

2020 Annual Report

"Let perseverance be your guide and hope your fuel." - H. Jackson Brown, Jr.

ARRE
ASXL RARE RESEARCH ENDOWMENT





What we do

We are the link between the family community and the medical and research community.

We help families:

- Understand best practices for care management
- Continually learn more about ASXL syndromes, their symptoms, and complications
- Drive the research agenda in the direction that is most meaningful to them

We help medical professionals and researchers:

- Understand the impact of their work on families
- Get the samples and data they need for research; we also directly fund some research
- Learn from each other based on their own experiences with ASXL patients

Our vision

We envision a world where all individuals with an ASXL syndrome have access to evidence-based treatments and engaged healthcare professionals who have knowledge and experience treating ASXL syndromes.

Our mission

Our mission is to support research and education that lead to improved quality of life for individuals with ASXL syndromes.

About ASXL syndromes

ASXL syndromes are caused by a mutation in one of the three ASXL genes:

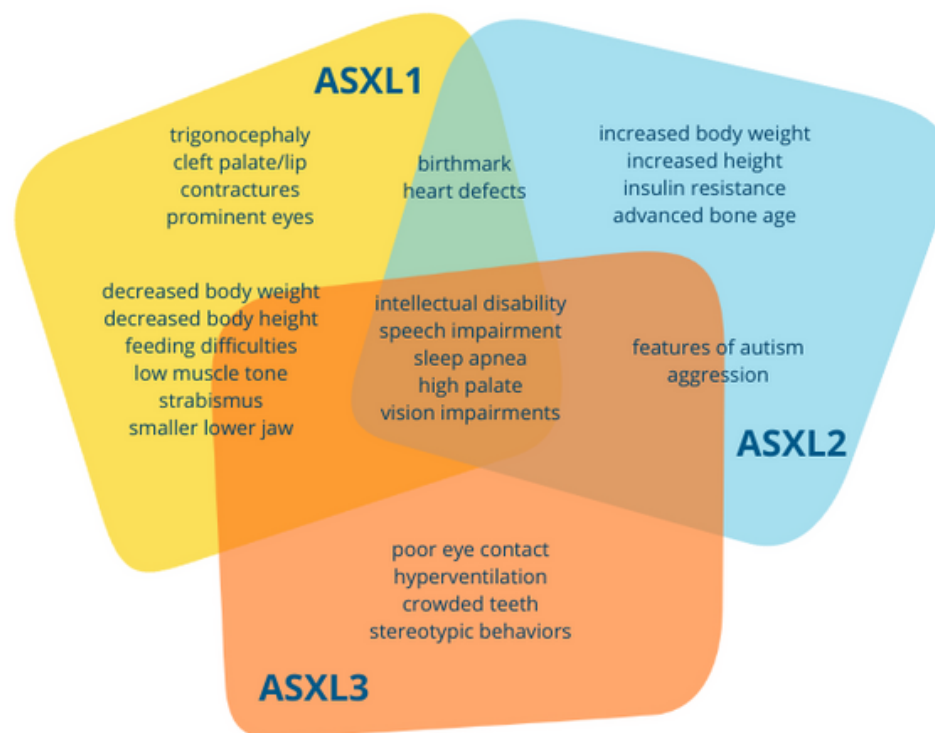
- **ASXL1/Bohring-Opitz Syndrome (BOS)**
- **ASXL2/Shashi-Pena Syndrome (SPS)**
- **ASXL3/Bainbridge-Ropers Syndrome (BRS)**

Each of these rare syndromes has a large spectrum of potential symptoms that vary in severity.

With so little understanding of what the ASXL genes do and the progression of these disorders, families are the world's best experts and advocates in their children's care.

Learn more at arrefoundation.org/asxl-syndromes

Common features



Dear friends,

The last year of the COVID-19 pandemic has given the world insight into what life is like for families like ours as we live with a rare, poorly understood disease. **For families with an ASXL syndrome, it's like living in a pandemic world indefinitely:** there are no known treatments, new symptoms appear unexpectedly, and the risk for severe illness is high. I hope more of the world can now empathize with the uncertainty, isolation, and challenges that families like ours experience daily.

