger. Ghrelin, as a hormone that has an antidepressant effect. When the body is lacking ghrelin, this situation can cause anxiety. That is why a depressed person tend to lose weight due to low level of hunger-induced hormone in the body (Bazian, 2020).

Keith Isaac Anak Noni@Boni

Ya… Eating is an inherently emotional activity and the attachment system is an emotion regulation system. Individuals with attachment insecurity have less interoceptive awareness and difficulty regulating emotion. Insecurely attached individuals may eat emotionally because they misinterpret internal hunger cues (Alexander, K. E., Siegel, H. I., 2013). For example, the patients think they are hungry when they are experiencing some other internal, attachment-related state. The current study found a positive association between attachment anxiety and emotional eating (Alexander, K. E., Siegel, H. I., 2013). This relationship was mediated by perceived hunger.

Sii Ming Ming

Thank you for your guys' explanation. So, what diseases can trigger extensive hunger?

Wong Mee Hui

Besides of anxiety, hypoglycemia or low blood sugar level can trigger extensive hunger. Normally, the hypoglycemia is temporary, and blood sugar levels are restored after eating. However, if he has liver disease, the hypoglycemia becomes chronic and he has the urge to eat all the time as liver is unable produce sugar to prevent blood sugar level from dropping (Majumdar, 2020). Next, type-2 diabetes make the person feels hungry too. High blood sugar causes hunger, even they do not need more food. This is because every cell in his body depends on insulin to obtain the sugar from the blood. If there is not enough insulin in the body, sugar accumulates in the blood, but it cannot enter cells where those cells need sugar. Therefore, the cells send the signal to the brain to eat more, causing him to feel hungry constantly (Majumdar, 2020). Excessive hunger is also associated with hyperthyroidism and Grave s disease. The thyroid increases the metabolic rate, so an overactive thyroid causes faster rate of burning calories, causing constant hunger which cannot be satisfied by eating (Majumdar, 2020).

Aneshaa Binti Chandrasekaran

Besides of hypoglycemia, type-2 diabetes, and hyperthyroidism, which mentioned by Mee Hui, Graves diseases, premenstrual syndrome and eating disorder such as bulimia can also

trigger excessive hunger. Overdose of certain drugs such as corticosteroids, cyproheptadine, and tricyclic antidepressants increase the metabolic rate to excessive rate as compared rate and eventually lead to excessive hunger.

Sii Ming Ming

However, why the person is not eating?

Keith Isaac Anak Noni@Boni

Several conditions can lead to a decreased appetite. Some medications and drugs may reduce the appetite, including illicit drugs such as cocaine, heroin, and amphetamines (Biggers, 2020). Some prescription medications such as certain antibiotics, codeine, morphine and chemotherapy drugs can reduce appetite as well (Biggers, 2020). Medical conditions such as chronic liver disease, kidney failure, heart failure, hepatitis and dementia can cause loss of appetite.

Sii Ming Ming

People who lose their appetite are so consumed by the source of their stress or anxiety that they cannot do anything else, including necessary tasks like eating. Besides of that, when someone starts to feel stressed or anxious, their body begins to release stress hormones. These hormones activate the sympathetic nervous system and trigger the body's fight-or-flight response (J., 2020). His sudden surge of stress hormones has several physical effects. For example, research suggests that one of the hormones, which is corticotropin-releasing factor (CRF) can affects the digestive system and may lead to the suppression of appetite (J., 2020).

Sii Ming Ming

What happen to our body when we are hungry?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Let me do a sharing about this idea. Firstly, vagus nerve sends signals to the brain about how full or empty your stomach is, as well as the different nutrients present in the intestines (What happens in my body when I feel hungry?, 2020).

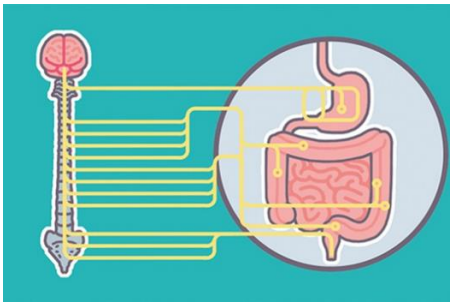

Figure 1: Nerve sends signals to the brain

When the stomach has been emptying for two hours, it begins contracting to sweep remaining food into the intestines. This rumbling is called ‘borborygmus’.

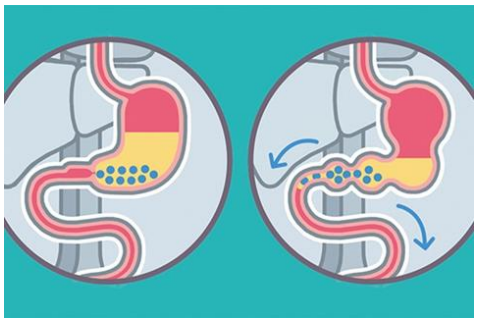

Figure 2: Contracting of stomach

Cells in the stomach and intestine produce ghrelin, a hormone that triggers feelings of hunger.

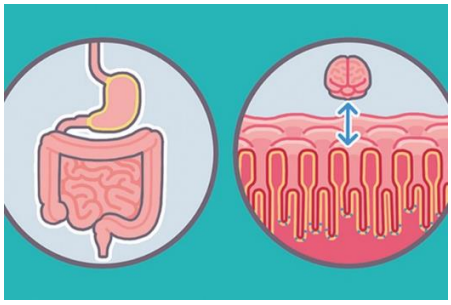

Figure 3: Production of ghrelin

The pancreas secretes glucagon to convert glucose stored in the liver to produce energy.

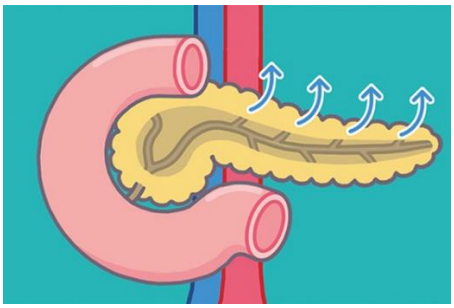

Figure 4: Secretion of glucagon

Levels of key nutrients in the blood, including glucose, amino acids, and fatty acids are at their lowest concentrations when they are hungry.

