



CARDIORESPIRATORY ENDURANCE FOR LIFE



Some people are full of energy; they are always on the move and never seem to get tired. These people have a healthy level of cardiorespiratory endurance which provides them with the energy and stamina to enjoy life to its fullest. **Cardiorespiratory endurance** is the ability of the heart and lungs to supply oxygen to the body. People with low levels of cardiorespiratory endurance become tired easily, and are often out of breath. Poor cardiorespiratory endurance can lead to health problems, such as heart attacks, strokes, high blood pressure, obesity, and Type 2 diabetes. Heart disease is the number one health problem in America. It accounts for more deaths than all other diseases combined. There are risk factors that increase the chances of suffering from heart disease. Age, gender and heredity are examples of risk factors you have no control over (uncontrolled). Smoking, poor nutrition, inactivity, and obesity are examples of risk factors well within your control (controlled).

Cardiorespiratory endurance training improves performance during physical activity, allowing a person to participate longer and take fewer and shorter rest breaks. Appearance is improved with cardiorespiratory endurance training, as it burns extra calories that would otherwise be stored as fat. Activities which are continuous in nature, such as jogging, jumping rope, swimming, hiking, power walking, skating and bicycling, are good examples of cardiorespiratory endurance training. These activities can be done for long periods of time without taking breaks. To receive the benefits from cardiorespiratory endurance training, it is recommended that a person work at 65-85% of his/her maximum heart rate or an intensity level (RPE) of 4 and keep it there for at least 60 minutes on most days of the week.

To understand how cardiorespiratory endurance training improves health, performance, and appearance, knowledge of the respiratory, cardiovascular and muscular systems is necessary.

The **respiratory system** includes the nose, mouth, trachea, diaphragm, and lungs. The diaphragm is a large, dome-shaped muscle that separates the chest and abdomen. When it contracts, air is drawn in through the nose and mouth, passing through the trachea (windpipe) and into the lungs. While air is in the lungs, an important exchange is made. Blood that is circulating around the lungs exchanges carbon dioxide for oxygen. Carbon dioxide is then eliminated in expired air as the diaphragm relaxes. The respiratory system works more efficiently after cardiorespiratory endurance training. The diaphragm becomes stronger, enabling the lungs to expand further, which allows a greater amount of air into the lungs with each breath.

The **cardiovascular system** includes the heart, arteries, capillaries, veins and blood. The heart is the most important muscle in the body. It is the pump that is responsible for circulating blood throughout the entire body. **Arteries** are the vessels or tubes that the oxygen carrying blood flows through as it leaves the heart to all the cells of the body. **Capillaries** are the smallest of the blood vessels, and is where the blood exchanges oxygen for carbon dioxide. Veins are the vessels that transport the de-oxygenated, carbon dioxide carrying blood back to the heart and lungs. Blood is the ultimate delivery truck for all the cells in the body. It delivers life-saving, energy-producing oxygen to the cells and then picks up carbon dioxide and takes it away.



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The cardiovascular system is greatly improved through cardiorespiratory endurance training. First, the heart, like all muscles, becomes stronger with more activity or overload. As the heart becomes stronger, it is able to pump more blood with each beat. The heart can then beat at a slower rate during rest. Another improvement is in the amount of capillaries that are around the muscles themselves. With more capillaries available to the muscles, an increased amount of oxygen can be delivered. Training has also been shown to increase the number of capillaries around the lungs. This improvement allows the blood to transfer carbon dioxide and oxygen more efficiently. With the heart's ability to pump more blood and with more capillaries present, the blood has more places to go.

The primary function of the cardiovascular and respiratory systems is to obtain oxygen for use by the body's cells and to eliminate carbon dioxide that cells produce. Bad habits such as smoking, lack of exercise, drug use, poor nutrition and obesity may interfere with the body's ability to utilize oxygen efficiently.

The muscular system has two main energy systems, the anaerobic system and the aerobic system. **Anaerobic** means without oxygen. **Aerobic** means with oxygen. The body can be compared to a car in that the muscles have two gears. The anaerobic system is used for short bursts of power and speed, and the aerobic system is used for long steady journeys. By doing cardiorespiratory endurance activities, which increase the heart rate for long periods of time, the muscles become more efficient at using oxygen and burning fat.

The anaerobic system is the most powerful and can create the greatest amount of force. This is good because it is the first energy system that is called upon when needed. For example, in an emergency, a person might need to run from a dangerous situation. The anaerobic system will use stored chemicals already present in the muscles to produce movement. The person will be able to run very fast. The problem with this system is that the muscles will not continue to perform with as much power or speed and the person will have to slow down or stop sooner. While the muscles use up these stored chemicals, the heart rate is increased to meet the energy demands in the muscles.

As the heart and lungs begin to deliver more oxygen to the muscles, they switch gears and begin to use the aerobic system. When oxygen is present in the muscles, the heart and lungs are much more efficient. The problem with this system is that a person can not run as fast, jump as high, or move with as much power as they can while using the anaerobic system. If the activity is too vigorous, the heart and lungs will not be able to supply enough oxygen to the muscles involved which causes the activity to become anaerobic.

Cardiorespiratory endurance training creates changes within the respiratory system by allowing the lungs to be able to breathe in more oxygen. The cardiovascular system improves by producing more blood cells, more capillaries and a stronger heart muscle. As the muscles spend more time training in the aerobic system they also begin to change. The muscles become better at taking oxygen from the blood and become more efficient at using oxygen. The muscles also become more efficient in using fat as an energy source. These improvements in the systems of the body all lead to remarkable improvement in health, performance, and appearance.

Key vocabulary words that will be introduced during this unit are:

- **Aerobic** – Energy producing system within the muscle that requires oxygen
- **Anaerobic** - Energy producing system within the muscle that is without oxygen
- **Arteries** – Small tubes or vessels for blood leaving the heart
- **Blood** – Red liquid that flows throughout the body delivering oxygen and picking up carbon dioxide
- **Capillaries** – Smallest of the blood vessels and the place where tissues of the body exchange carbon dioxide in exchange for oxygen
- **Cardiovascular system** – The network of blood vessels and the heart that pumps blood throughout the body
- **Mouth** – An opening in the body which is used for eating and breathing
- **Muscular system** – A complicated system of 650 muscles that coordinates and produces movement by shortening and lengthening muscles
- **Nose** – Part of the body that is used for smelling and breathing. The nose has two nostrils
- **Respiratory system** – The passageways, muscles, and lungs that allow oxygen to be breathed in (inhaled) and carbon dioxide to be breathed out (exhaled)
- **Trachea** – Part of the respiratory system, sometimes referred to as the windpipe
- **Veins** – Small tubes or vessels for blood returning to the heart