Living through lockdowns, changes to routines, managing virtual school, and the loss of therapies and care have all had a huge impact on our community. **This year's annual report recognizes the immense challenges our community faced in a pandemic while celebrating the special moments we found in a world turned upside down.** While much of the ARRE Foundation's work was paused last year, we made incredible progress on research and building our infrastructure. We delivered funding for our first five research grants, which you can read about here. We also set the stage to hire our first staff person, a Chief Development Officer, who joined us in January 2021 to bolster our fundraising and communications.

We celebrate all we have overcome and dream of a better future for all! Thank you so much for your support and for your investment in improving the lives of our loved ones.

Laura Badmaev
Chair, ARRE Foundation





Strategic plan: 2021-2023

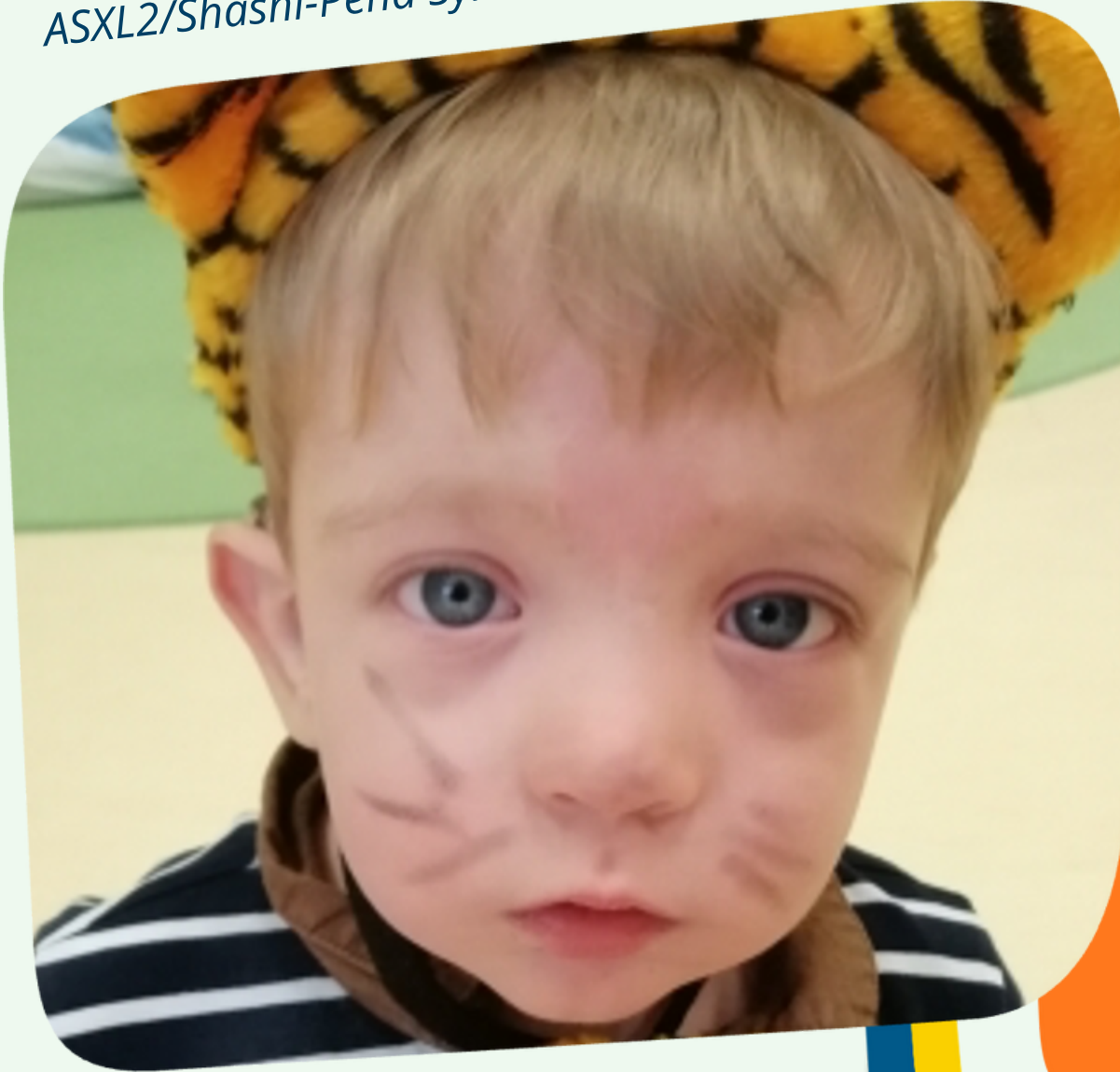
In July 2021, the ARRE Foundation's Board of Directors approved our strategic plan for 2021-2023. This plan lays out our priorities for the two years to advance our mission of supporting research and education that will lead to improved quality of life for those living with ASXL syndromes.

