

# STEM Studies

## Learning about the human body



- **Grades K–5**
- **Core literacy and math skills**
- **Hands-on, STEM-based activities**
- **Creative thinking and problem solving**

# STEM STUDIES

## Learning about the human body

Dear Teacher,

Congratulations, as a partner of The Leukemia & Lymphoma Society (LLS) your school has received this new science and health curriculum. These STEM-inspired activities have students practicing the scientific method, learning about careers in science and research, and developing their curiosity about scientific questions and answers, all while building core literacy and math skills. **Our goal is for students to grow as thinkers and problem solvers, igniting a fire that leads today's students to become the scientists of tomorrow.** We'll need those bright minds as we work to defeat blood cancers—and all cancers—once and for all.

The LLS Student Series programs enable students to get involved in LLS's mission: Cure leukemia, lymphoma, Hodgkin's disease, and myeloma and improve the quality of life of patients and their families. Students and schools can join in these programs:



- **Pennies for Patients** is a three-week program for elementary and middle schools where students collect change and raise funds online while learning about service and philanthropy.

- **Collect for Cures** is a program for high school students to demonstrate leadership, creativity, and teamwork to make an impact and raise money for blood cancer research.

More than **13 million students and 850,000 educators in 27,000 schools** across the US participate annually. Since its beginning, students have raised more than **\$315 million** to fund breakthrough therapies and patient services. Wow!

As students progress through these activities, they'll be building a **basic understanding of various human body systems** while at the same time practicing critical literacy and math skills. Then they'll apply that knowledge as they learn about the **cutting-edge work** that LLS-funded researchers and doctors are doing to combat blood cancers. Students will watch a short video of prominent researchers sharing how they **ask questions and think creatively** every day to solve scientific problems related to blood cancers.

Please know that the topic of cancer is addressed in a **supportive, sensitive, science-based format**. We realize that students may have friends, family members, or members of your school community who have been affected by leukemia, lymphoma, and other types of cancer. Students will read about breakthroughs and survivors' inspiring stories throughout the curriculum, conveying a sense of hope and progress in keeping with the LLS mission.

**We're so glad that your school is joining the quest to promote creative thinking and a sense of scientific inquiry in today's students.** There's no limit to what these students—tomorrow's researchers and medical professionals—will achieve!