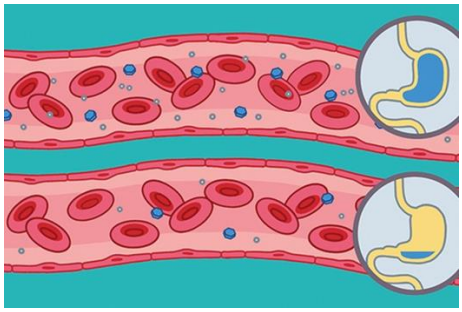

Figure 5: Comparison of key nutrients in blood between full stomach and empty stomach

Hunger increases the impulsiveness and reduces the ability to make long-term decisions (What happens in my body when I feel hungry?, 2020).

Aneshaa Binti Chandrasekaran

Besides of regulation of endocrine system, when we are hungry meaning, we have not enough food in the body to produce energy, the body will undergo glycolysis, Krebs cycle and electron transport chain (ETC) to produce energy.

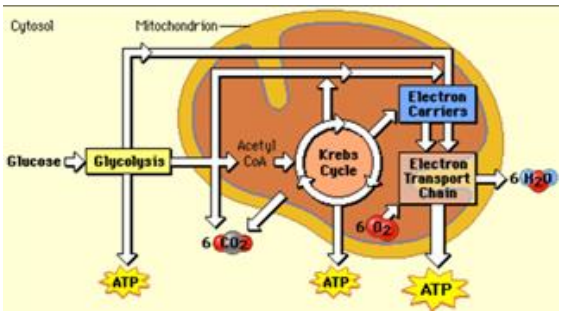

Figure 6: Glycolysis, the Krebs cycle, and the electron transport chain

The first stage in the breakdown of glucose to produce ATP is glycolysis. In this metabolic pathway, the six-carbon glucose molecule undergoes a series of transformations, each catalyzed by a different enzyme (Millard, 2020). Along the way, glucose is cleaved into two pieces that each end up as the three-carbon molecule pyruvate. The energy from hydrolysis of two molecules of ATP is needed to drive this pathway, but four molecules of ATP are eventually formed, for a net gain of 2 ATP (Millard, 2020).

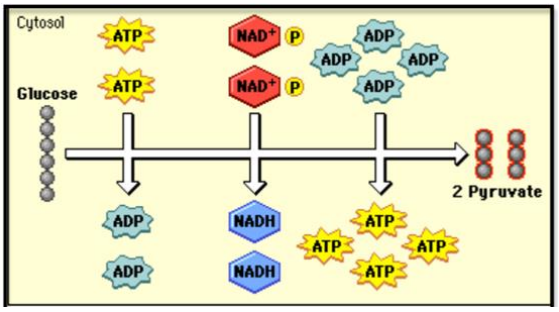

Figure 7: Production of ATP energy from glucose

During glycolysis, electrons produced during the oxidation of glucose end up captured in two molecules of NADH. NADH is one of two primary electron carriers in metabolism, and it exists as an oxidized form (NAD^+) and a reduced form (NADH) (Millard, 2020). This molecule is like a taxi for electrons, picking them up from glucose and dropping them off to other pathways of metabolism. The two molecules of pyruvate produced during glycolysis still contain a great deal of the original chemical energy of glucose. Pyruvate can therefore undergo further degradation to produce more ATP (Millard, 2020).

Whitney Shetha Anak Bujang

The Krebs cycle occurs inside the mitochondria and generates a pool of chemical energy from the oxidation of pyruvate, the product of glycolysis. Pyruvate is transported into the mitochondria and loses carbon dioxide to form acetyl-CoA (Millard, 2020). When acetyl CoA is oxidized to carbon dioxide in the Krebs cycle, chemical energy is released and captured in the form of 3 molecules of NADH, 1 molecule of $FADH_2$, and 1 molecule of ATP. The cycle starts and ends with oxaloacetate.

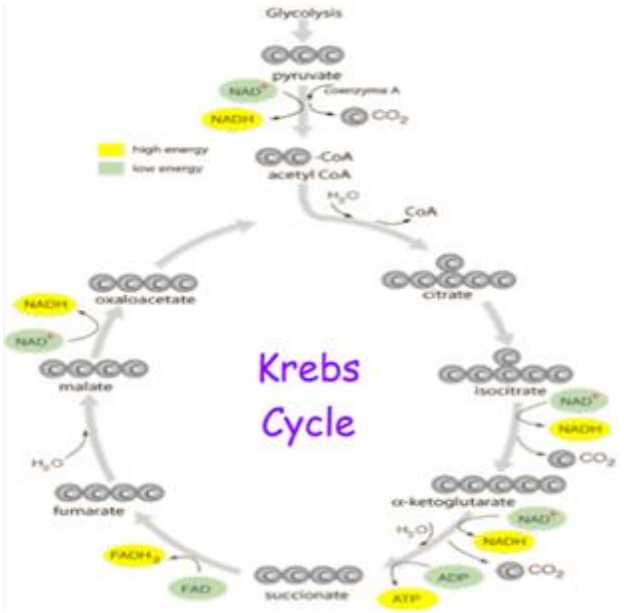

Figure 8: Krebs cycle

Pauline Poh Swee Ping

The NADH and $FADH_2$ produced during the Krebs cycle pass their electrons to the electron transport chain (ETC), the final stage of respiration. The electron transport chain consists of various proteins embedded in the mitochondrial membrane, as well as some mobile electron carriers (Millard, 2020). Electrons are passed through the carriers, eventually ending up reducing O_2 to form water. The energy released as the electrons flow through the chain is used to transport H^+ out of the mitochondria. The result is that it is more acidic outside the mitochondria, with a higher concentration of H^+ (Millard, 2020). As the hydrogen ions flow back inside the mitochondria through the ATP synthase, energy is released that is used to make ATP.