What we're working on:

- Raising more funds for more research
- Building scientific interest in ASXL genes and syndromes
- Developing more online education for families
- Finding partners in the rare disease community to help us work faster
- Hosting the ASXL Family Conference and ASXL Research Symposium in 2022 in-person with virtual access

Learn more at arrefoundation.org/arre-foundation

Domen's family
ASXL2/Shashi-Pena Syndrome



Best memory
**"His first words
and first steps!"**

Biggest challenge
**"Learning he has
febrile seizures
and hoping it
doesn't develop
into epilepsy."**

Contribute to the cause

Host a Facebook Fundraiser

Set up a Facebook Fundraiser in honor of your birthday or other special occasion in just one click! The funds you raise are transferred directly for us and there are no fees, so 100% of the proceeds benefit our mission.



Give when you shop

Select the ASXL Rare Research Endowment Foundation as your AmazonSmile beneficiary and Amazon will donate a portion of the proceeds of your purchases to us. Go to smile.amazon.com to get started.



Join the Sustainer's Circle

Join our special giving society that recognizes donors who make a recurring contribution to support our mission. Set up your recurring donation in any amount by credit card using our online donation form at arrefoundation.org/donate.



Research we're funding

The center of our mission is to support research to improve our understanding of the ASXL gene family and how we can improve care for those with ASXL syndromes.

In November 2019, the ARRE Foundation accepted its first research grant proposals from scientists from around the world who are seeking a better understanding of ASXL genes.

In 2020, we awarded our first research grants, each a two-year grant of \$55,000 per year, to five researchers whose work is currently underway.



**\$550,000
committed**



**5 research
awards**

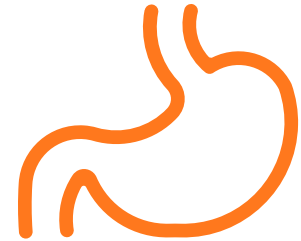
Learn more at arrefoundation.org/research-we-fund

Research we're funding



Micha Drukker, PhD
Leiden University, Netherlands

Project title: *Establishment of stem cell models and enteric nervous system screening platforms for ASXL disorders*



Using the cutting edge techniques of pluripotent stem cell research, Dr. Drukker is paving the way to discovering why some children with ASXL disorders have such a hard time holding down a meal. One of the common secondary diagnoses for young children is failure to thrive and “stomach migraines” that cause severe vomiting and pain for these little ones. Many children have been hospitalized for these complications. The worst part is that doctors just can’t seem to figure out what is going on, and none of the medicines that have been tried seem to help.

Dr. Drukker is working to change all that. In his new, state-of-the-art lab he is turning cells from patient skin biopsies into a working model of a human digestive system. Then using robots, he can test hundreds of medications and closely monitor the reaction of these very unique “mini-stomachs” to all of them — and all without side effects or danger to humans.

Research we're funding



Feng-Chun Yang, PhD

UT Health San Antonio, United States

Project title: *Identifying molecular targets for ASXL1 alteration-associated BOS*



Imagine being one in a hundred million, literally. Imagine having a rare syndrome that no one understands. Then you meet your mice. Mice that have been developed to study your syndrome and that may help to better your life. This is what happened to one little girl's family in Florida. Her name is Hazel and she has ASXL1/Bohring-Opitz Syndrome (BOS).

Dr. Yang and her colleagues from the University of Texas developed these mice a few years ago and have already made some exciting discoveries about how the ASXL1 gene works. The mice develop with a lot of the same symptoms that Hazel and her "BOS siblings" have. The hope is that with more study of these mice we can come to understand the "why" behind the syndrome, and that "why" is the first step to a big "what" — "what" we can do to help Hazel live a better life. And that's even more exciting than meeting a mouse just like you.

