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## Effects of Physical Activity on Body Systems

In this lesson we'll discuss the effects, both short-term and long-term, of physical activity on each of the major systems of the human body. In addition, we'll discuss both the positive and negative effects of exercise.

Effects of Physical Activity

The majority of scientists now believe that the effects of physical activity are mostly good for the human body. Many even believe that exercise and a proper diet, along with the cessation of smoking, are the most important things one can do to prevent premature death. We should note here that the effects of physical activity (and accompanying nutrition) are a source of endless debate among experts, scientists, and laypeople alike. This lesson will look at both the short and long-term effects on each of the major systems of the body that occur while engaging in physical activity.

Systems of the Human Body

Before we discuss the effects of physical activity on the human body, it is imperative that first we identify the major **systems of the human body**. They are the circulatory, digestive, endocrine, excretory, immune, integumentary, muscular, nervous, respiratory, and skeletal.

Circulatory or Cardiovascular System

Physical activity not only raises good HDL cholesterol but also reduces the dreaded triglycerides. This has the ever so important effect of keeping the blood in your circulatory or cardiovascular system flowing smoothly through your arteries and your veins. In the short-term, an athlete's blood pH actually becomes more acidic, and carbon dioxide is expelled at a more rapid pace. The heart rate also increases and the blood flow to the skin increases. We have all seen an athlete's face turn red during the exertion of strenuous physical activity. The bottom line is that, in the short-term, oxygen is rushed to the working muscles, and fuel is delivered to the body tissues.

In the long-term, however, the athlete's heart rate actually goes down, not up. We have heard about Tour de France cyclists having resting heart rates of only 40 beats per minute, whereas the average adult may have a resting heart rate of about 80 beats per minute. Another major long-term benefit seen is that the athlete's blood pressure will be reduced. High blood pressure has been linked to a myriad of health hazards, including strokes.

In the long-term, the benefits are vast as regular exercise can protect against heart attacks, strokes, and diabetes. The American Diabetes Association considers exercise so crucial in protecting the heart and blood vessels that it recommends 30 minutes of moderate exercise at least five days a week. On the downside, heart attacks can occur to anyone, even a world class athlete. It is worth noting, however, that far more Americans die each year of a sedentary lifestyle than they do from a fitness lifestyle.

Digestive System

When to eat and how much to eat are subjects of endless debate among experts. After all, in the short-term, when one exercises, the body must send more blood to the muscles; therefore, it must compensate by taking away from the needs of the stomach and the digestive system. This is why many experts believe eating a large meal too soon before exercise can cause stomach upset. We have all heard the advice of our parents not to swim for a half-hour after eating because cramps could result, which to this day is a source of contentious debate. Furthermore, a really fascinating study of forty Irish Rugby players found that, versus another group of non-athletes, the rugby players had more gut microbiota in their intestines, which is beneficial in helping the body's immune system.

Endocrine System

The **endocrine system** is composed of a series of glands that secrete hormones. Of special importance is the pituitary gland. In the short-term, exercise enables this gland to produce human growth hormone and secrete hormones that allow movement. Diabetes management comes into play here just as in the circulatory system. In the long-term, physical activity has a trifold effect of strengthening the ticker, lowering blood sugar levels, and improving insulin levels.

Excretory System

It's not the most pleasant or glamorous system to discuss, but the **excretory system** is responsible for the critical role of removing liquid and solid wastes from the human body. In the short-term, the rate at which the kidneys filter blood changes in relation to how hard the athlete exercises. Also, constipation may be relieved.

Immune System

Of all the human body systems, the effect of physical activity on the immune system seems to spark the most debate among experts and scientists. It is now believed that physical activity helps to strengthen the immune system. The general theory is that exercise increases the cells, and even gut microbiota, in your body that help fight disease. When a person exercises, the effect of enhancing the immune system lasts for several hours. There is evidence, however, that exercising for over two hours may actually cause a short-term weakening of the immune system. On the other hand, more intense physical activity for only about 30 minutes may not weaken the system. The evidence suggests that, if a person exercises for too long and doesn't rest enough, the immune system can suffer. The secret seems to be in finding a healthy balance between exercise and rest. More study will be needed to fully understand the connection between exercise and the immune system.

Integumentary System

The **integumentary system** is just a fancy term for the system that includes the hair, nails, and skin, the latter which by the way is the body's largest organ. In the short-term, as the exercise level increases, the blood flow to the skin increases, and then the heat disappears through the pores. This has the positive effect of cooling the body. Also, sweat can be produced on the skin during this process. In the long-term, physical activity can keep the skin looking more youthful and feeling softer and more pliable.

Muscular System

In the short-term, exercise may cause muscle soreness and muscle fatigue. Exercise temporarily breaks down muscle, but crucial rest allows muscles to rebuild and grow. In the long-term, we see how physical activity may have a dramatic, positive effect on the muscular system. The muscles may become larger and stronger or, depending on the exercise, they may develop muscle endurance. Exercises such as yoga may make the muscles more flexible. On the downside, the athlete may experience muscle pulls or even muscle tears.

Nervous System

The **nervous system** is composed of the spine, the nerves, and the brain. Nascent research is finding exciting news that exercise can stimulate the entire nervous system.

If you have ever wondered why you felt better after a brisk walk or an aerobics class, there is a scientific explanation for this phenomenon. Exercise actually boosts chemicals, known as **endorphins**, in the brain that help lift your mood. We have all heard someone joke about being on an 'endorphin high', and to many, this is more than just an expression. It should be duly noted, however, that there is another camp of scientists that say the runner's high is nothing more than a myth.

Many scientists now believe that exercise can do more than just elevate one's mood, it can also help alleviate depression in individuals who are prone to it. If that's not enough, physical activity may actually help stave off dementia. Scientists haven't fully solved this riddle, but many theorize this is due to the increased blood flow to the brain, which somehow prevents plaque from building up in the brain, a symptom connected to dementia.

Exercise can have psychological benefits, as well. In the long-term, some people may become addicted to exercise in a similar way that people become addicted to drugs or alcohol or even food. On the positive side, when one looks in the mirror and likes the results, exercise can result in improved self-image, self-confidence, and self-esteem.

Respiratory System

The average adult takes over 20,000 breaths each and every day. In the short-term, exercise increases the breathing which allows more oxygen to reach the lungs and the blood. In the long-term, exercise keeps the respiratory system and the lungs clear and healthy and able to produce more oxygen. This means the lungs will operate at a more efficient level while having more lung capacity.

Skeletal System

In the long-term, exercise can help a person lose weight and maintain that weight loss. Much less stress is put on the ankles, knees, and other joints, lessening the chance of injury. In the long-term, however, exercise can also wear down the cartilage between the knees and cause pain and discomfort. Obviously the risk of injury to the skeletal system is always there for the athlete during exercise. Sprains involve injury to ligaments and strains to tendons. There are also joint dislocations and, in the worst cases, fractures, breaks, or even death.

Lesson Summary

Most experts now believe that physical exercise can play a major part in the overall health of the human body and in preventing premature death. In this lesson we discussed the effects of physical activity on the human body and its major systems. We discussed the circulatory, digestive, endocrine, excretory, immune, integumentary, muscular, nervous, respiratory, and skeletal systems. Then, we looked at both the long-term and short-term effects of exercise on these systems.

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