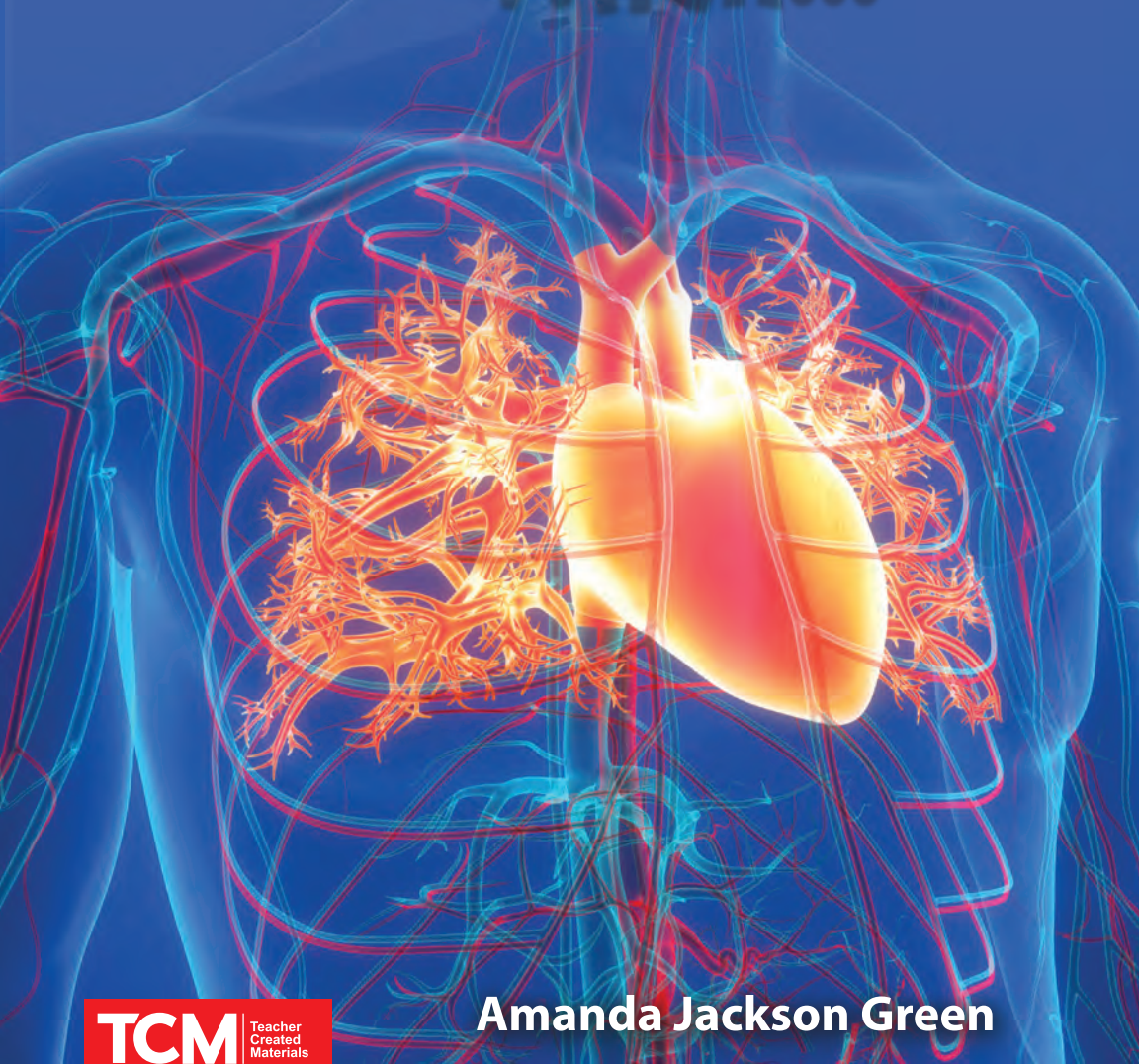




Smithsonian

What Happens in Your Body When...



TCM | Teacher
Created
Materials

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The Amazing Human Body

Think of a group of people you know. Maybe you're picturing your family, your sports team, or the other students in your class. No matter which group you imagine, the people in it may have a lot of physical differences. Height, skin tone, and features (such as hair color or eye color) likely vary among each person in the group. Although their bodies look different on the outside, they have a lot in common on the inside. Human bodies share almost all their experiences and functions. The differences are tiny compared to what they have in common.





