Long term effects of exercise

Assignment 2 The Body’s responses to long term exercise A response to long term exercise is a change that happens to your body over a long period of time due to exercise. It is also known as chronic exercise. Unlike the short-term effects, these changes do not happen immediately, they take time and effort to achieve. Once these responses take place it will allow an athlete to work at a higher intensity for longer. These changes mainly occur in the heart, lungs and muscles. This table shows the changes that occur in our body after long term exercise.

The cardiovascular system As a result of long term exercise, your muscles will begin to hypertrophy which means they get bigger in size due to the tearing of muscle fibres. Cardiac hypertrophy is an example of this and it is defined as the thickening of the heart muscle which results in a decrease in size of the chamber of the heart, including the left and right ventricles. This means that your heart will be able to pump more oxygenated blood with less strain on the heart, which is more efficient for when taking part in exercise.

This is due to an increase in stroke volume which is the volume of blood pumped from one ventricle of the heart with each beat. This means that the oxygen carried in the red blood cells can be used more efficiently and get there quicker. This will lead to a decreased recovery time as the heart is supplying a larger amount of blood (containing oxygen) in each contraction. This can also lead to a lower resting heart rate and blood pressure because the heart doesn’t need to work as hard to pump the blood around the body resulting in less stress and strain on the heart and arteries. Secondly, as the heart is stronger there will be an improvement to the body’s aerobic fitness

because the heart is becoming more efficient at using oxygen and is able to pump oxygenated blood around the body quicker and easier.

This can be due to capillarisation which is the growth of capillaries leading to blood increases. This allows an improved supply of glucose, better diffusion of oxygen and quicker elimination of lactic acid. Capillarisation therefore enables the fast fibres to be more resistant and maintain the best of their capacity for longer. This is likely to lead to an increased level of performance and a more efficient system for your body when training or taking part in regular exercise. This can be seen in athletes such as Mo Farrah, who specifically train their cardiovascular system to be able to cope with the demands of long distance running. Respiratory system

There are four main changes that occur as a result of long term exercise which include an increased vital capacity, increased strength of respiratory muscles, an increase in oxygen diffusion rate and increase in minute ventilation. Vital capacity refers to the amount of air being exhaled after a deep breath. An increase in vital capacity happens due to long term exercise because as the body is being worked there is a higher demand for oxygen. As the lungs supply this oxygen for the rest of the body they will eventually increase in size, meaning they can not only supply more oxygen with each breath but they can also exhale a larger amount of carbon dioxide (the waste product from respiration.) Respiratory muscles are the muscles that enable you to breathe, for example your intercostal muscles and your diaphragm.

As you take part in long term exercise, these muscles get stronger as they are working harder to supply the body with oxygen. The long-term effect of exercise is to build the endurance of these respiratory muscles, allowing deeper, fuller and more efficient breaths. The body’s oxygen diffusion rate increases as a result of long term exercise. Your body adapts to long-term exercise by increasing the size and number of capillaries, this adaptation makes the exchange of carbon dioxide and oxygen more efficient. Minute ventilation is the volume of gas inhaled or exhaled from a person’s lungs per minute. This can depend on breathing rate and tidal volume however as a result of long term exercise, this measure increases as the body is able to inhale/exhale a larger amount of gas per minute. This is due to the increased tidal volume and increased strength of respiratory muscles.

Muscular System Hypertrophy is when muscles grow in size due to the tearing of muscle fibres. This happens as a result of long term exercise which also leads to greater muscle mass and a lower percentage of fat in the body. This happens because of the increase in the number of myofibrils and connective tissue. Long term exercise increases tendon strength. Tendons have to adapt to meet increased demands of the skeletal muscles. Tendons connect muscle to bone and come under forces during exercise forcing them to adapt to become stronger to better deal with the forces applied, it also becomes of greater importance to adapt and maintain a balance as the muscles they are attached to grow in size, resulting in a greater force and pull upon the bone, or an improve in their ability to move faster.

The amount of myoglobin within skeletal muscle increases, which allows more Oxygen to be stored within the muscle, and transported to the

mitochondria. Long term training makes muscles increase their oxidative capacity which is achieved by an increased supply of ATP, also the ability of the muscles to store myoglobin. Long term exercise results in increased numbers of mitochondria. Increased numbers of mitochondria means an increase in the rate of energy production. Muscles consume more oxygen due to increased size and number of mitochondria therefore glycogen and fats are used more effectively. Increased numbers of mitochondria means an increase in the rate of energy production. Long term training increases the quantity of mitochondria which leads to an increase of the output of ATP.

Skeletal system Long term exercise slows the rate of skeletal aging. Athletes who maintain physically active lifestyles have greater bone mass compared to those who take part less. This is because the body gains and increased number of calcium stores which means that there are more minerals being stored that are essential for healthy bones and make them stronger and denser. Stronger bones are an outcome of long term exercise and this is due to the increased number of calcium stores. Stretch of ligaments and stronger ligaments – Long term exercise will enable ligaments to increase their stretch and become stronger in order to cope with the body’s gain of muscle. This is due to an increase in the production of collagen fibres which is a response to the stress being put on them from regular exercise.

This allows the ligaments to become more pliable which is helpful for athletes as they will have a wider range of movement and they are less likely to injure themselves as the ligaments are not only stronger but they are able to cope with intense exercise. Long term exercise will also affect the production of synovial fluid which allows movement around a joint. An

increase in synovial fluid is due to an increase in temperature as you do exercise.

The higher body temperature due to exercise causes the synovial fluid to become thinner and flow more freely around the joint allowing for greater range of movement for an athlete. This will benefit the athlete in many ways such as a reduced risk of becoming injured and the capability to achieve a wider range of movement, therefore improving the standard of performance. Increased thickness of a Hyaline cartilage is another chronic response of the skeletal system. This kind of cartilage is the most common type of cartilage in your body. This protects the ends of your bone from wear and tear. Over a long period of time the cartilage will become thicker as it needs to become a better shock absorber, this will therefore decrease the chances of an injury during any physical activity as they can take more pressure. Energy systems

Some changes that occur to our body's energy systems due to exercise include a higher tolerance to lactic acid, increased muscular stores for ATP and PC and developed fast and slow twitch muscle fibres. Increased muscular stores for ATP and PC occur due to the muscles increased supply of ATP causing an increased oxidative capacity. This is partly due to capillarisation allowing a larger blood supply to the muscles, therefore providing more energy. This also means that the body can get rid of Lactic Acid quicker as the larger blood volumes will provide the body with energy. This allows an athlete to be able to work harder for a longer period of time. For example, Mo Farrah has a very high tolerance to lactic acid as he takes part in chronic exercise all year round. This means that he is able to take part in his marathon's and races.

If he didn’t have a high tolerance to lactic acid or a high supply of ATP, he would not be able to maintain his long distance running and would struggle with the intensity of it. In conclusion, chronic exercise can have many different positive effects on the body. Personally, I believe it is really important to take part in chronic exercise to keep a healthy lifestyle and reduce the risk of becoming obese, injured or suffering from any illnesses due to a poor lifestyle.