Education and connection to others in the community are vital to understanding the disease and managing your fears and uncertainties about the future.

This guide outlines the three genetic types of the disease, current treatment options and how the Alport Syndrome Foundation offers support to patients and families.

Please feel free to share this guide with family members and with your physician(s).
WHAT IS ALPORT SYNDROME?

Alport syndrome is a rare hereditary disease that causes kidney disease, hearing loss and abnormalities in the eye. It is caused by genetic mutations that affect the Collagen IV family of proteins. Collagen IV is a major part of important tissues structures called basement membranes. The genetic mutations that cause Alport syndrome alter specific basement membranes in the filters of the kidneys (glomeruli) as well as the inner ear (cochlea) and the lens and retina of the eye.

Alport syndrome causes damage to the kidney through replacement of glomeruli, and associated structures called tubules, by scar tissue (fibrosis). Progressive fibrosis leads to kidney failure in many people with Alport syndrome. Hearing loss in people with Alport syndrome is not present at birth but often becomes apparent by late childhood or early adolescence. Fortunately hearing aids are usually very effective for patients with hearing loss caused by Alport syndrome. Eye abnormalities result in changes in the lens and retina. This may lead to the need for corrective lenses (glasses) and, in some people, cataracts, but otherwise are usually mild.

WHAT ARE THE DIFFERENT TYPES OF ALPORT SYNDROME?

There are three genetic types of Alport syndrome and each has a different inheritance pattern.

**XLAS**

*(X-linked Alport syndrome)*

This is the most common type. Without treatment XLAS leads to kidney failure in 50% of boys by age 25 and 90% by age 40. Girls with XLAS usually have slower disease progression with about 20% developing kidney failure by age 60. About 75% of boys with XLAS eventually develop hearing loss requiring hearing aids, compared to about 15-20% of girls. Eye changes are found in about 20% of boys and girls with XLAS.

Boys with XLAS are impacted more than girls because, as with all X-linked disorders, boys only have one X-chromosome whereas girls have two and the normal copy acts as a buffer to the mutated one.

It is estimated that 15% of patients with XLAS have a new spontaneous mutation, whereas the rest received the mutated gene from one of their parents.
ARAS
(Autosomal Recessive Alport Syndrome)

About 50% of parents of a child with ARAS will have blood in the urine. Most will not have progressive kidney disease. In ARAS the severity of disease in affected boys and girls is similar, leading to kidney failure and hearing loss in most patients when they are in their teens or twenties. Eye changes also occur frequently in ARAS patients.

ADAS
(Autosomal Dominant Alport Syndrome)

People with ADAS usually have a family history that is positive for progressive kidney disease. Kidney failure occurs relatively late in life (after age 40), hearing loss is unusual but can occur and changes in the eyes are very unusual. There is no difference in severity of disease in boys and girls.

How do I know which type I have?

The best way to determine the genetic type of Alport syndrome is genetic testing. Careful analysis of family history combined with biopsy of the kidney or skin can be used to determine inheritance if genetic testing is not possible.
WHAT TREATMENTS ARE AVAILABLE?

The recommended medications for treatment of Alport syndrome interfere with several hormones that together make up what is known as the renin-angiotensin-aldosterone system (RAAS.) The RAAS normally plays a very important role in maintaining the body’s fluid balance and blood pressure, helping to make sure that the kidneys get the blood flow necessary for good kidney function. The RAAS is overactive in various chronic kidney diseases, including Alport syndrome, and has been shown to promote scarring of the kidneys.

Medications that interfere with RAAS hormones protect kidney function in animals and people with chronic kidney diseases. Medications that interfere with RAAS hormones include:

- angiotensin converting enzyme (ACE) inhibitors — these medications block the production of angiotensin II, the active form of angiotensin.
- angiotensin receptor blockers (ARBs) — these medications block the action of angiotensin II.
- aldosterone inhibitors — these medications block the action of aldosterone.

Both ACE inhibitors and ARBs have been shown to slow down the loss of kidney function in mice with Alport syndrome. People who start taking an ACE inhibitor while their kidney function is still normal are older when they develop kidney failure than Alport patients who don’t receive ACE inhibitors or are started on ACE inhibitors after they have started to lose kidney function. ACE inhibitors, ARBs and aldosterone inhibitors are used to reduce elevated urine protein levels in people with Alport syndrome.

Researchers are still learning about the ways in which these medications protect the kidneys of animals and people with Alport syndrome. The current evidence indicates that these medications directly reduce fibrosis in the kidneys by blocking the RAAS. In addition, by lowering urine protein levels these medications may prevent the harmful effects of high urine protein levels on kidney cells.

These medications have relatively few and minor side effects, they are not expensive and they have been used safely in many children with kidney disease. These medications are readily available everywhere.
The Clinical Practice Recommendations for Providers is available on alportsyndrome.org and can be shown to your physician.