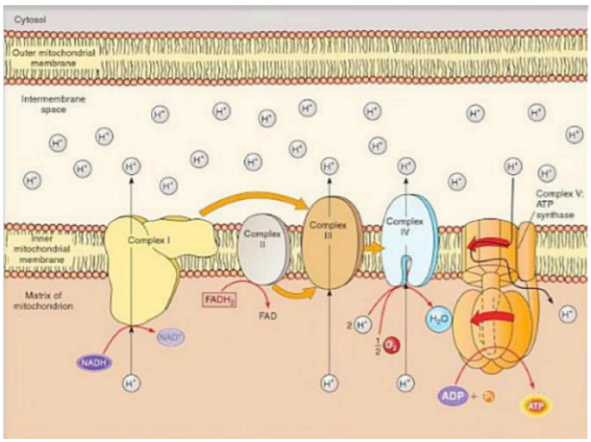

Figure 9: Electron transport chain

Aneshaa Binti Chandrasekaran

With 2.5 ATPs made from each NADH and 1.5 ATP from each FADH2 sent from glycolysis and the Krebs cycle. Adding 2 ATP molecules produced from glycolysis and 1 ATP produced in the citric acid cycle with 27 ATP molecules in the ETC yields a grand total of 30 molecules of ATP per molecule of glucose.

Sii Ming Ming

Thank you for detail explanation about what happen to our body when we are hungry. How hormones control appetite?

Pauline Poh Swee Ping

Corticotropin-releasing hormone (CRH) and adrenaline to suppress appetite whereas adrenal glands release hormone cortisol to increase appetite (Majumdar, Hunger is fine but excessive hunger may indicate health disorders , 2020).

Keith Isaac Anak Noni@Boni

Ghrelin is a hormone that is produced and released mainly by the stomach with small amounts also released by the small intestine, pancreas, and brain. Ghrelin has numerous functions. It is termed the ‘hunger hormone’ because it stimulates appetite, increases food intake, and promotes fat storage (What is gherlin?, 2020). As the stomach empties, the release of ghrelin increases. As soon as the stomach is filled, it decreases.

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

Cholecystokinin (CCK) is produced in the upper small bowel in response to food and gives a feeling of fullness (Proietto, 2020). It is released soon after food reaches the small bowel. In addition, Peptide YY, glucagon-like peptide 1, oxyntomodulin and progranulin are all made from the last part of the small bowel and make us feel full (Proietto, 2020). They are released in response to food in the gut. Next, leptin is the most powerful appetite-suppressing hormone and is made in fat cells (Proietto, 2020). The more fat cells we have, the more leptin the body produces.

Sii Ming Ming

For the fact 8 "biochemical investigation on blood", the learning issues will be "to discuss types of blood test and its function", "to identify the importance of blood test", and "to determine the process of blood measurement". For the first idea "the types of blood test and its functions", I want to make the explanation about this idea.

Blood cholesterol test is used to measure the blood cholesterol levels (Blood tests, 2020). The person is asked not to eat for 12 hours before the test to ensure that all the food is completely digested and do not affect the result. Next, blood culture involves taking a small sample of blood from a vein in the arm and from one or more parts of the body because at least 2 samples are usually needed. The results can determine the presence of bacteria in the blood. In addition, for blood gases test, a blood gases sample is taken from an artery to check the balance of oxygen and carbon dioxide in the blood and the balance of acid and alkali in the blood (Blood tests, 2020). There are several tests can be used to diagnose and monitor diabetes by checking the level of glucose in the blood. Firstly, fasting glucose test is a type of blood glucose level test after eating for at least 8 hours. Glucose tolerance test is where the level of glucose in the blood is checked after fasting, and again 2 hours later after being given a glucose drink (Blood tests, 2020). However, the third blood glucose test is HbA1C test, which done at GP surgery or hospital to check the average blood sugar level over the past 3 months (Blood tests, 2020).

Wong Mee Hui

For blood typing test, it is done before donating blood or having a blood transfusion, to check the blood group of patient belongs to. Cancer blood tests can be carried out to diagnose certain cancers or the risk of developing a cancer. There are 3 types of cancer blood tests for prostate-specific antigen (PSA), CA125 protein, and BRCA1 and BRCA2 genes to diagnose prostate cancer, ovarian cancer, and breast cancer, respectively (Blood tests, 2020). Chromosome testing, which also known as karyotyping, is a test to examine chromosomes to detect genetic abnormalities. This chromosome testing can be used to diagnose disorders of sex development (Blood tests, 2020).

Whitney Shetha Anak Bujang

Basic metabolic panel (BMP) is taken to check for levels of certain compounds in the blood such as electrolytes, calcium, glucose, sodium, potassium, carbon dioxide and chloride. However, complete metabolic panel (CMP) includes all the measurements of a BMP as well as additional proteins and substances related to liver function such as albumin, total protein, alkaline phosphatase, alanine aminotransferase and bilirubin. Lipid panel test checks levels of 2 types of cholesterol, which are high-density lipoprotein (HDL) and low-density lipoprotein (LDL).

Sii Ming Ming

Therefore, what are the importance of conducting blood test?

Keith Isaac Anak Noni@Boni

Blood tests help doctors check for certain diseases and conditions. They also help check the function of organs and show how well treatments are working. Specifically, blood tests can help doctors to evaluate the efficiency of organs such as the kidneys, liver, thyroid, and heart are working (Blood tests, 2020). It can help to diagnose diseases and conditions such as cancer, diabetes, anemia, and coronary heart disease. Furthermore, blood test can help to find out whether the person has risk factors for heart disease. It checks the efficiency of the medicine taking and how well the blood is clotting.

Sii Ming Ming

What is the instrument to measure blood?

