What helps to transport nutrients throughout your body, keep your temperature stable, protect your brain, and leave your body clean?

Summary
While singing simple songs about water in the body, students gain an appreciation for the many ways they need water.

Objectives
Students will:
- note the different ways the body uses water.
- determine that they need water.

Materials
- Copies or overheads of *Aqua Tunes* (optional)
- Copies of *Color Me Blue Body Chart*

Making Connections
People drink water and visit the rest room everyday. Students may have learned that their bodies are made mainly of water. Learning the many ways the body uses water increases students’ appreciation of their dependency on water.

Background
The human body is 65 to 70 percent water. A person without water for three to four days will not survive. Why is all this water needed? It is needed for nearly all physical and metabolic reactions in the body. Following are some of the ways the body uses water.

TRANSPORT:
Water carries essential nutrients throughout the body and moves waste out. Blood, which is mainly water, carries nutrients, hormones, enzymes, oxygen, and other life-sustaining materials to our cells. Water travels from the heart through blood vessels called arteries. The arteres get tinier and tinier until their walls are only one cell-layer thick. These vessels are called capillaries. At the capillaries, oxygen and nutrients leave the blood and enter cells. Water also passes back and forth between cells and capillaries through the process of osmosis. Waste (such as carbon dioxide and uric acid—the by-products of breaking down or burning proteins for energy and building materials) passes from the cells into the blood stream. On the way back to the heart, blood travels through veins, and waste materials are deposited and processed in the kidneys and lungs for eventual removal from the body.

TEMPERATURE CONTROL:
Water has a high heat capacity, that is, it will take in or give off large amounts of heat energy before changing from a solid to a liquid or a liquid to a gas. In this way, water helps our bodies to maintain a constant body heat. Water also helps control body temperature through sweating. Heat energy is dissipated when water evaporates off the skin. The adult body has over 2.5 million sweat glands.

LUBRICATION:
The mucous linings of various organs and the fluids between internal organs contain water. These materials ease movement and reduce friction between internal organs. In joints, such materials help bones slide more smoothly.

DIGESTION:
Water plays important roles in breaking down ingested food. It dissolves some food to help reduce it to simpler substances. Water helps synthesize
enzymes and transport them to the stomach and intestines. Enzymes are used in many digestive processes.

SYNTHETIC REACTIONS:
Water helps build hormones and enzymes that are used to control reactions in the body. Hormones are chemical messengers produced in special organs (e.g., adrenal gland, pituitary gland, pancreas). They affect the growth and behavior of various cells. Enzymes are special proteins that increase the speed and reduce the energy needed for chemical reactions to take place.

EXCRETION:
Water aids in cleansing the body. Respiration, digestion, and various metabolic reactions produce waste materials that need to be removed from the body. The kidneys and the large intestines use water to help remove waste materials. Water helps transport wastes out of the skin through sweating. When we exhale, we lose carbon dioxide and water—both by-products of respiration.

Procedure
▼ Warm Up
Ask students why they should drink plenty of water. Have them list ways they think the body uses water.

▼ The Activity
1. Have the class sing Aqua Tunes to learn how water functions in the body. Some songs can be simplified or omitted for younger students. Teach students songs line by line. If necessary, supplement lines with background information about the particular body functions. Actions to accompany the songs are written in bold.
2. Once students are familiar with the songs, distribute the Color Me Blue Body Chart and have them color body parts to which the songs refer. (NOTE: To facilitate student coloring, location and size of organs are altered.)

▼ Wrap Up
Have students summarize ways the body uses water. Students may wish to choreograph their own movements to the songs. Performances may be recorded or video-taped. They can perform songs in a school play or for their families. Students may want to create their own song about how the body uses water. Older students may write a science fiction story based on the use of water in the human body, or design a maze or board game.

Assessment
Have students:
• cite ways the body uses water (Wrap Up).
• write their own song or science-fiction story, or design a maze or board game, illustrating how water is used in the human body (Wrap Up).

Upon completing the activity, for further assessment have students:
• provide reasons why water is important.

Extensions
Students may be interested in watching the movie Fantastic Voyage, where humans are shrunk to molecular size and travel through the human body. Students could identify scenes in the movie that involve water.

Resources
Color Me Blue Body Chart

Date: ____________________________

Name: ____________________________

BRAIN
EYE
MOUTH
HEART
LEFT LUNG
STOMACH
INTESTINE
RIGHT LUNG
LIVER
KIDNEY
(AT BACK OF BODY)
BLADDER
Aqua Tunes

This song explains generally where water is found in the human body.