Sincerely,

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

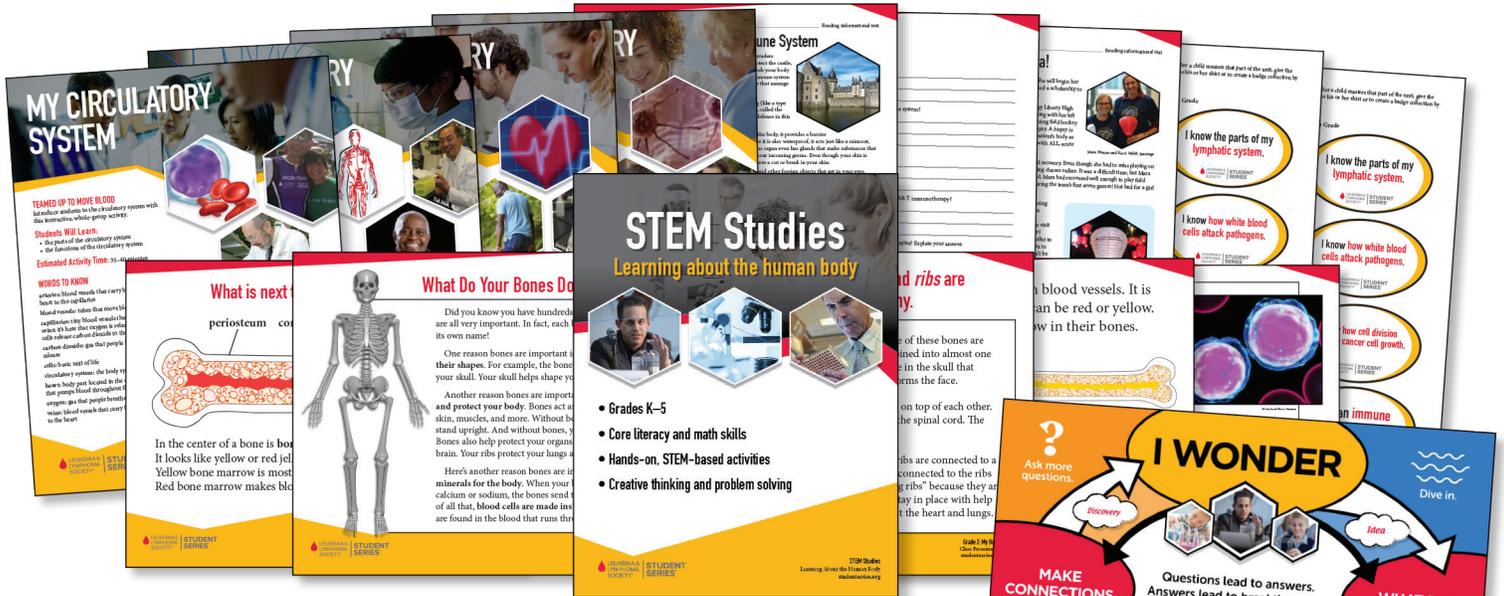


Scientists and medical professionals know a lot about blood, but there's a lot more to discover. The Leukemia & Lymphoma Society funds grants around the world so researchers can learn more about blood and how to stop blood cancers.



# Here's what your LLS STEM Studies curriculum includes for grades K–5

- 6 activities per grade level, including hands-on activities, a video-based activity, and a final wrap-up assessment
- 4 nonfiction passages per grade level
- 1 video featuring LLS-funded scientists talking about their careers
- ready-to-use presentation covering each grade-level's content
- 2 parent send-home notes per grade level
- badges and certificates to celebrate student learning
- time-saving patterns and planning sheets
- colorful poster to spark creativity and scientific thinking in your classroom
- teacher's guide



Your school also received this super-size poster to feature in your lobby, office, cafeteria, or other common area.



## STEM Studies addresses the standards, and more

- Covers core skills in literacy and math.
- Correlated to Common Core State Standards. (Not in a Common Core state? The standards covered are included in many other states' standards as well.)
- Features STEM-based activities and introduces students to STEM careers.
- Includes hands-on activities that get students up and moving.
- Video-based activity encourages creative thinking and shows students the important role that creativity and asking questions plays in STEM fields.
- Allows students to “meet” cancer survivors and learn what inspires them—and how they inspire others.
- Allows students to learn about LLS-funded researchers.



Irene Ghobrial, MD

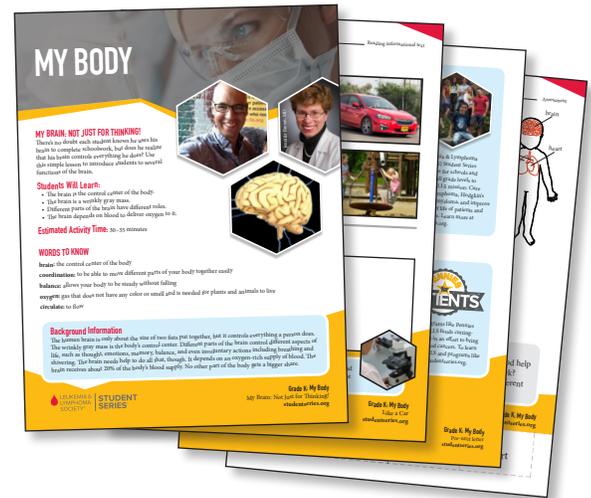


### Always Striving

The Leukemia & Lymphoma Society was founded in 1949. Today LLS is the world's largest nonprofit health organization that raises money to help doctors find cures for blood cancers. These funds also help patients and their families get the care and support they need.