Once a person's kidneys have failed he or she has reached End Stage Renal Disease (ESRD) and at this point, dialysis or a kidney transplant is required. Kidney transplantation has a very high success rate in people with Alport syndrome.

**IS THERE A CURE FOR ALPORT SYNDROME?**

Patients with Alport syndrome should avoid drugs that are potentially toxic to the kidneys. These include over-the-counter medicines such as non-steroidal anti-inflammatory drugs (NSAIDs) containing aspirin, ibuprofen and naproxen, as well as some decongestants.

Patients should speak with their Nephrologist to receive guidance on medicines that should be avoided.

Hearing and vision should also be monitored every one to two years beginning in children, particularly boys, at 7 to 8 years of age and continued regularly. Hearing aids should be prescribed as needed.

Maintaining a healthy lifestyle and a balanced diet is also beneficial. Nutritional considerations, such as sodium reduction and moderating protein consumption, should be discussed with your doctor.

**How common is Alport syndrome?**

Alport syndrome is a rare disease and affects less than 200,000 people in the US. Alport syndrome is estimated to affect approximately 1 in 5,000-10,000 people in the general population in the United States, which means that approximately 30,000-60,000 people in the United States have the disorder.

**What are the chances of passing Alport syndrome on to children?**

The likelihood of passing Alport syndrome to a child is based on the genetic type and the gender of the parent who has the mutated gene.

A male with XLAS will pass the affected X chromosome gene to all of his daughters and they will have XLAS. A male cannot pass an X-linked gene to his sons because the Y chromosome (not the X chromosome) is always passed to male offspring. A female with XLAS has a 50% chance with each pregnancy of having an affected child.

When each parent carries a mutation in COL4A3 or COL4A4, there is a 25% chance with every pregnancy that the child will have ARAS.

Each child of an affected ADAS parent has a 50% chance of inheriting the mutation.

**Beyond medication, dialysis and transplantation, what else can I do to slow disease progression?**

In addition to taking ACE inhibitors and/or ARBs to control proteinuria (protein in the urine), Alport syndrome patients need to control their blood pressure and be monitored regularly. Monitoring tests include urine and blood chemistry testing. As a general recommendation, Alport syndrome patients without any kidney function problems should be monitored yearly, patients with moderate kidney function problems should be monitored every 6 months, and those with advanced kidney failure should be monitored every 1 to 3 months.
WHAT IS THE

ASF is the leading independent nonprofit organization in the United States serving and giving a voice to the Alport Syndrome community.

Our Vision is to conquer Alport Syndrome.

ASF is focused on realizing this Vision, and has directed the majority of the Foundation’s resources to medical research. ASF raises awareness in the patient and medical community and is fostering collaboration among Alport syndrome stakeholders all over the world – including alliances with international patient support groups, patient registries, and medical researchers. ASF empowers the Alport syndrome community by centralizing medical information, hosting patient meetings and conferences, and providing education, advocacy, communication and a network of support.

Our Mission is to improve the lives of patients through education, empowerment, advocacy and research.

SERVICES AND RESOURCES AVAILABLE

HOPE Through Research

ASF supports groundbreaking research to advance the knowledge of, develop effective treatment protocols for, and discover a cure for Alport syndrome. ASF has facilitated more than $1 million in research funding by developing international strategic partnerships and alliances. ASF also provides funding and support to the Alport Syndrome Treatments and Outcomes Registry, alportregistry.org, which is critical for clinical trials. For more information about ASF’s research program and the latest research on Alport syndrome, please visit alportsyndrome.org.

ACTION Through Education

ASF empowers patients through education via a monthly newsletter, blog, webinars, social media and in person at ASF Family Meetings which include specialized programs for teens and young adults. For the medical community, ASF raises awareness of current clinical guidelines and promotes emerging research.

ASF’s website contains a wealth of information for patients, families and providers. Visit www.alportsyndrome.org to find in-depth information about Alport syndrome including Clinical Practice Recommendations for Providers, and lists of resources for genetic testing labs, hearing loss, transplantation services & physician contacts. Our website also contains a regularly updated blog and numerous educational webinars. Have a question you don’t see an answer for or don’t understand something you’ve read? Email or call!
**SUPPORT Through Community**

ASF has connected more than 7,000 patients, families, physicians and researchers in 75 countries. ASF also connects patients and families through local Alport Family Meetings, social media and private support groups.

The Alport Syndrome Foundation routinely posts on the popular social media channels including Facebook, Twitter, Instagram, YouTube and LinkedIn, utilizing these mediums to further reach and interact with our community. ASF currently moderates two private Facebook support communities — one page for our adult patients and a second for the younger individuals affected by Alport syndrome.

A newly developed Peer Mentor program connects patients with mentors to provide resources and a more direct and private support experience. All trained mentors are affected by Alport syndrome and will use their life experiences to assist those going through events that may seem intimidating and unfamiliar to them. Mentors will be best-matched with mentees based on experience.