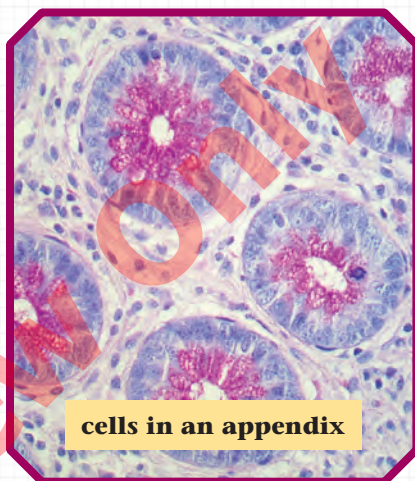
Every minute of every day, the tissues, organs, and systems that make up our bodies perform lots of tasks. These jobs keep us alive and help us interact with the world around us. A person's body keeps their heart beating, blood pumping, and lungs breathing. The person does not have to think about doing those things—their body does them automatically. This is all thanks to the basic parts and complex systems in their body.

When we understand how the human body works, we can better care for ourselves and others. We can learn how to stay healthy and heal from illness or injury. This knowledge can support us as we grow older. Learning about the body's many complex parts and systems can be a lifelong journey!

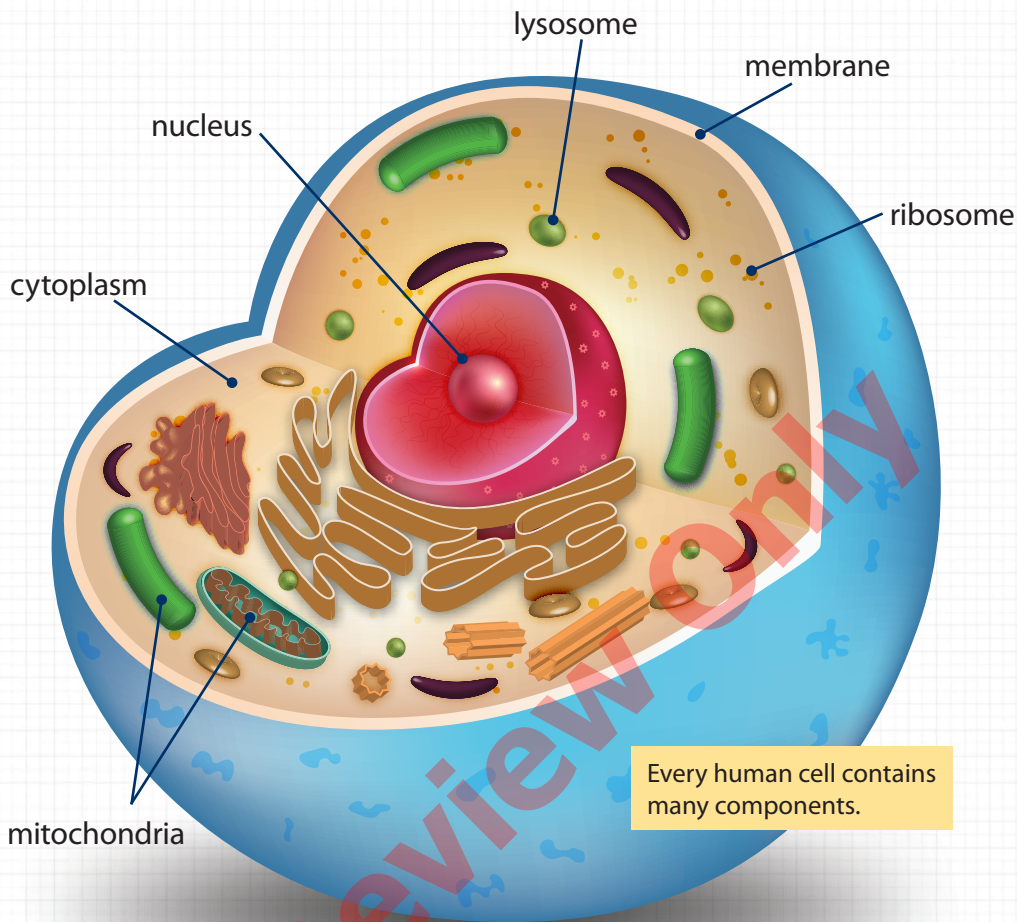
All About Healthy Cells

At the smallest level, the basic building block of the human body is the **cell**. All living **organisms**—including tiny **bacteria**, plants, animals, and humans—are made up of cells. Examining cells and how they work helps us understand all the amazing things human bodies can do.

