To learn more about LAL-D,
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Understanding Lysosomal Acid Lipase Deficiency (LAL-D)

A GUIDE FOR PATIENTS AND CAREGIVERS

BECOME EMPOWERED BY LEARNING MORE ABOUT LAL-D

You are receiving this guide because you or your child has been diagnosed with Lysosomal Acid Lipase Deficiency (LAL-D). LAL-D is a genetic, progressive, lifelong condition that can be diagnosed in people of all ages. If left untreated, it can lead to serious health problems. Your doctor is your best resource for information about LAL-D, but this guide will help answer some questions you may have along the way. If you need additional information, please speak with your doctor.

GET THE RIGHT INFORMATION, RIGHT FROM THE START

If you have been diagnosed with LAL-D, you probably have a lot of questions, such as

What is LAL-D?

Who has LAL-D?

What happens when people have LAL-D?

What are the risks of having LAL-D?

Why is testing important?

MYTH

Wolman disease and CESD are 2 separate, distinct diseases.

FACT

LAL-D, previously known as Wolman disease and CESD, is a single disease that affects infants, children, and adults.

WHAT IS LAL-D?

LAL-D is a rare, genetic, progressive condition in which infants, children, and adults have an uncontrolled buildup of fatty material (cholesteryl esters and triglycerides) in their liver, blood vessel walls, and other tissues. This buildup causes continuous damage that may affect the function of many organs throughout your body. Without treatment, infants with rapidly progressive LAL-D generally face death within the first year of life. In children and adults, LAL-D can lead to serious health problems that can occur at any time. LAL-D was previously known as Wolman disease in infants and cholesteryl ester storage disease (CESD) in children and adults. Now, both are often referred to as LAL-D.

AS YOU ARE READING

Find the meanings of underlined words in the Glossary on pages 10 through 12.

START LEARNING MORE ABOUT LAL-D

WHO HAS LAL-D?

LAL-D affects people of all ages, from infancy through adulthood. Individuals of any gender or ethnic background can have LAL-D.

Infants diagnosed with LAL-D begin to show severe symptoms at about 1 month of age. In children and adults, symptoms can appear around 5 years of age, but most people with LAL-D will have had symptoms by the time they are 12 years old. In some children and adults, LAL-D progresses without any obvious signs and symptoms and may not be diagnosed until later in life.

MYTH

LAL-D in children and adults is not severe.

WHAT HAPPENS WHEN PEOPLE HAVE LAL-D?

People born with LAL-D are not able to break down fatty materials because their bodies do not make enough of an enzyme called lysosomal acid lipase (LAL). People with LAL-D have very little or no LAL enzyme in their body. When the body does not have enough LAL, fatty material (cholesteryl esters and triglycerides) builds up in the liver, heart, and other organs, and causes problems.

In infants, LAL-D causes severe malabsorption, growth failure, liver scarring, and liver failure. Without treatment, the average age of death in infants with LAL-D is between 3 and 4 months. It has also been shown that children and adults with LAL-D can progress to liver scarring, liver failure, and other severe complications. Although LAL-D is a genetic, lifelong disease with no cure, you and your healthcare team can work together to manage the disease once it has been diagnosed.

FACT

LAL-D in children and adults is a life-threatening, progressive disease that causes continually worsening damage to many organs throughout the body.