## How to use these materials:

- Start out by reviewing the Classroom Presentation and the activities. The materials are flexible, so you can cover them all in just a week or you can spread them out over several weeks or months. Decide what's best for you. (If your school is participating in Pennies for Patients, consider completing the activities leading up to or during the campaign.)
- Coordinate with your grade level team. Share the materials and plan to do the activities at the same time, if possible. Each activity includes an estimate of how much time to allow.
- Review each activity and gather materials. Most activities require few, if any, additional materials. You'll find lots of patterns, printables, and templates to save you time.
- Display the "I Wonder" poster in your classroom. Draw students' attention to it and start the discussion about the role creativity plays in STEM fields. Let students know that they'll experience this themselves as part of the curriculum and activities.
- Send home the first parent note, the pre-unit letter.
- Work your way through the activities and nonfiction passages. Be sure to watch the researchers' video and complete the video-based activity, referring to your "I Wonder" poster as you go. Wrap up with the final assessment.
- Keep your student badges and certificates handy. Award them anytime students go above and beyond what's expected. Be sure to award the badges at the end of the unit.
- Send home the second parent note, the post-unit letter.
- Celebrate what students have learned. Refer back to the materials and remind students what they learned anytime related topics come up or are in the news. Each year the curriculum builds on previous knowledge, so let students know that they'll continue learning about STEM, the human body, and the impact of blood cancers next year.



## What Are Blood Cancers?

Blood cancers, such as leukemia, lymphoma, and myeloma or myelodysplastic syndromes, can affect the bone marrow, blood cells, lymph nodes and other parts of the lymphatic system. An estimated 1,237,824 people in the US are either living with, or are in remission from, leukemia, lymphoma, or myeloma.

LLS-funded research has led to the discovery and development of lifesaving therapies. Since 1954, LLS has invested more than \$1 billion in blood cancer research. Some of the therapies first approved for blood cancer patients are now helping patients with different types of cancers too.

## Why All the Buzz About STEM?

Jobs in science, technology, engineering, and math (STEM) are growing faster than other occupations. Current estimates predict that we'll need **1,000,000 additional STEM professionals** in the next decade—about the same time that some of your students will enter the workforce.

STEM isn't just test tubes and mathematical formulas. As students will see in this curriculum, STEM jobs require creativity to solve scientific problems. Without STEM professionals, today we wouldn't know about gravity, genes, or space. **And without STEM professionals in the future, we won't be ready to defeat blood cancers and all cancers.** There's critical—and exciting!—work to be done.

Our future STEM thinkers and problem solvers are in your classroom right now. Share your enthusiasm for science and math. Help students see that working in STEM fields constantly brings new challenges and questions with big and interesting problems to solve. It takes scientists of all kinds to tackle those problems and work out solutions. Your students could be the ones to discover a new planet, harness a new energy source, or outsmart cancer once and for all. STEM means creating and discovering the things that will change the world. Invite your students to be a part of it!

### Fields with maximum job growth

biomedical engineering

medical science

health care



**1,000,000**

Number of additional STEM professionals needed in the next decade



Estimated size of the STEM workforce in the US by 2018



**29% more**

Average amount earned by STEM professionals

### Saving Lives

The Leukemia & Lymphoma Society funded research that led to the discovery of lifesaving treatments for cancer. In fact, some of the treatments first approved for blood cancer patients now help people with other kinds of cancers and diseases.

# Grade-by-Grade Skills and Topics

## Kindergarten: My Body

Students learn about the brain, heart, and lungs. They also learn that body systems work together.

### Brain

- The brain is a wrinkly gray mass and is the control center of the body.
- Different parts of the brain have different roles.
- The brain depends on blood to deliver oxygen to it.

### Heart

- The heart is a muscle that pumps blood.
- Blood moves around our bodies and keeps our bodies alive.
- Exercise is important for a healthy heart and blood flow.

### Lungs

- When we breathe in air, it goes to our lungs.
- Our blood picks up oxygen from the air we breathe and delivers oxygen throughout the body.

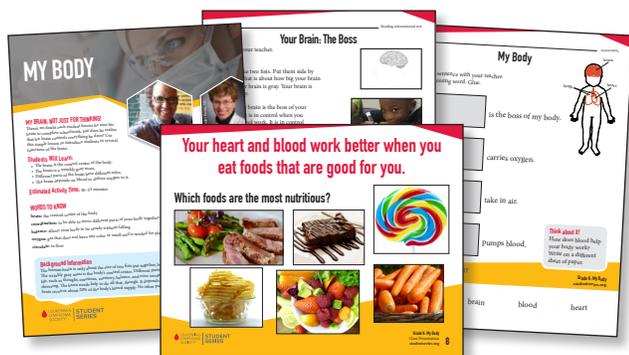
### Body systems

- Different parts of our bodies depend on each other to work well.
- Part of our blood fights germs.

