The body’s response to acute exercise essay

ASSIGN BUSTER

As a health and fitness instructor I need to be able to apply my anatomical and physiological knowledge to practical activities and exercises. I have conducted practical assessments to explore how the body responds to physical activity and exercise. I have then written a report, including all the anatomical and physiological changes that occur within each of the bodily systems. Acute exercises are a lower intensity for a shorter period of time. For example it could be twenty minutes on the treadmill. Acute responses are immediate responses to exercise such as an increase in body temperature and heart rate.

There is an increase in blood supply as it has to go to the parts of the body that are exercising the most. For example if an individual took part in a cross country run, the blood supply would increase because their legs would need more energy. This means that there would be more blood circulating in their legs than normal because they are being overworked. During acute exercise muscle pliability increases allowing a greater range of movement. Acute exercise causes muscle fibre tears. Energy Systems Response to Acute Exercise:

An energy systems response to acute exercise happens when the exercise is of a high intensity, which is too much for the cardiovascular and respiratory system to deal with. The first response is to use the creatine phosphate energy system. The first response is to use the creatine phosphate energy system. This works in the fast-twitch muscle fibre of the muscles high energy creatine phosphate compounds which are able to break down extremely quickly to create large amounts of ATP. ATP is where we get the energy from

to continue and this system only works for the first 10 to 20 seconds of exercise with 100% effort.

It is likely that the lactic acid system would provide energy at the start of any activity, even if the intensity is not enough for the aerobic system. If you go out on a jog, most of this is powered by the aerobic system, but the start of the jog is needs to create ATP so that the heart and lungs have enough oxygen and can saturate the blood before the aerobic system can kick in. When the heart and lungs have caught up with the movement of the activity and the intensity is low enough, then the aerobic energy system can fuel the body.

In scenarios, such as an overweight person trying to walk up the stairs, the unfit person cannot supply enough oxygen to their body with the aerobic system. This may require a tremendous amount of effort for the individual, so they would have to use the anaerobic system without a choice. This would cause them high heart and breathing rates, they would have to take recovery periods and would produce lactic acid, as a part of anaerobic energy production. Energy Systems: ATP is the only usable form of energy in the body; therefore it must be made from ADP continually for our muscles to continue to contract. PC/Lactic/Aerobic.

An increase in muscle contraction means that more energy is needed when we start to exercise. Muscles use more oxygen and glucose from the muscles and liver to produce more energy for acute exercise. Lactic acid is created where oxygen is not available. Body temperature and the skin reddens as blood moves to the surface to radiate heat as energy is produced. Energy

Continuum: The duration and intensity of the activity will determine which the predominant system is. For example, a 1500metre race represents a mixture of energy systems used when the athlete kicks at the start and finish of a race the phosphocreatine system will be used.

During the race there will be a mixture of the lactic acid and aerobic system depending on the time taken to run the distance. For some activities it is easy to decide which energy systems are involved to produce energy, for example, a marathon probably uses 95-100% of the energy from the aerobic system. In the first energy system, ATP is useful for a very short time. After this, another chemical called PC (phosphocreatine) starts creating ATP. PC is like ATP in the fact that it is made from foods you eat and stored in the cells.

The body stores only small amounts of ATP and PC, and the energy from this source can only be used for short quick bursts, such as lifting weights or the start of a race when you need an explosive burst of energy. The second energy system that is used when system one is depleted is called anaerobic glycosis. Anaerobic means “ without oxygen”. And glycosis is the breaking down of glucose. Glucose is a form of carbohydrate that is stored in the blood. So, this second energy system produces ATP by the process of breaking down glucose. The glucose is only partially broken down and it leaves a by-product behind called lactic acid.

Lactic acid forms in the muscle and gives the feeling of discomfort and muscle fatigue, it also hinders the production of ATP. The third energy system is called aerobic metabolism. Aerobic means oxygen. The body uses oxygen in combination with glucose, proteins, and fats stored within itself to

produce large amounts of ATP. This produces high-energy ATP that lasts for hours and doesn’t leave behind any fatiguing by-products such as lactic acid. Sports that rely on this energy system are marathon running, cycling, and swimming. This energy system is where the cardiovascular system is strengthened and stored fats are used up.

Nerves that directly supply the heart and chemicals in the blood can rapidly alter heart rate. Before the start of exercise heart rate usually increases above resting levels. This is known as anticipatory heart rate. Before acute exercise this happens norepinephrine from your sympathetic nervous system is released, as well as the hormone epinephrine from your adrenal gland. This is because your brain sends signals to your glands to release norepinephrine and epinephrine to send to the heart to start the anticipatory heart rate. The greatest anticipatory heart rate response is observed in short sprint events.

Respiratory System: Respiratory rate increases (number of breathes per minute), which is called frequency. When you are exercising your respiratory system responses by your breathing rate increases and you start to breathe heavily, this happens because your muscles need more oxygen so you breathe deep and quicker so a supply of oxygen can get to the muscles, also when you finish exercise your breathing rate will decrease and start to recover. Another response from the respiratory system is the tidal volume, which increase as a response to exercise this is because the muscle needs an increase of oxygen.

As well as the breathing rate and tidal volume, the pulmonary ventilation is also a response to exercise on the respiratory system. The pulmonary ventilation increases when the body starts to do exercise, this happens because like most of the other responses the muscles need more oxygen, there is also an increase in the removal of carbon dioxide The lungs take in oxygen and give out carbon dioxide. This gas exchange takes place in the alveoli of the lungs. Alveoli are bunches of tiny air sacks situated inside the lungs. The individual sacks are called alveolus. They fill with air when you breathe in.

Alveoli have very thin walls which permit the exchange of gases Oxygen and Carbon Dioxide. They are surrounded by a network of capillaries, into which the inspired gases pass. Gases can pass through the thin walls of each alveolus and capillary into the bloodstream. Gases can also pass from the bloodstream into the alveolus. The aim of breathing is to get oxygen into the bloodstream where it can be delivered to the working muscles of the body. The oxygen enters the mitochondria where it combines with fats and carbohydrates to produce energy, with carbon dioxide and water as waste products.

The energy is used to produce muscle contractions. The respiratory centre in the brain speeds up the rate of breathing to get rid of excess carbon dioxide. The breathing rate increases because carbon dioxide levels rise. Diffusion is the movement of gas from an area of high pressure to an area of low pressure across a semi permeable membrane. In the lungs we have a high pressure of oxygen, and in the muscles we have a high concentration of carbon dioxide and they will diffuse across the semi permeable membrane.

Materials like oxygen, carbon dioxide and glucose enter and leave cells by diffusion. When a cell is respiring the concentration of oxygen and glucose inside the cell is lower than the surrounding blood so these substances move into the cell. As carbon dioxide is produced the concentration inside the cell increases to a level higher than the surrounding blood, so carbon dioxide diffuses out of the cell. Cell membranes are very thin to allow materials to diffuse through them easily.