

2018 ANNUAL REPORT



PRESIDENT'S LETTER



Dear Friends:

There is no denying that 2018 was an extraordinary year in autism science. Now, more than ever, we have to keep pushing forward, leveraging new knowledge and technology, and putting it to work for people with autism and their families.

ASF continues to catalyze meaningful progress. We maximize our impact by investing in the most promising science and in researchers who are doing the most innovative work; work that has the greatest potential for improving people's lives. For example, in 2018 we expanded the Baby Siblings Research Consortium to include a cohort of grandchildren. This Next Generation Sibs project will provide important information about recurrence risk and early warning signs in the offspring of unaffected siblings.

As always, we are grateful for your continued support of our organization and its mission. We look forward to another year of progress!

Sincerely,

Alison Singer

CHIEF SCIENCE OFFICER'S LETTER



Dear Friends:

This year marked enormous progress in understanding autism spectrum disorders. By studying brain tissue and genetics of people with autism, scientists showed biological similarities between autism, schizophrenia and ADHD, which is opening up new treatment options for those on the autism spectrum, particularly those with comorbid conditions.

Studies funded by ASF are finding new ways to mitigate symptoms in people with ASD. These new treatments range from pharmaceuticals to classroom-based behavioral interventions and parent-mediated therapy. ASF also led work to develop the first policy brief focusing on how to improve the employment outlook for people with autism and how the research community can better support people with autism in the workplace.

Thank you to all the ASF supporters for helping to make this science happen.

Sincerely,

Dr. Alycia Halladay

ACCOMPLISHMENTS

In 2018, our ninth year of operation, the Autism Science Foundation:

Awarded over \$540,000 in autism research funding for predocs, postdocs, undergrads and collaborative consortium activities, including the Autism Sisters Project.

Built a new online tool to help researchers study the single-gene forms of autism.

Registered over 1,500 people for the Autism BrainNet and communicated with families across the US about the importance of postmortem brain tissue research.



Disseminated a new policy brief on employment needs for people with autism; presented these data at the International Society for Autism Research meeting.



Hosted our fifth annual Day of Learning, bringing scientists and families together to discuss key autism topics, including sex and gender differences, diet, medical marijuana and adult outcomes. In 2019, we will add a second Day of Learning event in San Francisco!

Completed an internal assessment showing our funded grantees were 80% more likely to remain active autism researchers than those investigators who applied for but didn't receive funding.

Raised a record \$350,000 at our annual Ride FAR bike event.



Supported an expanding Baby Siblings Research Consortium, enabling the group to better understand early features of autism and develop biomarkers to diagnose autism before behavioral symptoms emerge.



FUNDING SCIENCE

In 2018, ASF awarded over half a million dollars in grant support primarily through its pre- and postdoctoral fellowships, research accelerator awards and undergraduate summer research grants. Below are summaries of the projects funded by these awards.

POSTDOCTORAL FELLOWSHIPS



Joon An, PhD | University of California, San Francisco
Mentor: Stephan Sanders, PhD

Determining the nature and function of the SCN2A mutation in ASD

SCN2A is a gene that encodes a sodium channel that is critical for communication between brain cells and has been shown to be important for both ASD and seizures. This study will provide a better understanding of the role of the SCN2A gene in autism, using data collected from both animal models and people with this mutation. This detailed investigation of SCN2A will help develop new therapies that might improve symptoms of people with ASD.

This fellowship is supported through a partnership between the Autism Science Foundation and the Families SCN2A Foundation.



Laurel Joy Gabard-Durnam, PhD | Harvard University
Mentor: Charles Nelson, MD, PhD

Examining brain function during critical periods of development in ASD

In order to better understand critical periods of brain development, this project will analyze patterns of brain activity in those with autism and compare them with brain activity in girls with Rett Syndrome and in people who are typically developing. Because girls with Rett Syndrome show noticeable regression, this research will help inform the timing of biological targets for future intervention strategies.

This fellowship is supported through a partnership between the Autism Science Foundation and the Rett Syndrome Research Trust.



Aaron Gordon, PhD | University of California, Los Angeles
Mentor: Daniel Geschwind, MD, PhD

Identifying the converging genetic pathways across different forms of ASD

This project will study how brains work in people with autism by taking skin cells and turning them into neurons. They include those with known genetic causes of autism and those with unknown heritability. Researchers will then be able to see commonalities and differences across various forms of autism, enabling the development of better therapies for all people with an autism diagnosis.



Whitney Guthrie, PhD | Children's Hospital of Philadelphia
Mentor: Robert Schultz, PhD

Developing a novel method for early screening of autism using electronic medical records

This study will access the existing electronic health records containing information on developmental milestones from over 75,000 children with and without autism. Using this enormous dataset, researchers will look for new markers that can enhance standardized screening measures for ASD. The findings will help clinicians better evaluate children with early risk indicators.