Finally, students learn that asking questions is a key part of science. Students make a booklet to collect their own questions.

- Curiosity is important in science.
- Asking questions is a key part of research.
- Words such as *how* and *why* are question words.

Student read grade-appropriate informational text and meet Storm, a hockey-playing blood cancer survivor.



## Grade 1: My Blood

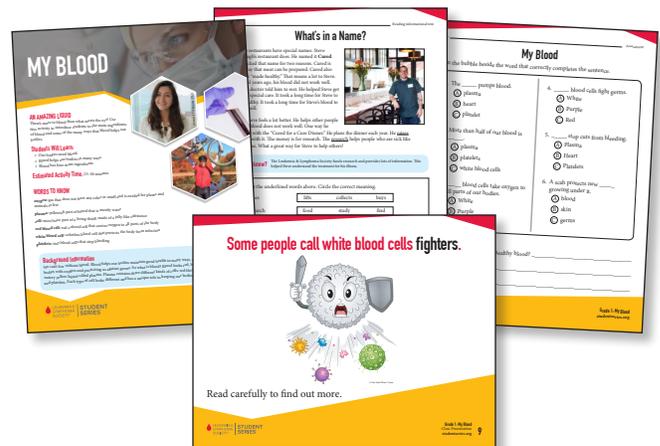
Students learn that our bodies need blood. They also learn about the many important functions of their blood.

- Blood has four main parts—plasma, red blood cells, white blood cells, and platelets. Students learn what each does.
- White blood cells increase when a person is sick because white blood cells fight germs.
- Platelets help healthy blood form clots.
- Scabs form over wounds to keep germs out and to protect the new skin growing under them.
- On average, an adult has 10 pints of blood, a 40-pound child has 2–3 pints of blood, and a baby has one cup of blood. Students also learn that one pint is equal to two cups.

Finally, students learn that asking questions is a key part of science. Students make a booklet to collect their own questions.

- Curiosity is important in science.
- Asking questions is a key part of research.
- Some scientists research ways to prevent, treat, or cure illnesses.

Student read grade-appropriate informational text and meet Steve, a restaurant owner who named his restaurant Cured for a very special reason.



# Grade-by-Grade Skills and Topics

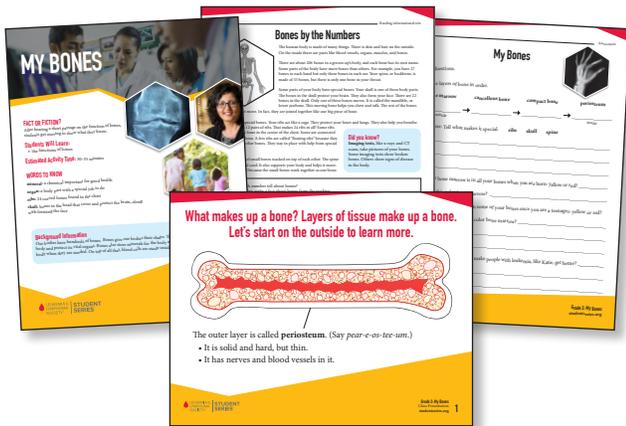
## Grade 2: My Bones

Students learn all about bones:

- What bones are made of
- The functions of bones
- That joints and bones work together for movement
- Why bones such as the skull, spine, and ribs are special
- What bone marrow is
- What problems can be associated with bone marrow

Finally, students learn that asking questions is a key part of science. Students use a printable to ask and answer their own questions about science and bones.

Student read grade-appropriate informational text and meet Katie, who needed a bone marrow transplant and got one from a very special donor.