Aneshaa Binti Chandrasekaran

At home, the person can measure his/her blood sugar level individually by using a small device called glucose meter or glucometer (Blood glucose meter to monitor blood sugar levels, 2020). The drop of blood they get with a finger prick is often enough to use on a test strip. A finger prick can be done with a special needle (lancet) or with a spring-loaded device that quickly pricks the fingertip (Blood glucose meter to monitor blood sugar levels, 2020). They can place the drop of blood on the test strip. Depending on the type of meter used, they may put the strip into the meter before or after they put the drop of blood on the test strip.

Keith Isaac Anak Noni@Boni

Blood analyzer is used to analyze the blood sample. The tube of blood is being placed directly into the machine (Follow that blood sample: A short lab tour, 2020). This blood analyzer can run batches of samples up to 120 samples per hour. In general, chemistry analyzers use serum or plasma, and hematology and coagulation analyzers use blood that contains an anticoagulant to prevent clotting (Follow that blood sample: A short lab tour, 2020).

Sii Ming Ming

For the fact 9 “blood sugar levels are 2.7 mmol/L”, there are 3 learning issues, which are “to discuss symptoms, causes, and treatment of low blood sugar level”, “to determine normal sugar level for human”, and “to discuss the relationship between hunger sweating and tremor with low sugar level”. Based on the fact 9, is the blood sugar level high or low?

All

Low!!!!!

Sii Ming Ming

What is the normal blood sugar level?

Syarifah Nurazra Kamelia Binti Wan Mohammad Khairul

A blood sugar level less than 140 mg/dL (7.8 mmol/L) is normal.

Keith Isaac Anak Noni@Boni

A reading of more than 200 mg/dL (11.1 mmol/L) after two hours indicates diabetes. A reading between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L) indicates prediabetes.

Aneshaa Binti Chandrasekaran

For most healthy individuals, 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 (Campbell, 2020).

Sii Ming Ming

Blood sugar level targets are 4 to 7 mmol/L for people with type 1 or type 2 diabetes before meals. After meals, the blood sugar level targets are under 9 mmol/L for people with type 1 diabetes and under 8.5mmol/L for people with type 2 diabetes (Blood sugar level ranges, 2020).

Sii Ming Ming

What are the symptoms of low sugar level?

Pauline Poh Swee Ping

The symptoms of low sugar level are feeling hungry, sweating, tingling lips, feeling shaky or trembling, dizziness, feeling tired, a fast or pounding heartbeat, tearful, moody, and turning pale (Low blood sugar (hypoglycaemia), 2020).

Wong Mee Hui

The patients with low blood sugar will being nervous or anxious, impatience, confusion, nausea, sleepy, feeling weak or having no energy, blurred vision, coordination problems, seizure, and nightmares (Hypoglycemia (Low blood sugar), 2020).

Sii Ming Ming

What are the causes of low sugar level?

Pauline Poh Swee Ping

Taking too much diabetes medicine, especially too much insulin, sulphonylureas or glinides such as repaglinide and nateglinide can cause low blood sugar level.

Whitney Shetha Anak Bujang

Besides of that, skipping or delaying a meal can also lead to low blood sugar level (Diabetes – Diagnosis and treatment, 2020).

Wong Mee Hui

Hypoglycemia symptoms can be caused by over-exercising and not enough carbohydrates intake, starvation, and excessive alcohol intake (Diabetes – Diagnosis and treatment, 2020).

Sii Ming Ming

What is treatment of low sugar level?

Pauline Poh Swee Ping

It is very easy to treat low sugar level! Just consume glucose or sweet food such as chocolate!

Wong Mee Hui

However, it depends on the individual whether he or she has diabetes or not. If he or she has diabetes, they eat or drink 15 to 20 grams of carbohydrates in form of juice, hard candy, or glucose tablets if it is below or below 3.9 mmol/L. If blood sugar levels are still low after 15 minutes, they must be sent to hospital (Hypoglycemia (low blood sugar), 2020). If he or she does not have diabetes, the way to treat hypoglycemia depends on its causes. If a medicine causes your low blood sugar, the medicine should be replaced to another one. If a tumor causes the low blood sugar level, surgery is required (Hypoglycemia (Low blood sugar), 2020).

Aneshaa Binti Chandrasekaran

For emergency treatment, glucagon is a hormone that raises blood sugar quickly. It can be lifesaving if someone is not alert enough to eat or drink something to raise his or her blood sugar. Glucagon is available only by prescription.

Sii Ming Ming

What does hunger links to low sugar level?

Aneshaa Binti Chandrasekaran

Increased appetite can also be caused by abnormally low blood glucose. If blood glucose readings fall below 4 mmol/l, the body usually responds by releasing stored glucose from the liver to raise glucose levels back to normal.

Sii Ming Ming

Then, what does sweat links to low sugar level?

Aneshaa Binti Chandrasekaran

When glucose levels fall too low, the body tells the adrenal glands to release the hormone epinephrine, which signals the liver to make more sugar. The excess epinephrine creates an "adrenaline rush," which can cause feelings of anxiety. Due to excess adrenaline was produced, it will cause sweating. Once the blood glucose returns to normal, the sweating should stop. In addition, this symptom is controlled by the autonomic nervous system the part of the central nervous system that governs the skin and is usually one of the first signs of low blood sugar. The excessive perspiration comes on without warning, regardless of how warm or cold the external temperature may be.

Sii Ming Ming

What does hand tremor relate to low sugar level?

Aneshaa Binti Chandrasekaran

The central nervous system starts to malfunction when glucose levels are off balance. As a result, it releases catecholamines, chemicals that encourage glucose production and produce arm and hand tremor.

Sii Ming Ming

Based on the trigger we can conclude that the disease is called hypoglycemia. Based on the symptoms mentioned in the trigger, which irregular heart rhythm, lethargy, tremor of hands and arms, anxiety, sweating and hunger. All these symptoms are related to low blood sugar

level. These symptoms are signs given by the body through endocrine system and metabolism. - Hypoglycemia is associated 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 (Aucoin, M., & Bhardwaj, S., 2016). It is even more obvious when blood sugar levels reading was 2.7 mmol/L. For most healthy individuals, 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 (Campbell, 2020). But in this trigger, the reading was extremely lower than normal reading. Therefore, we can conclude that he is experiencing low blood sugar level (hypoglycemia).