Let's start with the parts of a cell. Most cells in the human body have three main parts. First, the membrane is the outermost layer. It acts like a gatekeeper. The membrane allows some substances, such as oxygen, to enter a cell. This layer can also block substances, such as acids, from getting in. Next, the nucleus is at the center of a cell. The nucleus is like the mastermind of a cell, continually giving instructions. The nucleus can tell a cell when to grow, multiply, or release waste. Finally, like the glue that holds everything together, **cytoplasm** fills the spaces between all the parts of a cell. Together, these three parts perform key jobs for cells.



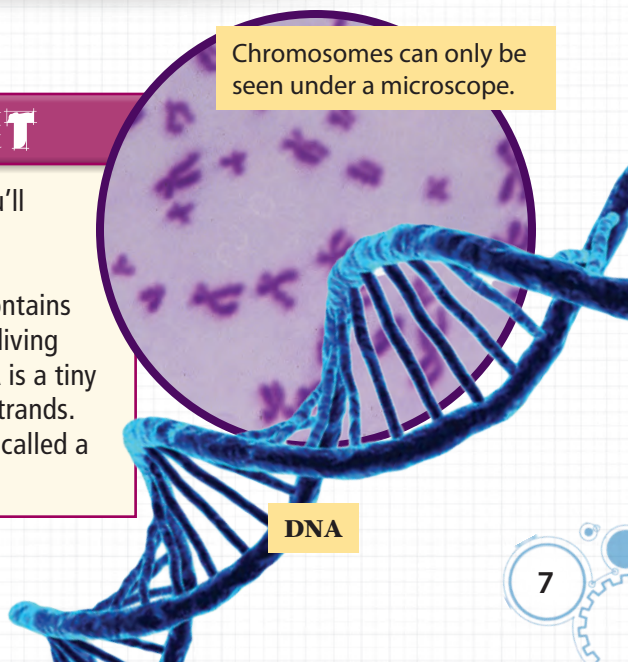
Cells also contain several types of **organelles**. Organelles perform specific functions for a cell. For example, oval-shaped mitochondria take in oxygen and nutrients, transforming them into energy. Ribosomes are another type of organelle. They look like small dots, and they produce proteins. Proteins are vital in every cell. They give a cell structure and help it complete important tasks. Finally, globe-shaped lysosomes act like a cell's maintenance crew. They remove waste to help a cell maintain optimal performance.



FUN FACT

Inside the nucleus of a cell, you'll find chromosomes. These are structures that carry DNA, or deoxyribonucleic acid. DNA contains all the information about how living things look and function. DNA is a tiny molecule made of two linked strands. Its twisted, ladderlike shape is called a *double helix*.

Chromosomes can only be seen under a microscope.



More than 200 types of cells are found in human bodies. Human cells have varying sizes and **densities**. Most cells in humans are so small that they can only be seen under a microscope. Cells are in a continuous state of change and **replication**. Different types of cells divide and multiply at different speeds. These factors make it difficult for scientists to know the number of cells in one person. However, recent estimates put the number at a whopping 36 trillion cells for an adult male.

All this change and replication can be a good thing when it comes to healing. In normal functioning, cells are constantly renewing the human body toward health and wellness.