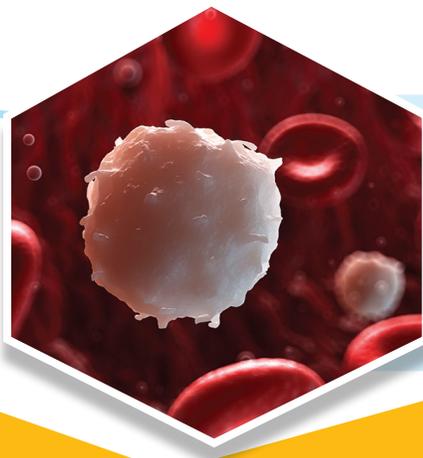
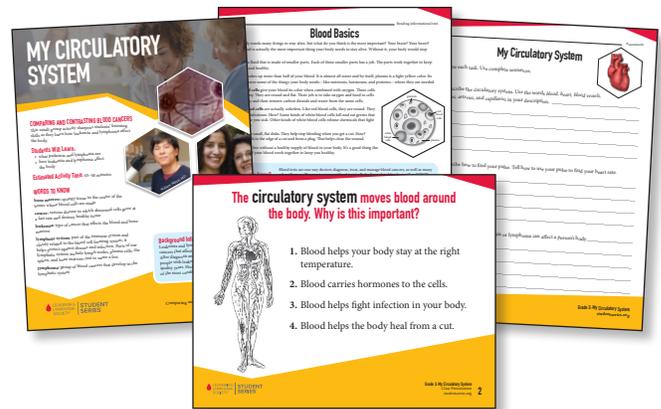
## Grade 3: My Circulatory System

The circulatory system includes the heart, lungs, and blood vessels that move blood around the body. Student learn

- the parts of the circulatory system
- the functions of the circulatory system
- the parts and functions of the blood vessels
- how the pulse relates to the circulatory system
- how to find their pulses and calculate their heart rates
- what leukemia and lymphoma are
- how leukemia and lymphoma affect the body

Finally, students learn that asking questions is a key part of science. Students use a printable to ask and answer their own questions about science and the circulatory system.

Student read grade-appropriate informational text and meet Jane, a cancer survivor who found a support group through LLS and who works to support others with cancer.



## Amazing Options

Thanks to funding from The Leukemia & Lymphoma Society, new and exciting treatments are being tested. One of these groundbreaking treatments involves removing a patient's immune T cells from his or her body and reprogramming the cells to find and fight cancer cells.

# Grade-by-Grade Skills and Topics

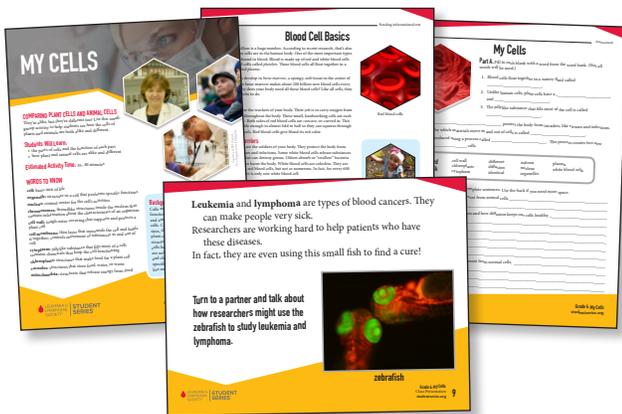
## Grade 4: My Cells

Students go molecular and learn all about cells:

- the parts of cells and the function of each part
- how plant and animal cells are alike and different
- parts of the human cell
- that human body cells are different shapes and sizes based on their function
- how materials move in and out of cells through the process of diffusion
- how diffusion relates to red blood cells and the work they do in the body
- how cells divide
- how cancer cells and normal cells differ

Finally, students learn that asking questions is a key part of science. Students use a printable to harness the power of asking “Why?” and to learn more about cells.

Students read grade-appropriate informational text and meet Ira and Dean, two cancer survivors and athletes who accomplished amazing things.



