

The Living
BODY

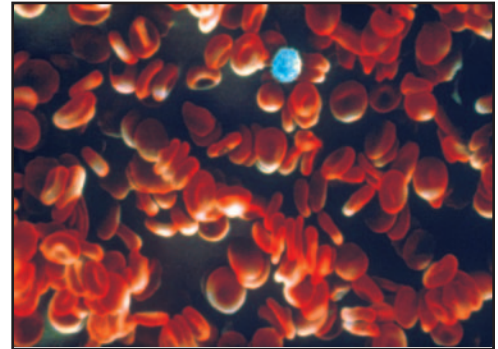
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Life Under Pressure

Summary

This program examines the circulatory system; it is set in a small Italian village, whose water system is the analogy for the human body's circulatory system. The camera traces the path of freshly oxygenated blood as it is pumped from the heart, circulates through the arteries, and returns to the heart through the veins. Blood pressure is also examined, and the consequences of extremes in blood pressure are illustrated.



Blood is the body's fluid transport system, delivering essential supplies to every part of the body. It is transported through the network of blood vessels which control the flow of blood through muscles and valves. The heart is at the center of blood circulation. Under pressure from the heart, the blood flows outwards in the arteries and back through the veins. The fibrous, muscular walls of the aorta—the widest artery in the body—receive the full force of blood as it is pumped from the heart. The arteries become narrower and divide into smaller and smaller tubes as they reach further through the body. It is in the capillaries that dissolved substances in the blood leak out and are absorbed by the surrounding tissue.

When freshly oxygenated blood is first pumped from the heart, some of it is immediately diverted into the coronary arteries. The remaining pumpful of blood is divided between arteries leading to the arms, brain, and down the center of the body. The blood supply to the brain is constantly monitored for pressure and oxygen level by special detector cells in the arteries of the neck. The artery descending through the body's center has branches leading to the stomach and intestines; the kidneys receive one quarter of the blood pumped by each heartbeat, filtering the entire blood volume two or three times per hour. The main artery then forks, a branch leading to each leg. The blood vessels in the leg become narrower and dilate or constrict to control the blood flow. Small rings of muscle at the junctures between vessels open and close to divert blood in response to hormonal messages.

After the blood has unloaded its supply of oxygen, it returns to the heart in the veins, whose walls are thinner than arteries' because they don't carry blood under pressure. They also have pocket valves that prevent blood from flowing back after it has been squeezed forward. Leg veins depend on random leg movements to help squeeze blood toward the heart. The veins widen as they move further up the body and are joined by other veins returning blood from other organs and limbs. The rhythmic movement of breathing aids in pushing blood in the chest toward the heart, where it is pumped to the lungs again and repeats its circulatory path through the body.

Objectives

1. To illustrate the paths of the major blood vessels.
2. To examine how the capillaries function as the site where blood unloads the substances needed by the tissues.
3. To analyze how blood pressure is created and maintained.
4. To show how blood flow is controlled by valves and the dilation and constriction of vessels.
5. To describe how veins use a system of valves and muscle movements to squeeze low-pressure blood back to the heart.
6. To demonstrate the consequences of low and high blood pressure.

Recall Questions

1. How is the body dependent on the circulatory system? Be specific.
2. What is the main source of pressure that pushes blood through the network of vessels that contain it?
3. What are the differences between arteries and veins in terms of their structures and functions? Why are the arteries usually illustrated by the color red, and veins blue?
4. How much blood is diverted to the coronary arteries with each heartbeat?
5. How is the blood supply to the brain monitored? Why is this so important?
6. What are the special designs in veins that force low-pressure blood back to the heart?

Interpretive Questions

1. Many people are plagued with varicose veins in their legs. What are some possible causes for this condition?
2. Can you think of reasons why blood would be diverted from one part of the body to flow to another?

Vocabulary Required for Effective Viewing

- aorta
- arteries
- blood pressure
- capillaries
- coronary arteries
- pocket valves
- veins



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