Research we're funding



Dale Frank, PhD

Technion, Israel

Project title: *Utilizing early *Xenopus laevis* (frog) neural development as a platform for understanding Bainbridge-Ropers Syndrome*



Dr. Dale Frank from Israel is working on ASXL3/Bainbridge-Ropers Syndrome (BRS) research with frogs. When most people think about scientific research they may think of mice or guinea pigs, but rarely do they think of frogs. So why are frogs such a good fit for this research?

Frog embryos develop a central nervous system within 2-3 days! This makes for faster science — and they are actually very similar in their DNA to humans. Their eggs are clear so you can watch a frog's development much easier than you could with, say, a mouse. Given their size, they can be easily manipulated to modify their gene expression and watch the outcome of the embryo in real time. Dr. Frank's team is already watching these frogs develop and investigating how the nervous system develops early on in frogs that have BRS. He can then find out how the ASXL3 protein changes those developments.

Research we're funding



Valerie Arboleda, MD, PhD

University of California Los Angeles, United States

Project title: *Molecular and clinical biomarker development for Bohring-Opitz Syndrome*



ASXL1 is a gene that we still don't understand, but we do know that when things go wrong with it, it can cause some very severe consequences. Dr. Arboleda's lab is starting the journey to understand and, hopefully, treat the underlying causes of Bohring-Opitz Syndrome. She and her colleagues are studying the molecular mechanisms of the ASXL1 mutation and how it actually impacts cells. They are working with skin biopsies to find differences in DNA or chemicals for people with BOS so that they have a way to test if certain drugs make a difference in those biomarkers.

Dr. Arboleda's project helps lay a foundation for the discovery of drugs that could open up a new beautiful world of better health for affected individuals.

Research we're funding



Rosanna Weksberg, MD, PhD

The Hospital for Sick Children, Canada

Project title: *Development and diagnostic applications of ASXL1 and ASXL3 DNA methylation signatures*



Some genes are thought to be “epigenetic regulators” that put down markers, like bookmarks, that help the body decide which gene instructions to use. That’s how your body creates eye cells that are completely different from your muscle cells from the same “book” of DNA. Recent studies indicate that ASXL genes may be some of these epigenetic regulators.

Dr. Weksburg and her team want to discover more. They have already looked at about 25 similar genes and found a specific pattern or “signature” to each. They hope that their research into ASXL1 and ASXL3 signatures will lead to a better understanding of what these genes actually do in the body and how they do it.

Wyatt's family
ASXL1/Bohring-Opitz Syndrome



Best memory

"With everyone home, Wyatt hasn't been sick in over a year!"

Biggest challenge

"No vacation and missing seeing family and the ASXL community."

Volunteers

We are a volunteer-based organization and we are so grateful to the family members, friends, and professionals who give their time and expertise to make our work possible.

Our forward progress toward our ambitious research goals is only possible with the support of the ASXL community. Please consider joining us as a volunteer!

From small tasks you can complete in a few minutes on your own to bigger leadership roles, you can find a way to contribute that fits your interests and capacity.

Learn more at
arrefoundation.org/volunteer

2020 leadership

Board of Directors

Laura Badmaev, Chair
Melissa Richards
Bianca Russell, MD
Wen-Hann Tan, BMBS
Jeanette Troiola

Volunteers

Angela Cole Duquette
Julie Chandler Lopez
Madalina Magureanu
Jerry Sebastian
Sünne van Gemert-Godbersen

Medical and Scientific Advisors

Stephanie Bielas, PhD
Bianca Russell, MD
Wen-Hann Tan, BMBS
Feng-Chun Yang, PhD

ASXL clinics

There are five geneticist specialists at four clinics that we consider to be experts at understanding and treating ASXL syndromes. These doctors can make referrals based on your child's specific needs. These sites are also sponsors of the ASXL Patient Registry and can collect research samples.



Wen-Hann Tan, BMBS
Boston Children's Hospital

Where the world comes for answers



Loren Peña, MD, PhD
Cincinnati Children's



Vandana Shashi, MD
Jennifer Cohen, MD
Duke University



Bianca Russell, MD
University of California, Los Angeles

ASXL Professional Network

The ASXL Professional Network is a group of healthcare providers and researchers who work with ASXL disorders. The goal of this network is to connect people who need to learn about ASXL syndromes with the people who know the most about ASXL syndromes.