FILA Table

Trigger: A 23-year old man developed an irregular heart rhythm, complained lethargy, tremor of hands and arms. He complained about anxiety, sweating and hunger. Biochemical investigation on blood revealed blood sugar levels is 2.7 mmol/L.

Facts	Ideas	Learning issues	Action
a. 23-year old man developed an irregular heart rhythm	a. How to detect and diagnose irregular heartbeat? b. What is the health condition of young adult? c. What diseases related to irregular heart rhythm? d. When should we be worried about irregular heartbeat? e. What are the causes of irregular heart rhythm? f. What are the treatments of irregular heart rhythm?	To discuss symptoms, causes, treatments, and ways to prevent irregular heart rhythm.	a. Irregular heartbeat can be detected and diagnosed by electrocardiogram, Holter monitor, stress test, echocardiogram, pulse check, and smartphone heart rhythm apps. b. Young adults are expected to have a healthy heart condition with minimal chances of getting cardiovascular diseases. The heart of normal young adult should beat with a regular rhythm, consisting of double "ba-bum" beats with even spaces in between each. A normal resting heart rate for adults' ranges from 60 to 100 beats per minute. However, the range for a healthy resting heart rate varies between individuals. The fitter a person is accompanied with their lower resting heart rate. Olympic athletes will usually have a resting heart rate of less than 60 bpm, because their hearts are highly efficient. c. Irregular heart rhythm could be a symptom of heart arrhythmias and heart failure. When the electrical impulses that coordinate heartbeats do not work properly, it causes heart to beat too fast, too slow, or irregularly. Generally, there are two types of arrhythmias: • The first type of arrhythmias is Tachycardia. This refers to a fast heartbeat, which a resting heart rate more than 100 beats per minute. • The second type of arrhythmias is Bradycardia. This refers to a slow heartbeat, which a resting heart rate less than 60 beats per minute.

	g. How to prevent irregular heartbeat?		d. The patients are advised to go immediately for doctor or doing a check-up if they feel a slow or irregular heartbeat or notice pauses between heartbeats. The patients are encouraged to visit a doctor when they notice the additional symptoms with irregular heartbeat or heart attack such as fainting, dizziness, chest pain, swelling in your leg or shortness of breath. e. There are several causes of irregular heart rhythm as below: i) Coronary artery disease Fat, cholesterol, and calcium build plaques in the arteries, which make the artery difficult to send blood and apply pressure to heart. ii) Heart surgery Heart surgery changes the way of heart working, including the way of heart beats. Doctors will often monitor patient's heart after surgery. iii) Low blood sugar and eating disorder anorexia and bulimia causes electrolyte imbalance and severe malnutrition. The way of heart beats changes when the electrolyte such as sodium, magnesium, potassium, and calcium are maintained in imbalance level. iv) Unhealthy lifestyle Alcohol abuse, diabetes, excessive caffeine intake and overdose of medicine such as beta-blockers, cocaine or amphetamines causes the heart beats in fast rhythm. v) Substance use disorder or an electric shock The electric impulses do not travel through the heart correctly and increase the risk of arrhythmia. f. Based on the types and situation of irregular heart rhythm, there are different types of treatments as below: i) Medication Antiarrhythmics are drugs that are used to treat abnormal heart rhythms resulting from irregular electrical activity of the heart. ii) Device

			Implantable cardioverter defibrillator (ICD) and pacemaker can help in treatments of irregular heart rhythm. ICD is implanted near to the left collarbone to stimulate the heart to return to its normal speed. A pacemaker is a small device which is usually implanted under the skin of chest or abdomen. If your heart rate is too slow or if it stops, it sends electric pulses to prompt the heart to beat at regular speed. iii) Changing in lifestyle Eat heart-healthy foods such as vegetables and whole grains, exercise regularly, quit smoking and drink alcohol in moderation can reduce the effect of irregular heart rhythm. g. To prevent irregular heartbeat, it is important to live a heart-healthy lifestyle such as staying physically active, stress management and keeping a healthy weight. Smoking is avoided and limit the intake of caffeine and alcohol. Be cautious when using over-the-counter medications such as some cold and cough medication, which contain stimulants that may trigger a rapid heartbeat.
b. complained lethargy	a. What are the signs of lethargy? b. What are the causes of lethargy? c. What is the treatment of lethargy? d. What is the difference between fatigue and lethargy?	To discuss symptoms, causes, treatments, and ways to prevent lethargy. To differentiate between lethargy and fatigue.	a. Lethargy can be diagnosed with several signs such as mood changes, decreased alertness or decreased ability to think, fatigue, low energy, sluggishness, chest pain, dizziness, irregular heart rhythms, shortness of breath, change in appetite, anxiety, slower movement as compared to usual and sneezing. b. There are many causes of lethargy as below: i) Heart and lung -related problems Asthma, cardiomyopathy (weakened or abnormal heart muscle function), chronic obstructive pulmonary disease (COPD, includes emphysema and chronic bronchitis), coronary artery disease (plaque build-up in the walls of coronary arteries), heart failure (deterioration of the heart's ability to pump blood), heart valve disease, irregular heartbeat (arrhythmia) and pneumonia.