Christine Ochoa Escamilla, PhD | U of Texas SW Medical Center
Mentor: Peter Tsai, MD, PhD

Understanding the genetic influence of brain circuitry in ASD

People with autism have fewer Purkinje cells than typically developing individuals, but what this means and how it manifests are not well understood. Using an animal model of ASD, Dr. Ochoa Escamilla will expand work started under an ASF predoctoral fellowship to study how these particular cells influence brain connectivity and circuit formation during development. This will help identify and develop specific pharmacological interventions based on a known cellular target.



Thanks to funding from the Autism Science Foundation, our lab is examining data from thousands of young children to see when and how autistic behaviors emerge. By using this information, pediatricians will be better able to diagnose ASD well before most symptoms even emerge.”

— WHITNEY GUTHRIE, POSTDOCTORAL FELLOW

PREDOCTORAL FELLOWSHIPS



Amy Ahn | University of Miami
Mentor: Daniel Messinger, PhD

Automating and accelerating the autism diagnostic process

This study will utilize automated methodologies in diagnosis, such as head-mounted cameras and other objective measures, in order to determine if they can be used in conjunction with existing clinical practices to speed up the diagnostic process. This technology will specifically be tested in an equal number of boys and girls to determine if it can also be used to develop more gender-specific referral guidelines.



Cara Keifer, MA | Stony Brook University
Mentor: Matt Lerner, PhD

Explaining how the ASD brain works during social interactions

By studying moment-to-moment brain responses that occur before, during and after social situations, this study will help clinicians understand how small differences in the way the brain works may lead to large effects in social interaction in adolescents with autism. Eventually, this information will allow scientists to expand treatments that will have the biggest impact on social interaction at different ages.



Julia Yurkovic | Indiana University
Mentor: Daniel Kennedy, PhD

Evaluating attentional deficits in ASD during real life situations

Julia will study the use of mobile eye tracking technology worn by parents while interacting with their children in naturalistic settings, whereas most eye tracking studies are performed by clinicians. This will help scientists better understand attentional problems in toddlers with autism in the real world and improve targeted attention-based early intervention programs for ASD.

ACCELERATOR AWARDS

The accelerator grant mechanism is designed to rapidly fund novel findings, provide resources to build on an existing project or explore unexpected opportunities.



Allison Jack, PhD

The George Washington University

Exploring oxytocin as a mechanism for sex-related differences in brain structure in autism

Oxytocin is a hormone in the brain that influences social relationships and social bonding. Dr. Jack and her colleagues will build on an existing NIH-funded study to better understand the role of this hormone on brain connectivity, as well as on gender differences in autism symptoms.



Anne Roux, MPH, MA

Drexel University

Employment policy for youth with autism: Document analysis of WIOA state plans

Recent changes in how states may use federal funding for vocational training provide a natural experiment to better understand factors that affect the success of transition programs for adolescents with autism. This funding will allow the team at Drexel to characterize the new programs emerging in each state and speed up the ability to identify which programs are working so that best practices can be shared more quickly.

UNDERGRADUATE GRANTS

ASF is the only autism organization to offer summer grants to undergraduate researchers, encouraging the best and brightest students to launch a career in autism science.



Ethan Gahr and Dr. Sara Jane Webb

Seattle Children's Hospital

Ethan built upon a large NIH study examining why more males than females are diagnosed with autism. His research may help scientists understand why females are often underdiagnosed, and inform the development of more targeted interventions for females with ASD.



Evan Suzman and Dr. Tiffany Woynaroski

Vanderbilt University

Evan studied infants known as "baby siblings" who have a high probability of an autism diagnosis because they have an older sibling with autism. Using this design, the group at Vanderbilt looked at early sensory features to determine how they relate to later social communication and language deficits. These findings may help shape early intervention techniques in infants with sensory issues.



Christina Layton and Dr. Jennifer Foss-Feig

Seaver Autism Center at the Icahn School of Medicine, Mount Sinai

Christina utilized brain activity measurements to see how disruptions in different brain pathways affect visual and auditory processing in people with autism. The results will identify how these biological measures explain symptom severity in people with autism, and may be used to complement behavioral measures to improve diagnosis of ASD.



Ryan Risgaard and Dr. Xinyu Zhao

University of Wisconsin, Madison

Ryan and Dr. Zhao examined new molecules that, when applied to certain cells, can reignite production of the FMRP protein, which is low in people with Fragile X Syndrome and contributes to autistic symptoms in those without Fragile X Syndrome. This project will provide critical information on new compounds that may ultimately be used to treat core symptoms of ASD.



Undergraduate fellow Tatiana Winkelman of Yale University presented her ASF-funded research at the International Meeting for Autism Research.



The Baby Siblings Research Consortium, supported by ASF, now includes 44 researchers around the world studying the developmental origins of autism and searching for the earliest signs of ASD. Analysis of the younger siblings of children with autism (over 4,000 of them!) has shown how early motor features predict diagnosis, and has uncovered biological markers that predict autism before behavioral signs are present. This enables earlier diagnosis and earlier intervention, and improves outcomes.



The BSRC uses advanced techniques to find early behavioral and biological markers so that autism can be diagnosed as early as possible.