Learn more at
[arrefoundation.org/
asxl-professional-network](https://arrefoundation.org/asxl-professional-network)

ASXL Patient Registry

We proudly support the ASXL Patient Registry (officially called the "ASXL-Chromatin Disorders Registry") at the University of California Los Angeles.

The registry includes information and biological samples from the three ASXL-related disorders: ASXL1/Bohring-Opitz Syndrome, ASXL2/Shashi-Pena Syndrome, and ASXL3/Bainbridge-Ropers Syndrome.

In 2020, we provided \$75,000 to support the patient registry and biobank. This financial contribution provides salary support for the research coordinator and funds biobank sample processing and coordination. This includes the free sharing of samples to qualified researchers who use those samples to study aspects of ASXL disorders.

One of those researchers who is using data and samples from the ASXL Patient Registry is Dr. Rosanna Weksberg. You can read about her research on ASXL1 and ASXL3 on page 12.

Learn more at arrefoundation.org/asxl-registry.



Eva's family
ASXL1/Bohring-Opitz
Syndrome

Adair's family
ASXL3/Bainbridge-Ropers Syndrome



Best memory

"She started walking! Having her older siblings around during the day motivated her to keep up."

Biggest challenge

"Teletherapy."

Research published in 2020

Our community celebrates every time researchers publish new information about ASXL genes or syndromes.

These are the most relevant research studies published in 2020.

For full article summaries and citations, visit arrefoundation.org/published-research

"PR-DUB maintains the expression of critical genes through FOXK1/2- and ASXL1/2/3-dependent recruitment to chromatin and H2AK119ub1 deubiquitination"

by Kolovos P, Nishimura K, Sankar A, et al.

This deeply scientific article focuses on how ASXL gene mutations impact the ability of cells to function properly.

"ASXL3-related disorder"

by Balasubramanian M, Schirwani S.

This article is a clinical summary of Bainbridge-Ropers Syndrome published in GeneReviews, the go-to resource for clinicians to better understand genetic disorders - a huge step for the Bainbridge-Ropers Syndrome and ASXL community!

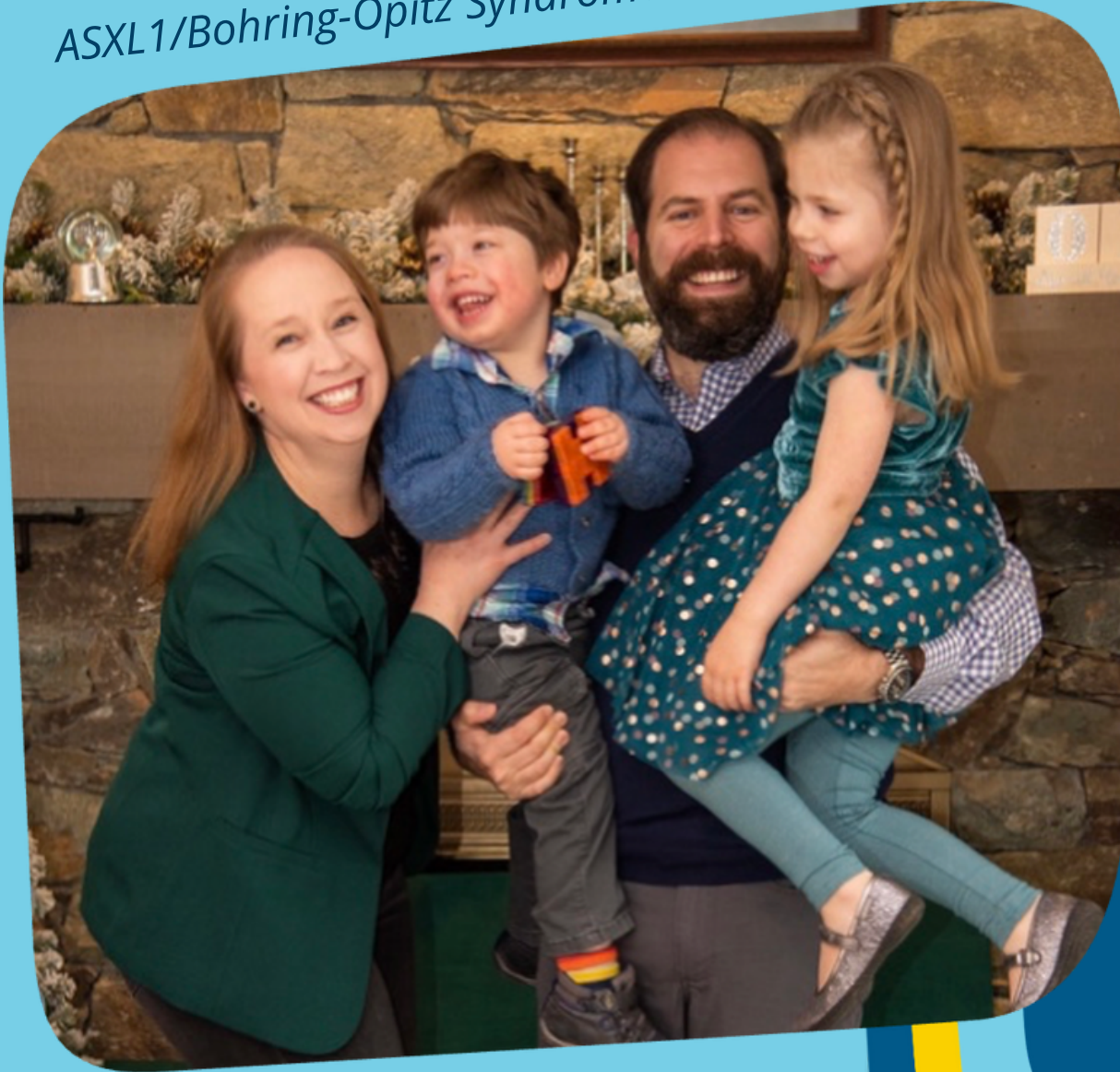
"The tale of two genes: From next-generation sequencing to phenotype"