(Just a four count beat... students can march in place to keep a beat)

Water, water, I have water everywhere in my body!
Water, water, where is water
Where is water in your body?
(Point to the body part when it is mentioned in the song)
Is there water in your arms? YES!
Is there water in your eyes? YES!
How about your bones? YES!
There’s even water in your toes!
Is there water in your liver? YES!
Is there water in your brain? YES!
How about your mouth? YES!
There’s even water in your nose!

Water, water, I drink water
I drink water everyday!
Water, water, I use water,
I use water many ways!

Use the following song to help students understand how water helps lubricate the body and facilitates movement.
(To the tune of “Are You Sleeping”... make body motions to follow the lyrics)

Bend your elbow, move your shoulder
Up and down
Up and down.
If your joints lacked water
this would not be easy.
Bend your knee!
Flex your foot!
Suck your tummy in, swing your middle
Twist and shout
Twist and shout.
Imagine what this’d feel like without water padding.
Shake your head!
Take a breath!

The following song introduces the topic of how water helps maintain body heat.
(To the tune of “Do Your Ears Hang Low”)

Do you shiver when it’s cold (shiver)
Do you sweat when it’s hot (wipe brow)
Does your temperature stay even when you’re smiling or you’re not?
(smile/don’t smile)

Water helps to keep you cool
(act cool)
Water helps to keep you warm
(act warm)

You need water in your body
So your temp can conform.
Aqua Tunes

This song sums up how water leaves the body and helps remove waste.

(To the tune of “Mary Had a Little Lamb”)

Water leaves me nice and clean, nice and clean
Water leaves me nice and clean
Taking waste away.
Everyday I breathe and sweat, breathe and sweat
Water leaves when I breathe and sweat
Taking waste away.
Water leaves me another way, ‘nother way
Water leaves me another way
But I’m too polite to say!
(spoken) Don’t forget to flush!

The following song, provided by Vivian Werner’s first grade elementary class 1993-94 (Jefferson Elementary, Pullman, Washington), will help students understand their need for water.

(To the tune of “Old McDonald”)

We need water to survive,
it keeps us alive!
And if you drink it everyday
You can run and play.

..........It’s in our food,
It’s in the air,
You’ll find water everywhere,

We need water to survive,
it keeps us alive!

The following two songs contain technical terms and are better for older students. Involve students in defining new words.

This song presents basic information of how water is used in digestion and the chemical processes that produce molecules such as hormones and enzymes.

(To the tune of “My Bonnie Lies over the Ocean” or a contemporary tune selected by students)

With water my cells can create things
Cells also need water to break things
You might wonder what must be broken
It’s food that’s too big for my cells.
Oh, break down, break down
Break down the food into tiny pieces
Break down, break down
Break down the food for my cells!
The food in my cells are the makin’s
Of hormones and enzymes I need
To help me to grow and to function
But without water these won’t be made.
Oh, make up, make up
Water helps cells make these chemicals
Make up, make up
Make up these things that we need.
Aqua Tunes

(Have students adapt this as a rap tune)

I have water in my blood
Lub, dub, lub, dub, lub
To pump my blood I need my heart
(point to heart)
Lub, dub, lub, dub, lub
Blood goes to my cells (spread hands all over body to represent blood’s movement)
Through my arteries
Capillary here, osmosis over there
My heart pumps my blood around
Lub, dub, lub, dub, lub
I have water in my blood
Lub, dub, lub, dub, lub
And in my blood there’re nutrients
(point to belly)
Lub, dub, lub, dub, lub
With a sugar over here (spread hands all over body to represent movement of nutrients)
And a protein over there
Here’s a fat, there’s some starch
Everywhere in arteries
My blood carries nutrients
Lub, dub, lub, dub, lub
I have water in my blood
Lub, dub, lub, dub, lub
And in my blood there’s oxygen (point to lungs or chest)
Lub, dub, lub, dub, lub
A hemoglobin here (spread hands all over body to represent movement of oxygen)
Goes from lungs to cells
Here’s a breath, there’s some air
Everywhere in arteries
My blood carries oxygen
Lub, dub, lub, dub, lub
Oxygen helps burn the food
Lub, dub, lub, dub, lub
Burning food makes energy (jump up and down or run in place)
Lub, dub, lub, dub, lub
With respiration here
Makes energy right there
So I can jump
And I can run
Every time that I play
I burn food for energy
Lub, dub, lub, dub, lub
All this action does make waste (wipe brow)
Lub, dub, lub, dub, lub
That’s okay ’cause I have blood
Lub, dub, lub, dub, lub
With a carbon dioxide here
And a uric acid there
To my lungs (point to chest)
To my kidneys (point to back)
Water helps remove this waste
Lub, dub, lub, dub, lub