# Lesson 1.2: The Case of the Obstructed Respiratory System

#### **Overview**

Read this to see how causal loop diagrams can illuminate a system and a problem in it.

## **Quick Introduction: Foxes and Rabbits**

This Loopy animation shows a simple balancing loop with only two variables: foxes and rabbits. As you know, foxes eat rabbits. When there are more rabbits available as food, the fox population grows. When there are a lot of foxes, the rabbit population falls. The cycle repeats indefinitely as the two populations balance each other out. Watch how positive and negative relationships change as this animation plays out.

## Foxes and Rabbits Loopy Video (23 seconds)



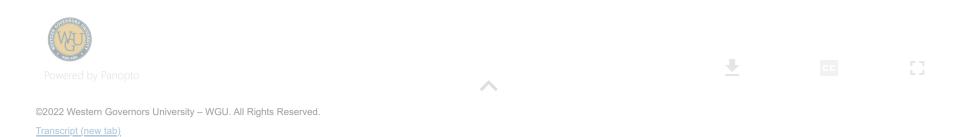
# **Normal Respiratory Function**

Now, look at a more complex system. The human respiratory system transports oxygen to the cells of the body and, at the same time, removes carbon dioxide. Operating correctly, the system works as shown in this Loopy animation:

## **Human Respiratory System Loopy Video (23 seconds)**

Human Respiratory System Loopy





With each breath, oxygen is inhaled and transported to the lungs. Blood moving through the lungs carries oxygen to the heart. From there, the oxygen-rich blood is pumped throughout the body, depositing oxygen in all the cells and picking up carbon dioxide, a waste gas. The oxygen-poor, carbon dioxide-rich blood then flows back to the heart and is pumped to the lungs, where the blood releases carbon dioxide and picks up oxygen, and the process continues.

### Willem's Heart

The respiratory system is indeed an impressive thing when it works correctly, but it does not always do that.

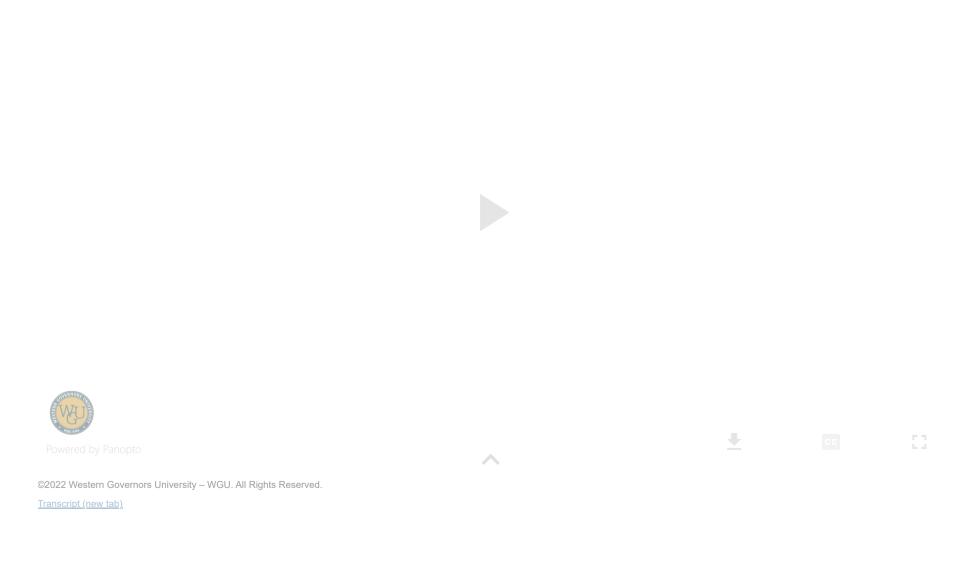
For example, Willem's doctor has just told him that his heart is not operating quite as it should. Because of years of cigarette smoking and a subpar diet, Willem is suffering from atherosclerosis, a narrowing of the arteries (vessels carrying blood from the heart to the body) caused by plaque buildup on the artery walls. Willem has been experiencing some chest and leg pain, shortness of breath, and fatigue, and his doctor believes that Willem has an arterial blockage which is making his heart work harder than it should and slowing the movement of blood around his body.

Can you envision a revised Loopy animation that represents Willem's heart? Take a moment to think.

Now see if your ideas resemble this version:

## **Human Respiratory System with Blockage Loopy Video (21 seconds)**

Human Respiratory System with Blockage Loopy



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