	e. When should we seek medical treatment for lethargy? f. How to prevent lethargy? g. How low blood sugar level is linked to lethargy?	To understand the relationship between low blood sugar level and lethargy.	ii) Psychosocial or neurological conditions Alcohol use, anxiety disorders, dementia, decreased motivation, depression, drug abuse, eating disorders, grief, inadequate sleep, lack of exercise, low blood sugar level, stress, overexertion, overwork, and work shift changes can cause the lethargy. iii) Symptoms of diseases Anaemia, cancer, haemorrhage, leukaemia, diabetes, exposure to environmental toxins or poisons, infections, malnutrition, low blood sugar level, kidney diseases and thyroid disorders can lead to lethargy. c. The treatment for lethargy depends upon its underlying cause. Home remedies and practicing healthy habits at home can reduce the fatigue related to lethargy. For example, the patients can drink plenty of fluids, eat a healthy diet, get plenty of sleep, and reduce stress levels. d. Lethargy is a related term to fatigue. Lethargy is losing of motivational force and abnormal drowsiness that make the patients difficult to start new activity. Fatigue is extreme tiredness and refers to the state of reduced capacity for work or accomplishment following a period of mental or physical activity. e. Patients need to seek medical treatment immediately when the symptoms come suddenly, for instance chest pain, unresponsive or minimal responsive, paralyzed on one side of limb or face, disorientation, fast heart rate, loss consciousness, rectal bleeding, severe headache, shortness of breath, eye irritation, fatigue more than two weeks, and vomiting blood. In addition, patients who experience the changes in behaviour with suicidal also need to seek for medical attention.

			f. Lethargy can be prevented by stress management. Practicing a healthy lifestyle can prevent lethargy also such as such as eat a balanced diet, get regular exercise, drink more water, cut down on caffeine, ditch the alcohol, address allergies such as seafood, eggs, milks, soy, and flour, sit less, eat iron rich foods, and eat smaller meals than often. g. Food is breakdown by the digestive system. The most preferable energy source of the body is glucose, which derived from carbohydrates. Hormones such as insulin helps to control blood sugar levels. However, when the insulin level is too high, it will cause too little glucose in the blood. When the cells do not get enough glucose, the cells do not get enough energy for normal functioning and the person will experience fatigue, weakness and eventually lethargy.
c. tremor of hands and arms	a. What are the causes of tremor of hands and arms? b. What is the treatment of tremor of hands and arms? c. Does tremor only occur on hands and arms? d. Is it normal for young adult to experienced tremor of hands and arms?	To analyse the tremor disease on young adult. To discuss medical science on tremor of hands and arms. To discuss symptoms, causes, treatments, and ways to prevent	a. Tremor is caused by a problem in the deep parts of the brain that control movements. Most types of tremor have no known cause, although there are some forms that appear to be inherited and run in families. Tremor can occur on its own or be a symptom associated with several neurological disorders such as multiple sclerosis, stroke, traumatic brain injury and neurodegenerative diseases that affect parts of the brain. Movement disorder such as essential tremor and dystonic tremor can cause tremor of hands and arms. The use of certain medicines such as particular asthma medication, amphetamines, caffeine, corticosteroids, and drugs used for certain psychiatric and neurological disorders can cause tremor of hands and arms. Shaky hands can also be caused by seizure, overactive thyroid, caffeine overdose, alcohol abuse or withdrawal, which related to addiction and low blood sugar level. b. Tremor of hands and arms can be treated as below: i) Medications

	e. What is the science behind tremor of hands and arms? f. How to prevent tremor of hands and arms?	tremor of hands and arms.	Propranolol, primidone, beta-blockers (metoprolol and atenolol), antiseizure medications (gabapentin and topiramate), anti-anxiety medication (alprazolam), Botox are used to treat tremor of hands and arms. ii) Surgery Deep brain stimulation (DBS) and thalamotomy are conducted by surgeon as the drug therapies are not efficient to the patients. iii) Physical therapy Using a wider and heavier writing tools, wrists weights, heavier glasses and utensils can train the muscle coordination and strength. c. No. Tremor of hands and arms can occur in almost any part of the body including head, vocal cords, torso, ad legs. But it occurs most often in the hands. d. It is normal for young adult to experience tremor of hands and arms. Physiologic tremor occurs in all healthy individuals. It is rarely visible and typically involves a fine shaking of both hands and the fingers. It is not considered a disease but is a normal human phenomenon that is the result of physical properties in the body. e. The tiny muscle fibers in your hands and arms constantly contract and relax at random, and sometimes there is an imbalance between muscle groups, which causes the timing of these contractions to be off. physiological tremor is caused by oscillatory reflex loops which induce synchronous motor unit activity or by the force fluctuations produced when the incompletely fused twitches of just-recruited motor units are low-pass filtered by the elastic properties of the muscle. f. Tremor of hands and arms can be prevented by preventing the underlying illness that can cause tremors. Avoid caffeine, stress management, and eating a balanced diet can prevent the tremor of hands and arms.
d. anxiety	a. What are the symptoms of anxiety?	To identify the different	a. The causes of anxiety are traumatic events, medication-induced, or some underlying issues such as medical problems like thyroid problems, as heart

	b. What are the causes of anxiety? c. What is treatment of anxiety? d. How to prevent anxiety? e. What are the types of anxiety? f. Is anxiety categorized as mental illness?	types of anxiety. To analyse either anxiety whether related to mental illness. To discuss symptoms, causes, treatments, and ways to prevent anxiety.	disease, diabetes, respiratory disorders such as chronic obstructive pulmonary disease (COPD), chronic pain or irritable bowel syndrome and asthma, and drug misuse. Anxiety can be caused by gene and stress due to illness and alcohol abuse. b. Anxiety can be treated as below: i) Self-treatments Doctors recommend several exercises and techniques to cope with brief or focused bouts of anxiety, including stress management, relaxation techniques such as long baths, yoga, and meditation, exercises to replace negative thoughts with positive ones and supporting network with family members and friends. Sipping chamomile tea or taking a chamomile supplement and smelling diluted aromatherapy oils might help to ease anxiety symptoms. ii) Psychological counselling and therapy CBT aims to recognize and alter the harmful thought patterns that can trigger an anxiety disorder and troublesome feelings, limit distorted thinking, and change the scale and intensity of reactions to stressors. Psychotherapy is another treatment that involves talking with a trained mental health professional and working to the root of an anxiety disorder. iii) Medications Antidepressants and sedatives are working to balance brain chemistry, prevent episodes of anxiety, and ward off the most severe symptoms of the disorder c. The prevention of anxiety disorder can be done by below: i) Avoid or limit anxiety inducer such as caffeine and alcohol. ii) Talk to someone and seek for professional help when suffering. iii) Get enough sleep. iv) Eat a balanced diet.