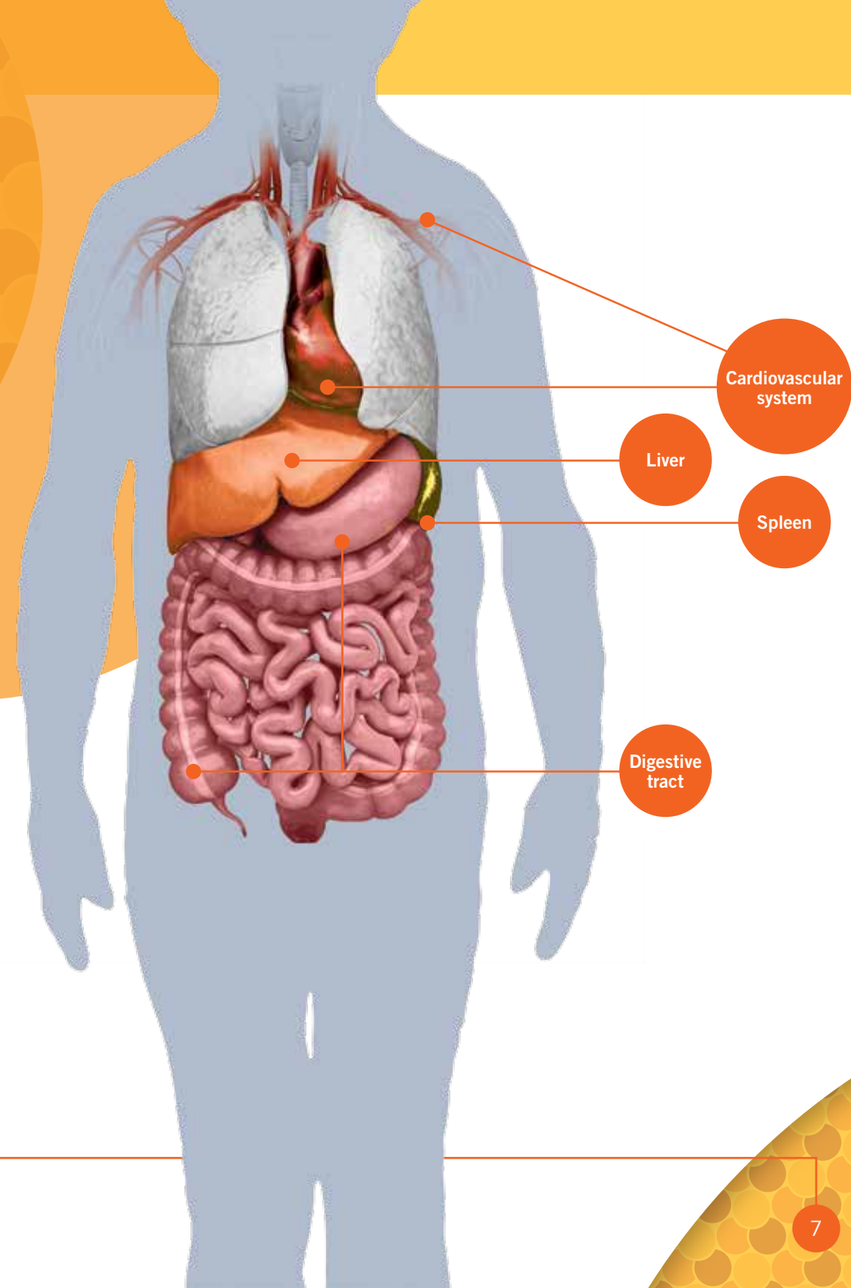
WHAT ARE THE RISKS OF HAVING LAL-D?

LAL-D affects many vital organs, such as the liver, spleen, digestive tract, and cardiovascular system. In fact, most people with LAL-D experience complications in more than one organ system.

Potential complications of LAL-D:

- **Liver damage**
  - — Liver problems can include enlarged liver, liver scarring, and liver failure
- **Problems with the cardiovascular system**
  - — Cardiovascular complications can include high amounts of "bad" cholesterol (low-density lipoprotein cholesterol), low amounts of "good" cholesterol (high-density lipoprotein cholesterol), atherosclerosis, heart attack, and/or stroke
- **Problems with the spleen**
  - — Problems with the spleen include enlarged and/or overactive spleen, too few platelets in the blood, and/or anemia
- **Problems with the digestive tract**
  - — Problems with the digestive tract include pain, malabsorption, gallbladder problems, bleeding, and diarrhea
- **Other complications associated with LAL-D include growth failure or failure to thrive, malnutrition, and calcium deposits in the adrenal glands**

Because LAL-D occurs throughout the body, many important organs are affected by the disease.



WHY IS TESTING IMPORTANT?

As with other rare diseases, diagnosis is often delayed—LAL-D can be commonly confused with other more common conditions. Now that you have received a diagnosis, you can help those you love by making sure the rest of your family gets screened for LAL-D with a simple blood test. Because LAL-D is an inherited genetic disease, there's a chance that other members of your family could have it too.

TALK WITH YOUR DOCTOR ABOUT LAL-D

Now that you understand what LAL-D is and how it can affect your body, it's up to you to take action. Since LAL-D is genetic, lifelong, and progressive, early management of your disease may reduce your risk of serious complications in the future. Talk with your doctor about the best way to manage your disease.

MYTH

LAL-D can be treated with lipid-lowering medicines (such as statins) or a liver transplant.

ADDITIONAL RESOURCES FOR LAL-D EDUCATION AND SUPPORT:

LAL Solace, Inc.
191 Barnstable Court
Harvest, AL 35749
Tel: 256-425-2638
Email: lalsolace@gmail.com
Website: www.lalsolace.org

Genetic and Rare Diseases (GARD) Information Center
PO Box 8126
Gaithersburg, MD 20898-8126
Tel: 888-205-2311
Fax: 301-251-4911
TTY: 888-205-3223
Website: https://rarediseases.info.nih.gov/gard/

National Organization for Rare Disorders (NORD)
55 Kenosia Avenue
Danbury, CT 06813-1968
Tel: 203-744-0100
Fax: 203-798-2291
Website: http://www.rarediseases.org

FACT

Lipid-lowering medicines such as statins do not address the root cause of LAL-D. A liver transplant does not address the root cause of the disease and does not stop the progression of the disease in other organs. Data on long-term outcomes of each approach are limited.