ASF has established a volunteer-based Youth Advisory Council to make sure the requests of teens and young adults are heard. This age group is hard hit by the disease and ASF has developed special programming at Alport Family Meetings (AFMs) in which participants interact with other youth, often meeting a fellow Alport syndrome patient for the first time, while learning about the disease and its management from program directors and guest speakers (including nephrologists and dietitians).

ASF also offers teens and young adults the opportunity to apply for the Paul Silver Tribute Award, up to $1,000 to accomplish a goal, dream or project.

The voice of the Alport syndrome community is built on the personal stories of thousands of patients, families, friends and medical professionals. The ASF website provides resources to share your Family Story or Message of Hope with the community. Spread awareness by hosting or helping with an event, whether it’s a local ASF fundraiser or our Annual 5K for Healthy Kidneys. Start volunteering with ASF by simply visiting our official website, registering and indicating how you’d like to help spread Alport Awareness. Be sure to follow us on our various social media channels and share our posts.

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Understanding your provider’s terminology can seem intimidating at first and take some time to get used to. Below is a glossary of terms commonly used when discussing Alport syndrome and kidney disease:

**Anemia**: Condition in which the body lacks an adequate amount of healthy red blood cells.

**Antibody**: Specialized protein produced by the body to respond and counteract a specific antigen.

**Antigen**: A substance that stimulates antibody production upon entering the body. Antigens are viewed as foreign by the immune system.

**ASTOR**: Alport Syndrome Treatments and Outcome Registry. ASTOR’s main purpose is to enroll those with a history of Alport syndrome in a central registry. This information is then used as a basis for studies designed to test potential treatments for Alport syndrome patients.

**Chronic Hypertension**: High blood pressure that continues to persist.

**Collagen 4**: Collagen are the building blocks that our bodies use to build cells. Collagen 4 (also known as Collagen IV) is a type of collagen that makes up the lining between our blood and our kidneys.

**Creatinine**: Chemical waste product from the metabolism of creatinine. A Creatinine blood test is used to indicate renal function.

**GFR (Glomerular Filtration Rate)**: A GFR blood test indicates how well your kidneys are filtering and their overall function.

**Gestation Hypertension**: New onset of high blood pressure without proteinuria during pregnancy.

**Hematuria**: Blood in the urine.

**Hemodialysis (HD)**: A form of dialysis in which the blood is cleaned with the assistance of a dialyzer machine. Blood exits the body into the machine where it is cleaned of waste by a special filter and then returned to the body. This procedure is most often performed at a clinic multiple times a week, but can also be done at home with adequate training.

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**Immunosuppressant Drug**: These drugs, taken by almost all transplant recipients, suppress the strength of the recipient’s immune system in order to prevent organ rejection.

**Kidney Biopsy**: Medical procedure in which a needle is inserted through the skin to retrieve a kidney tissue sample.

**Microalbuminuria**: The presence of small amounts of albumin (a type of protein) in urine.

**Microhematuria**: Blood in the urine only visible under a microscope.

**Native Renal Function**: How long a person’s own kidneys function before dialysis or transplant is required.

**Orphan Disease**: A disease that has not been adopted by the pharmaceutical industry as it provides little financial incentive to make and market medications.

**Peritoneal Dialysis (PD)**: In this type of dialysis, the abdominal cavity is filled with a sterile solution called dialysate which collects waste products and excess body fluid. These are then removed from the body via an abdominal catheter. PD can be performed manually or automatically (with use of an electronic machine called a cyclor). PD is generally performed in the home with daily treatment times varying per patient.

**Phosphorous Binders**: Also called phosphate binders or simply binders, these pills are taken with meals and snacks to prevent the body from absorbing phosphorous from the foods eaten.

**Preeclampsia**: Disorder of pregnancy that occurs after 20 weeks gestation consisting of new onset high blood pressure (BP > 140/90) and proteinuria. Preeclampsia complicates 3-5% of all pregnancies and is more common in first pregnancies.

**Proteinuria**: An excess amount of protein found in urine.

**Rare Disease**: In the United States, a rare disease is one which affects fewer than 200,000 people.

**Registry**: A list of patients and their basic information. Registries are helpful to researchers by making available large numbers of patients so that research can be conducted. Early Alport syndrome research suffered due to the lack of adequate numbers of patients to study.

**Superimposed Preeclampsia**: Chronic high blood pressure before pregnancy with development of worsening high blood pressure and protein in the urine during pregnancy.
The Alport Syndrome Foundation (ASF) is the leading independent, nonprofit organization in the United States serving and giving a voice to the Alport syndrome community. ASF’s mission is to improve the lives of patients through education, empowerment, advocacy and research to realize the vision of conquering Alport syndrome.

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