			v) Avoid severe anxiety-causing medications. d. There are many types of anxiety as below: i) Post-traumatic stress disorder (PTSD) It is developed after exposure to a terrifying event or ordeal in which grave physical harm occurred or was threatened. ii) Social anxiety disorder It is an anxiety disorder when the patients feel overwhelming worry and self-consciousness about everyday social situations. iii) Panic disorder Patients experiencing recurring panic attacks at unexpected times. They may live in fear of the next panic attack. iv) Agoraphobia People who have agoraphobia have a fear of certain places or situations that make them feel trapped, powerless, or embarrassed. These feelings lead to panic attacks. v) Generalized anxiety disorder (GAD) They experience constant anxiety and worry about activities or events, even those that are ordinary or routine. vi) Obsessive-Compulsive Disorder (OCD) It is an anxiety disorder and is characterized by recurrent, unwanted thoughts and repetitive behaviours. vii) Substance-induced anxiety disorder It is characterized by symptoms of intense anxiety or panic that are a direct result of misusing drugs, taking medications, being exposed to a toxic substance or withdrawal from drugs.

			e. Yes. Anxiety is categorized as mental illness.
f. sweating	a. What metabolism related to human sweats? b. What is the mechanism of sweating? c. Why human sweats during anxiety? d. What disease related to over-sweating? e. What are the types of over-sweating?	To analyse the process of human sweating. To discuss the relationship of sweating symptoms to anxiety. To know the disease related to sweating.	a. When the body temperature rises, the sympathetic nervous system stimulates the eccrine sweat glands to secrete water to the skin surface, where it cools the body by evaporation. Thus, eccrine sweat is an important mechanism for temperature control. The eccrine sweat glands are located all over the body and produce a lightweight, odourless sweat. The sweat glands will reabsorb sodium chloride to maintain the electrolyte concentration in the body, including bicarbonate to maintain acid-base balanced. The apocrine sweat glands are concentrated in the hair follicles of the scalp, armpits, and groin. They continuously secrete a concentrated fatty sweat into the gland tube. Emotional stress stimulates contraction of the gland, expelling its contents. Skin bacteria break down the fats into unsaturated fatty acids that possess a pungent odour. b. The neural pathway from the brain to sweat gland is started by efferent signals hypothalamus travelling through the tegmentum of the pons and the medullary raphe regions to the intermediolateral cell column of the spinal cord. In the spinal cord, neurons pass through the white ramus communicans, and then synapse in the sympathetic ganglia. Postganglionic non-myelinated C-fibers combine with peripheral nerves and travel to sweat glands. The neural impulse due to the activated axon terminal is thought to travel antidromically to a branch-point, and then travel orthodromically to other nerve terminals, capping in the release of acetylcholine. Acetylcholine released from cholinergic nerves is rapidly hydrolysed by acetylcholinesterase. Thus, acetylcholinesterase is capable of modulating sweat rate during low to moderate sweating activity. c. During anxiety, nerves trigger the flight-or-fight response of the sympathetic nervous system and the body releases stress hormones such as adrenaline and cortisol, which cause our heart to pound fast. The body tries to direct more blood away from the extremities and toward its vital organs. It turns on apocrine glands to produce anxiety sweat, which

			physically different than heat sweat. this sweating is an evolved behavior that makes others' brains more alert and primed for whatever it is that's making us anxious. d. Hyperhidrosis, hypoglycaemia, drugs addiction, anxiety such as social anxiety and generalized anxiety disorder, medical condition such as diabetes, thyroid problems, cancer, heart attack, nervous system disorders and infections are diseases related to sweating. Sweating is also related to endocarditis, heart attack, heart exhaustion, leukaemia, and malaria.
g. hunger	a. How hunger links to anxiety? b. What diseases can trigger extensive hunger? c. Why is he not eating? d. What happen to our body when we are hungry? e. How hormones control appetite?	To discuss the relationship between hunger symptoms to anxiety. To discuss the metabolic pathways, occur in body when hungry.	a. Eating is an inherently emotional activity and the attachment system is an emotion regulation system. Individuals with attachment insecurity have less interoceptive awareness and difficulty regulating emotion. Insecurely attached individuals may eat emotionally because they misinterpret internal hunger cues. During anxiety, cortisol, the hormone which increases appetite is released by the adrenal glands due to persistent stress. If the stress is prolonged, cortisol may stay elevated due to stress, contributes excessive hunger. Without enough sugars and nutrients in your blood, your body becomes stressed, and anxiety is often the result. Lacking hormones such as ghrelin can cause anxiety. b. Hypoglycaemia, type-2 diabetes, hyperthyroidism, Graves diseases, premenstrual syndrome, and eating disorder such as bulimia are related diseases that trigger hunger. Drug addiction towards corticosteroids, cyproheptadine, and tricyclic antidepressants also trigger hunger. c. Some medications and drugs may reduce the appetite, including illicit drugs such as cocaine, heroin, and amphetamines. Some prescription medications such as certain antibiotics, codeine, morphine, and chemotherapy drugs can reduce appetite as well. Medical conditions such as chronic liver disease, kidney failure, heart failure, hepatitis and

			dementia can cause loss of appetite. People who lose their appetite are so consumed by the source of their stress or anxiety. d. The body works when hungry as below: i) The endocrine system Vagus nerve sends signals to the brain about how full or empty your stomach is, as well as the different nutrients present in the intestines. When the stomach has been emptying for two hours, it begins contracting to sweep remaining food into the intestines. This rumbling is called 'borborygmus'. Cells in the stomach and intestine produce ghrelin, a hormone that triggers feelings of hunger. The pancreas secretes glucagon to convert glucose stored in the liver to produce energy. Levels of key nutrients in the blood, including glucose, amino acids, and fatty acids are at their lowest concentrations when they are hungry. Hunger increases the impulsiveness and reduces the ability to make long-term decisions ii) Glycolysis The first stage in the breakdown of glucose to produce ATP is glycolysis. In this metabolic pathway, the six-carbon glucose molecule undergoes a series of transformations, each catalysed by a different enzyme. Along the way, glucose is cleaved into two pieces that each end up as the three-carbon molecule pyruvate. The energy from hydrolysis of two molecules of ATP is needed to drive this pathway, but four molecules of ATP are eventually formed, for a net gain of 2 ATP. iii) Krebs cycle Pyruvate is transported into the mitochondria and loses carbon dioxide to form acetyl-CoA. When acetyl CoA is oxidized to carbon dioxide in the Krebs cycle, chemical energy is released and