GLOSSARY

Adrenal glands: in addition to regulating blood pressure, these glands work in conjunction with the kidneys to regulate blood chemistry. The adrenal glands are also vital in maintaining acid-base (pH) balance in the body.

Anemia: a condition in which the number of red blood cells is below normal.

Atherosclerosis: a condition in which fat, cholesterol, and lipids build up on artery walls, narrowing the space inside vessels and limiting the flow of blood. Atherosclerosis can lead to heart attacks, strokes, and even death. It is sometimes referred to as "hardening of the arteries."

Calcium: a mineral found mainly in the hard part of bones, where it is stored. Calcium is essential for healthy bones and is important for muscle contraction, heart action, and normal blood clotting.

Cardiovascular: of, relating to, or affecting the heart and blood vessels.

Cholesterol: a waxy, fat-like substance made in the liver and found in the blood and in all cells of the body. Too much cholesterol in the blood may build up in blood vessel walls, block blood flow to tissues and organs, and increase risk of developing heart disease and stroke. There are 2 types of cholesterol: low-density lipoprotein cholesterol (LDL-c), often called the "bad" cholesterol, and high-density lipoprotein cholesterol (HDL-c), often called the "good" cholesterol.

Cholesteryl ester: a type of fatty material in the body that is broken down by the LAL enzyme in people who do not have LAL-D.

Cholesteryl ester storage disease (CESD): another name for LAL-D that occurs in children and adults. It is a genetic disorder in which the body does not make enough of the LAL enzyme, or the LAL that the body produces does not work properly. LAL is needed to break down certain fats (lipids) in the body.

Diarrhea: a condition in which a person has loose, watery stool that occurs more frequently than usual.

Digestive tract: the group of organs that handles the process of breaking down food for use by the body.

Enzyme: a substance that, in small amounts, increases the rate of a specific biochemical reaction. Enzymes are often required for the normal metabolism, or breakdown, of substances in the body.

Failure to thrive: the inability to grow and develop normally. A condition in which an infant or child's weight gain and growth are far below the usual levels for his or her age.

Gallbladder: a small organ just beneath the liver in which bile secreted by the liver is stored until needed by the body for digestion.

Genetic: inherited. Genetic diseases are determined by the combination of genes for a particular trait that are on the chromosomes received from a person's father and mother.

Growth failure: a condition in which a child does not grow at the normal speed of other children of his or her age.

Heart attack: a serious condition in which the flow of oxygen-rich blood to a section of heart muscle suddenly becomes blocked, most often by a buildup of fat, cholesterol, and other substances in the walls of the arteries. The interrupted blood flow can damage or destroy part of the heart muscle.

Liver: the largest solid organ located on the upper-right side of the abdomen that has many important functions, including making and processing fats (lipids), such as cholesterol.

Liver failure: severe inability of the liver to function normally.

Lysosomal acid lipase (LAL): an enzyme that breaks down lipids so that they can be carried from the body's tissues to the liver for removal. Mutations in the *LIPA* gene result in a decrease or loss of LAL enzyme activity. Without this enzyme, the lipids build up in the cells and tissues, causing the symptoms of LAL-D.

Lysosomal Acid Lipase Deficiency (LAL-D): a rare inherited (genetic) condition involving a decrease or loss of LAL enzyme activity which causes accumulation of lipids in tissues. The lipid accumulation can lead to complications in multiple organs.

Malabsorption: poor absorption of nutrients by the intestines.

Malnutrition: used to refer to any condition in which the body does not receive enough nutrients to properly function. Malnutrition can occur when a person cannot properly digest or absorb nutrients from the food they consume; this may occur with certain medical conditions such as LAL-D.

GLOSSARY (cont'd)

Platelets: colorless blood cells that help blood clot.

Progressive: a disease or health condition that gets worse over time, resulting in a general decline in health or function.

Spleen: a large, oval organ on the left side of the body between the stomach and the diaphragm that produces cells involved in immune responses.

Statins: a class of drugs that reduce the levels of fats (lipids such as cholesterol) in the blood.

Stroke: the sudden death of brain cells due to lack of oxygen, caused by blockage of blood flow or the rupture of an artery to the brain.

Triglyceride: a type of fatty material in the body that is broken down by the LAL enzyme in people who do not have LAL-D.

Wolman disease: another name for LAL-D that occurs in infants. It is an ultra-rare, rapidly progressive genetic disorder in which the body does not make the LAL enzyme, which is needed to break down certain fatty material in the body.

Notes