

*The Living*  
**BODY**

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HUMANITIES &  
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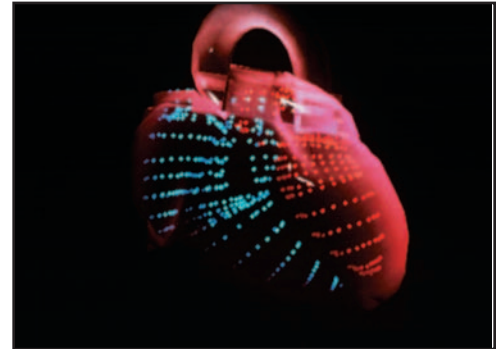


# Two Hearts That Beat as One

## Summary

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This program follows a family's activities during a day at an amusement park. The mechanics of the heart's pumping action, its structure and adaptability to the body's changing demands are examined in detail as family members seek thrills on waterslides and roller coasters.



The heart is the source of power for the body's delivery system. It pumps blood that delivers regular supplies of food and oxygen to all the body's cells. The human heart is actually two pumps contained within the same organ. Oxygen from the air breathed in mixes with blood in the lungs, and flows to the heart where it needs to be pumped at a high enough pressure to supply the farthest reaches of the body. As the blood travels through the body, it gives up oxygen and takes on carbon dioxide. As this blood returns to the heart, it must be pumped again into the lungs where it can take on more oxygen and get rid of its carbon dioxide. As the heart contracts and sends out a pumpful of blood, its valves prevent the blood from pouring back as the heart muscle relaxes again. The force of the heart's contractions, as well as the rate of its beats, can vary to send blood to where it is needed, and at the right pressure and speed.

The heart is divided into two halves separated by a solid wall of tissue. Each half has two chambers connected by a valve. The camera explores the interior of a beating human heart, following the path that freshly oxygenated blood takes as it enters the left atrium. The viewer sees columns of tissue connecting the chamber walls, and watches the rhythmic opening and closing of the delicate, sectioned membranes of the heart's valves. The heart has basically three components: heart muscle, four valves, and a pacemaker. The heart muscle provides the force to push blood through the valves, which produce the sound of the heartbeat by generating waves of turbulence in the blood each time they close. The pacemaker coordinates the timing of heart muscle contractions through electrical impulses, thus controlling the heart rate.

The body can prepare itself to escape dangerous or stressful situations. This is the so-called "fight or flight" response which causes the heart to increase its activity. This activity provides muscle with extra supplies of oxygen and fuel. Through exercise the human heart can be trained to increase its output four or five times. A well-trained heart actually grows bigger and stronger and can deliver the same amount of blood with fewer beats.

Heart muscle cells need access to a blood supply of their own, which is provided by the coronary arteries. Fats in the blood or blood clots can lead to these arteries becoming narrowed or blocked. If the blockage is severe enough it produces a heart attack.

## Objectives

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1. To show that the human heart is actually two pumps joined together in the same organ.
2. To illustrate the heart's structures and components, and explain how they work.
3. To describe the heart's role in the body's "fight or flight" response.
4. To explain how the heart can grow larger and stronger through exercise.
5. To examine the network of coronary arteries.

## Recall Questions

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1. What adjustments does the heart make when a person moves from a rested physical state to strenuous exercise?
2. Explain why the blood that enters the right side of the heart appears bluish in color compared to the blood passing through the left chambers of the heart.
3. What causes the familiar sound of the heartbeat?
4. What is the effect of adrenaline on the heart? Where is it produced?
5. Describe the conditions in the heart's coronary arteries that lead to heart attack.

## Interpretive Questions

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1. Why do you think the heart has four chambers? Why is it not constructed with just two chambers, one on the left, the other on the right?
2. Recount a recent situation that triggered a "fight or flight" response in you. What emotions can trigger this response?
3. Why do you think the heart muscle requires its own network of arteries? Why does it not just absorb the nutrients it needs directly from the blood flowing through its chambers?

## Vocabulary Required for Effective Viewing

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- adrenaline
- angina
- aorta
- artery
- atrium
- capillaries
- contraction
- coronary arteries
- pacemaker
- pressure
- valve
- ventricle



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