			captured in the form of 3 molecules of NADH, 1 molecule of FADH2, and 1 molecule of ATP. The cycle starts and ends with oxaloacetate. iv) Electron transport chain (ETC) The NADH and FADH2 produced during the Krebs cycle pass their electrons to the electron transport chain (ETC), the final stage of respiration. The electron transport chain consists of various proteins embedded in the mitochondrial membrane, as well as some mobile electron carriers. Electrons are passed through the carriers, eventually ending up reducing O_2 to form water. The energy released as the electrons flow through the chain is used to transport H^+ out of the mitochondria. The result is that it is more acidic outside the mitochondria, with a higher concentration of H^+. As the hydrogen ions flow back inside the mitochondria through the ATP synthase, energy is released that is used to make ATP. 30 ATP molecules can be yield per molecule of glucose. e. Hormone that suppress appetite i) Corticotropin-releasing hormone (CRH) ii) Adrenaline iii) Cholecystokinin (CCK) iv) Peptide YY v) Glucagon-like peptide 1 vi) Oxyntomodulin vii) Progranulin viii) Leptin Hormone that promote appetite i) Ghrelin ii) Cortisol

h. Biochemical investigation on blood	a. What are the types of blood test? b. Why we need to test blood? c. What is the instrument to measure blood?	To discuss types of blood test. To identify the importance of blood test. To determine the instrument of blood measurement.	a. The types of blood test are as below: i) Blood cholesterol test ii) Blood culture iii) Blood gases test iv) Fasting glucose test v) Glucose tolerance test vi) HbA1C test vii) Blood typing test viii) Cancer blood test ix) Chromosome test x) Basic metabolic panel (BMP) xi) Complete metabolic panel (CMP) xii) Lipid panel test b. The importance of blood test are diagnose diseases, check the function of organs, check the efficiency of treatment, find out the risk factors for heart diseases, the efficiency of the medicine taking, and how well the blood is clotting. c. Glucometer is used to measure blood sugar level. Blood analyser is used to analyse the blood sample.
i. blood sugar levels are 2.7 mmol/L	a. Is the blood sugar level high or low? b. What is the normal blood sugar level? c. What are the symptoms of low sugar level?	To discuss symptoms, causes, and treatment of low blood sugar level. To determine normal sugar	a. Low. b. For most healthy individuals, 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. Blood sugar level targets are 4 to 7 mmol/L for people with type 1 or type 2 diabetes before meals. After meals, the blood sugar level targets are under 9 mmol/L for people with type 1 diabetes and under 8.5mmol/L for people with type 2 diabetes.

	d. What are the causes of low sugar level? e. What is treatment of low sugar level? f. What does hunger links to low sugar level? g. What does sweat link to low sugar level? h. What does hand tremor relate to low sugar level?	level for human. To discuss the relationship between hunger sweating and tremor with low sugar level.	c. The symptoms of low sugar levels are feeling hungry, sweating, tingling lips, feeling shaky or trembling, dizziness, feeling tired, a fast or pounding heartbeat, tearful, moody, turning pale, being nervous or anxious, impatience, confusion, nausea, sleepy, feeling weak or having no energy, blurred vision, coordination problems, seizure, and nightmares. d. The causes of low sugar level can be Taking too much diabetes medicine, especially too much insulin, sulphonylureas or glinides such as repaglinide and nateglinide. Skipping or delaying a meal, over-exercising, not enough carbohydrates intake, starvation, and excessive alcohol intake also can cause low sugar level. e. The treatment of low glucose level depends on individual whether he or she has diabetes or not. For diabetes patients, they need to consume 15 to 20 grams of carbohydrates in the form of juice, hard candy, or glucose tablets. Glucagon is used in emergency treatment. Change the medicine that will cause low blood glucose level or seek for medical help also to treat low blood glucose level. f. Increased appetite can also be caused by abnormally low blood glucose. If blood glucose readings fall below 4 mmol/l, the body usually responds by releasing stored glucose from the liver to raise glucose levels back to normal. g. When glucose levels fall too low, the body tells the adrenal glands to release the hormone epinephrine, which signals the liver to make more sugar. The excess epinephrine creates an "adrenaline rush," which can cause feelings of anxiety. Due to excess adrenaline was produced, it will cause sweating. Once the blood glucose returns to normal, the sweating should stop. In addition, this symptom is controlled by the autonomic nervous system the part of the central nervous system that governs the skin and is usually one of the first signs of low blood sugar. The excessive

			perspiration comes on without warning, regardless of how warm or cold the external temperature may be. h. The central nervous system starts to malfunction when glucose levels are off balance. As a result, it releases catecholamines, chemicals that encourage glucose production and produce arm and hand tremor.
j. EXTRA QUESTIONS	a. What disease can we conclude from the trigger?	To identify the possible disease of the man.	The possible disease is hypoglycaemia. Based on the symptoms mentioned in the trigger, which irregular heart rhythm, lethargy, tremor of hands and arms, anxiety, sweating and hunger. All these symptoms are related to low blood sugar level. These symptoms are signs given by the body through endocrine system and metabolism. It is even more obvious when blood sugar levels reading was 2.7 mmol/L. For most healthy individuals, 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. But in this trigger, the reading was extremely lower than normal reading. Therefore, we can conclude that he is experiencing low blood sugar level (hypoglycaemia).

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