Four times as many boys as girls are diagnosed with autism, and unaffected sisters of people with autism may hold the key to understanding why. In many cases, they have genetic deletions or duplications that would cause autism if they were boys, and yet these girls have no symptoms. By studying these girls and the protective factor they seem to show, we can learn more about how to protect males and females from the most debilitating symptoms of autism. Scientists at the Seaver Center at Mount Sinai Hospital, the University of California at San Francisco and the Broad Institute at MIT are collecting and studying samples from over 50,000 individuals and should have data ready to publish in 2019.

We are collecting DNA from sisters of people with autism because it may help us understand why some girls are protected from autism.



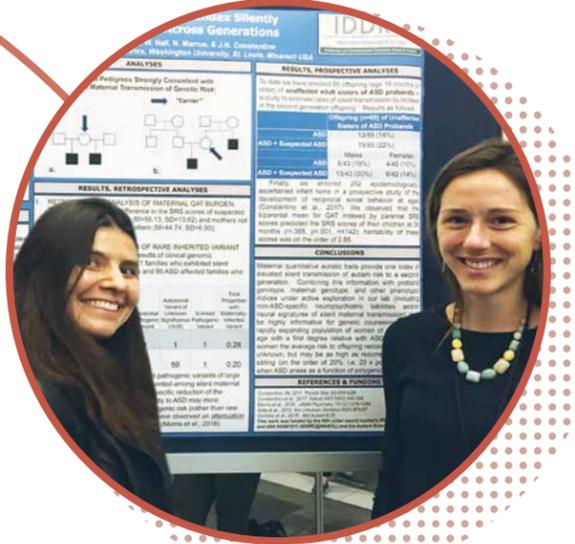
ASF participated in 28 different events across the US to explain the importance of brain tissue donation.



In 2018, 1,544 new people registered with the Autism BrainNet and agreed to donate postmortem brain tissue for autism research. This growing resource fostered major discoveries in understanding the symptoms and features of autism, identifying biological treatment targets and determining changes in the brain on a cellular level throughout the lifespan.



As children with autism grow up, so do their siblings. Some are ready to have children of their own. This year we expanded the Baby Sibs Consortium to add a cohort of children born to unaffected siblings: the Next Gen Sibs. Our goal is to determine the recurrence risk of autism in this population and to search for early warning signs in grandchildren so that we learn more about the recurrence risk in the offspring of unaffected siblings.



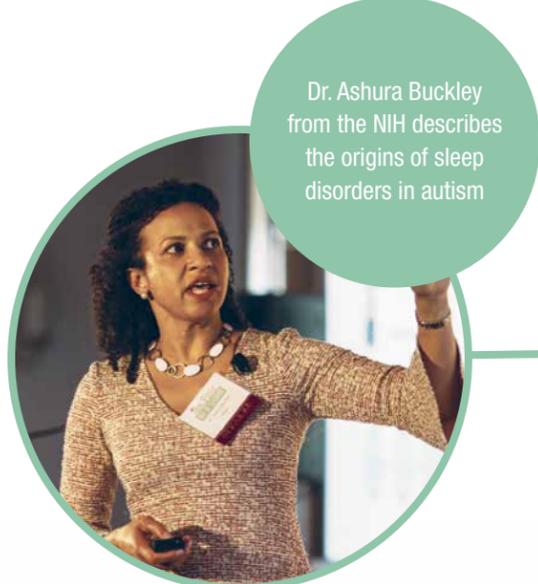
AUTISM SCIENCE FOUNDATION 5th ANNUAL DAY OF LEARNING

Our fifth annual TED-style autism conference featured talks by top autism researchers from across the country for a full day of learning. More than 350 parents, teachers, students, people with autism and other stakeholders participated.



Biology of Cannabis
 Cannabis chemistry -> 540 compounds
 Tetrahydrocannabinol (THC) - psychoactive
 Stimulates CB1, CB2 & CB1/CB2 receptors
 Cannabidiol (CBD) nonpsychoactive
 GPR55 receptor
 TRPV1 receptor
 Nicotinic (A & B) receptors

Dr. Orrin Devinsky from NYU explains how medical marijuana may help people with autism



Dr. Ashura Buckley from the NIH describes the origins of sleep disorders in autism



Experts in autism biology, treatments, sleep, nutrition, sensory issues, sex differences and adult outcomes presented at the Day of Learning



ASF President Alison Singer welcomes attendees to the Day of Learning



WALL STREET RIDES FAR FOR AUTISM RESEARCH

Our fourth annual Wall Street Rides FAR (For Autism Research) drew a huge crowd and raised more than \$350,000! Participants enjoyed bicycling through the scenic fall foliage or participating in a 5k trail walk. Join us for our fifth Ride FAR on October 5, 2019.



The Morris Family chaired the 5k trail walk



Ride FAR Chairs Bryan and Melissa Harkins



Over \$350,000 was raised to support ASF science initiatives



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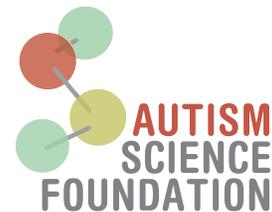
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