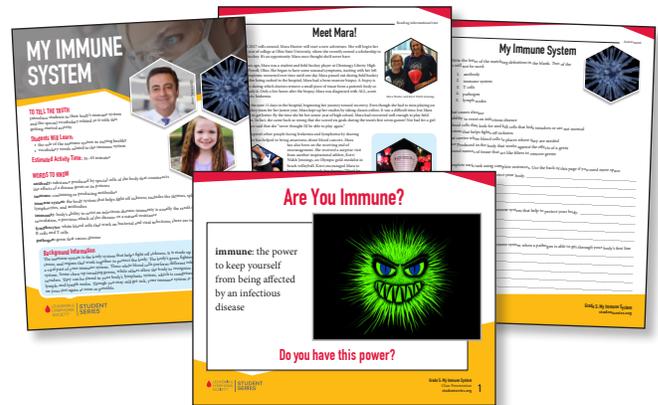
## Grade 5: My Immune System

Many body parts and systems come together as students learn about the immune system:

- the role of the immune system in staying healthy
- what a pathogen is
- how the skin, mucus, saliva, and other structures protect the body from pathogens
- the different types of white blood cells
- how white blood cells attack pathogens

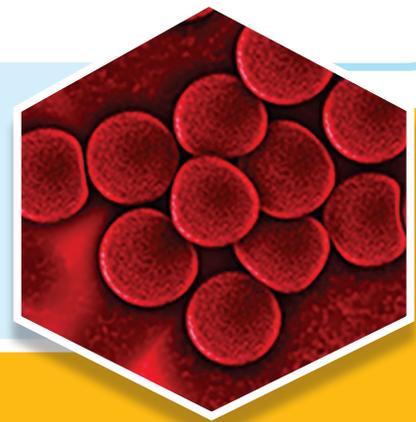
Finally, students learn that asking questions is a key part of science. Students use a printable to turn “Why?” into “Wow!” and to learn more about their immune systems.

Students read grade-appropriate informational text and meet Mara, who beat cancer and earned a college scholarship to play field hockey. Mara also got a visit from an athlete who inspires her, Olympic gold medalist Kerri Walsh Jennings.



## Cells by the Billions

The human body has over 37 trillion cells. Cancer happens when some cells grow too fast and spread out of control. The Leukemia & Lymphoma Society has invested more than \$1 billion dollars in research to advance treatments and cures.



# Get Started!

LLS offers lots of sources for additional information.

## studentseries.org

Want to get more involved with LLS? Take the next step and participate in Pennies for Patients. Students collect pennies to help fund lifesaving research. Students receive collection boxes and can set up online fundraising pages. You'll get everything you need—a coordinator's guide, an Honored Hero poster, parent letters, motivational morning announcements, collection materials, and more. You'll also get ideas like these to make fundraising fun!



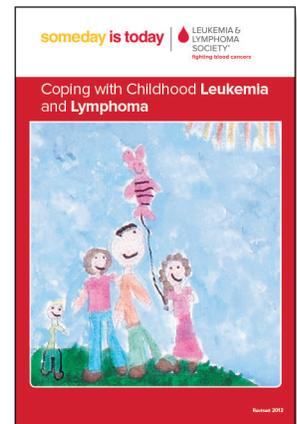
- **Stuck for a Buck**—Students pay \$1 for a piece of duct tape they use to tape a lucky staff person to a wall.
- **Pennies Pie**—The top fundraising classroom gets to throw a pie at their teacher or principal.
- **Crazy for a Cure**—A staff member offers to kiss a pig, shave his or her head, put on a chicken suit, etc., if your school reaches its goal.
- **Pound of Pennies**—Have weekly class/period weigh-ins, and the heaviest donation wins—a quick way to keep students motivated!

Students will have a blast AND make a difference!

## lls.org

Get basic information on leukemia, lymphoma, myeloma, and other blood cancers. Learn about treatments, find clinical trials, contact an information support specialist, read survivor stories, and find support groups. LLS provides countless resources to support and guide families and individuals affected by blood cancers.

Have a student affected by blood cancer in your school? Find out about the Trish Greene project, which helps children and youth cope with life after treatment and teaches those around them how to deal with related issues. Learn more at [lls.org/childhood-blood-cancer/about-childhood-blood-cancer/school](http://lls.org/childhood-blood-cancer/about-childhood-blood-cancer/school).



*From all of us at LLS, thank you for teaching students the science fundamentals in this curriculum and for laying the groundwork for tomorrow's scientists, researchers, and other STEM professionals. Together we can defeat blood cancers!*