by Rohanizadegan M, et al.

This article is an example of how modern genetic analysis allows us to screen for disorders when patients present with complex symptoms that may be caused by multiple factors. In many instances, the sooner a condition is identified, the more effective a treatment plan will be.

William's family

ASXL1/Bohring-Opitz Syndrome



Best memory

"We spent 2020 laughing, dancing, singing and being together in our home making lasting memories!"

Biggest challenge

"Knowing the risk COVID-19 presents to a medically fragile child."

2020 financial report

We paused our fundraising efforts in 2020 while our community managed unprecedented strains on their lives due to the COVID-19 pandemic. Nonetheless, we moved our research program forward using funds granted from previous years to pay out our first research grants.

Revenue

Individual donations	\$20,905
Corporate donations	\$1,039
Foundation grants	\$55,000
Investment gains	\$573
Other	\$1,379
Total revenue	\$78,898

Expenses

Administrative costs	\$1,269
Professional fees	\$1,600
Marketing	\$1,060
Research grants	\$273,900
Total expenses	\$277,778

2020 donors

Thank you to all of our financial supporters in 2020! We know the year was challenging in more ways than one and we are grateful to everyone who invested in our work.

From those who included us in their year-end giving plans, to our corporate workplace donors, to our foundation grantors, to our Facebook fundraisers, to our calendar purchasers, we appreciate you!

Ways to give

- Give a one-time gift by credit card or check
- Start a monthly donation and join our Sustainers Circle
- Make a gift of stock
- Include us in your estate plans
- Host a Facebook fundraiser

Learn more at arrefoundation.org/ways-to-give



Josh's family
ASXL3/Bainbridge-Ropers
Syndrome

So far in 2021...

Hired our first staff person

Amanda Johnson joined our team in January as our first paid staff person. She brings over 10 years of nonprofit management and fundraising experience to the role of Chief Development Officer to accelerate our work.

Launched a new website

Our updated website features updates to our resource library, a new page for newly diagnosed families, and more comprehensive descriptions of each ASXL syndrome

Hosted a virtual ASXL Family Conference

Over 135 attendees from 19 countries joined our virtual education sessions for families with clinical and research experts in BOS, SPS, and BRS. Recordings from these sessions are on our website now.

Ahead in 2021...

2021 ASXL Research Symposium

In November, we'll convene the world's leading researchers virtually to discuss their progress and latest findings.

New family education

In September, we'll release two new resources for families: a recording explaining the genetics of ASXL syndromes and a live webinar with clinician-researcher Rosanna Weksberg (Hospital for Sick Kids) about her ASXL-related research.

Connect with us



ARRE

ASXL RARE RESEARCH ENDOWMENT

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