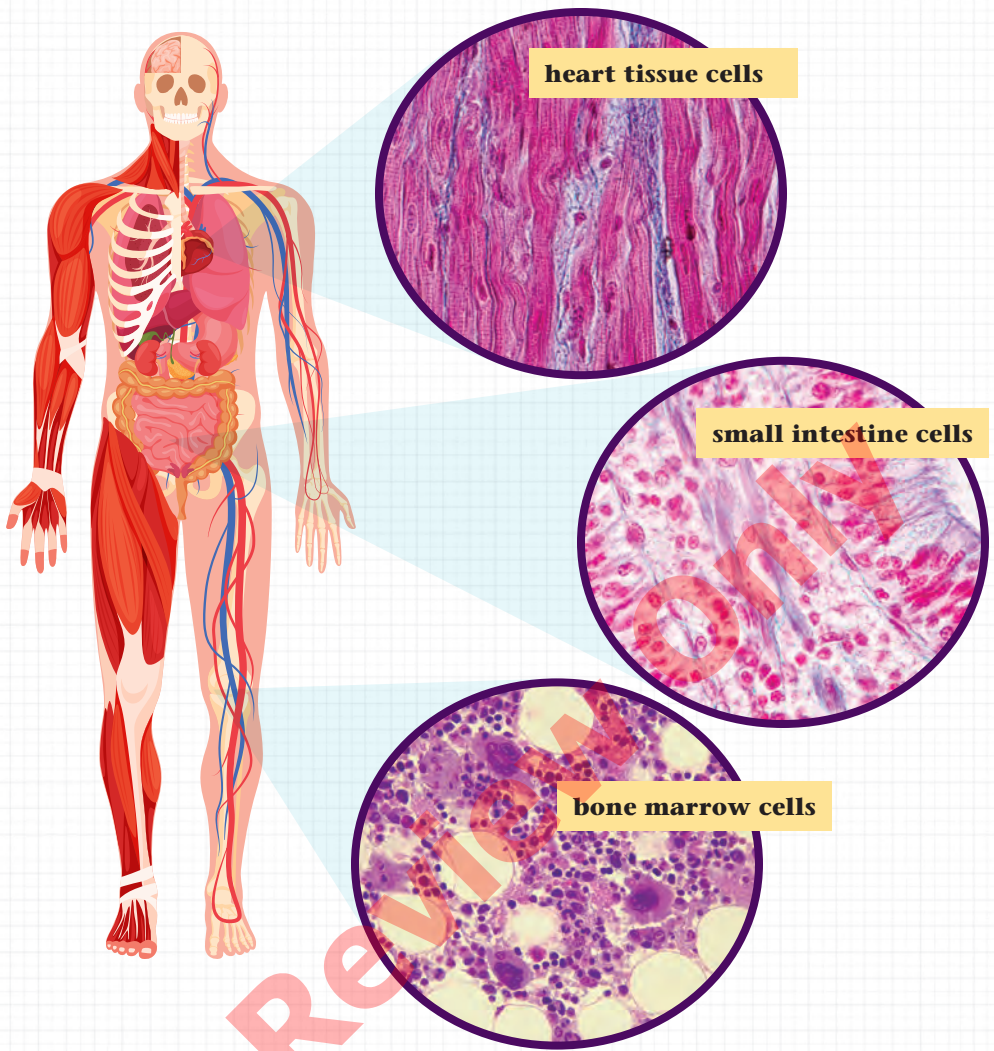
Microscopes allow the structures of cells to become visible to human eyes. These are what human cheek cells look like!

MATHEMATICS

How Many Cells?

You have more cells in your body than there are stars in the Milky Way—trillions more, in fact! Scientists estimate that there are between 100 to 400 billion stars in the Milky Way. In comparison, every human body has trillions of cells. One trillion is equal to 1,000 billion.





How Cells Come Together

In human bodies, various combinations of cells join to form tissues. Some examples of tissues are blood, **muscles**, fat, and bones. Organs, such as the liver and heart, are made up of several kinds of tissues. Each organ performs a specific function. For example, the lungs take in oxygen and release carbon dioxide. Together, organs and tissues make up bodily systems. These systems complete more complex tasks, such as digesting food or controlling bodily movements. Systems keep human bodies stable and healthy, all while supporting the tasks of daily life. Understanding these systems allows us to learn what happens in the body in a healthy state.

STEAM CHALLENGE

Define the Problem

Imagine that you are a biomedical engineer. You are interested in developing new devices and equipment to improve human health. You have been assigned to design and build a model of a bionic hand that can be used to help patients who have lost a hand. The model must be able to pick up and hold objects of various shapes and sizes. Identify how different things work together to accomplish a task.



Constraints: Your bionic hand must resemble a human hand. You may only use the materials provided to you.



Criteria: The fingers of your bionic hand must be able to move, and you must be able to control the movement of the fingers. The bionic hand must be able to pick up and hold two different types of objects.



CAREER ADVICE

from Smithsonian

Do you want to become a scientist?

**Here are some tips to keep
in mind for the future.**

"Science is a way for us to understand the world around us and share it with one another. What are you curious about? What do you wonder? What moves you? Those questions are where it all begins; see where following them can lead you!"

– Alia Payne, Ocean Education Specialist,
Smithsonian National Museum of Natural History

"Think about your likes and interests and then research more about the different science fields that exist. There are many different types of scientists and many different ways to get into this field; there is no 'one way' to get here! Many scientists have backgrounds in biology, chemistry, environmental science, psychology, physiology, physics, and more. But even if your path goes in a different direction, your interests can always lead you back to science later."

– Bayley McKeon, Ocean Education Specialist,
Smithsonian National Museum of Natural History



Read and Respond

1. What is a cell, and what are its three key parts?
2. How are tissues, organs, and systems different from one another?
3. Choose one of the body systems identified in the book. In your own words, explain the system's role in the body.
4. What might happen in the body if the nervous system were not working correctly?
5. Why is getting enough sleep important for staying healthy?
6. Based on what you've learned about the body, what is something you could do to take care of yourself next time you are hurt or sick?

