Duke
CENTER *for* AUTISM
and BRAIN DEVELOPMENT
An NIH Autism Center of Excellence

EXCEPTIONAL PEOPLE EXTRAORDINARY DISCOVERIES

UNRAVELING THE COMPLEXITIES OF AUTISM TO BRING LIFELONG IMPROVEMENTS

The Duke Center for Autism and Brain Development's interdisciplinary team of neurobiologists, computer engineers, data scientists, molecular biologists, psychiatrists, psychologists, and physicians is conducting groundbreaking research to create more accurate and scalable methods of early detection and early intervention, develop and evaluate new therapies, and make new discoveries in genetics, molecular science, and neuroscience. The center's research discoveries meaningfully impact individuals diagnosed with autism and their families, increasing access to proven therapies worldwide. The center has twice been named a "National Institutes of Health (NIH) Autism Center of Excellence," a designation given to only a handful of U.S. research centers, and is a part of the multi-site NIH Autism Biomarkers Consortium for Clinical Trials, which has validated the first autism brain-based biomarkers to be accepted under the FDA's Biomarker Qualification Program.

OUR FOUR-PART MISSION

SCIENCE
Through scientific research, we develop more effective methods of early detection and treatment for individuals with ASD across the lifespan.

POLICY
Our research shapes public policy, positively impacting quality of life for neurodiverse individuals, especially in the areas screening, interventions, and service delivery.

CLINICAL
Our clinical providers use evidence-based interventions and treatments to address the needs of the whole person, seeking to meet each patient's unique needs with compassion.

TRAINING
As a part of Duke University School of Medicine, we educate and inspire the next generation of scientists and practitioners.




SCIENTIFIC ADVANCES, NOVEL AUTISM DIAGNOSTIC TOOLS & INNOVATIVE THERAPIES

Using artificial intelligence to detect autism – A team of Duke researchers specializing in psychiatry, pediatrics, biostatistics and bioinformatics, computer and electrical engineering, and civil and environmental engineering are working to develop artificial intelligence tools for detecting autism during infancy and identifying brain-based biomarkers of autism. Researchers are testing a digital app, used by parents at home on a smart phone, to screen young children's behavior and interactions with their caregivers. Computer vision analysis and artificial intelligence automatically code the videotapes to identify behavioral characteristics of infants and toddlers who are later diagnosed with autism and to track their development. The team has shown that the app detects early signs of autism in toddlers and, in collaboration with Duke Health Primary Care clinics, is now testing the same tool with infants as young as six months. The app uses computer vision analysis and machine learning to make precision measurements of changes in behavior, providing a more reliable, sensitive tool for measuring improvement in clinical trials.

Harnessing machine learning to guide physicians – Nearly 3,000 patients who are diagnosed with autism are seen at Duke each year. The center's data scientists and clinicians are applying artificial intelligence, including machine learning and natural language processing, to Duke patients' electronic health records to determine whether information collected during routine health care visits could alert physicians to patients at higher likelihood for neurodevelopmental disorders. Now, as a part of the NIH Autism Center of Excellence research program, the investigators are using artificial intelligence to analyze 260,000 health insurance claims, including those from 6,000 children from birth to 18 months of age who have been diagnosed with autism. Using the data, the team will develop an algorithm to predict autism during infancy and identify the nature of early medical conditions associated with a later diagnosis of autism.

Understanding the nature of brain function in autism – Center researchers are applying novel methods to measures of brain wave (EEG) activity in autistic children and those not diagnosed with autism to better understand how autism affects brain function and the ability to learn and develop social and language skills. This project also aims to develop new brain-based biomarkers that could be used to identify autism or track progress in clinical trials. As part of the NIH Autism Center of Excellence research program, the team is using artificial intelligence to monitor brain wave activity that is synchronized with videotaped behavior of autistic children. The data will be used to identify brain networks associated with behaviors characteristic of autism.

Evaluating the efficacy of cell therapy for improving social and communication skills – Center researchers are testing whether cell therapies, derived from umbilical cord blood or tissue, could improve social and communication skills in children and adults with autism. Researchers are currently examining potential improvements in behavioral outcomes, as well as changes in brain activity and attention abilities. The team has published study results showing that umbilical cord blood might enhance attention to stimuli and improve communication skills in children diagnosed with autism who do not have intellectual disability. More research is underway to evaluate whether cellular therapies could benefit children and adults with autism.

Unveiling how genetic mutations affect synaptic pathways – A center team of molecular biologists, neurobiologists, and neuropsychopharmacologists are using animal models and state-of-the-art technologies, such as CRISPR, to help understand how genetic mutations impact synaptic pathways in the brain, affecting speech, social, and communication skills. Using novel techniques developed at Duke, the team is developing a deeper understanding of how rare gene mutations affect brain function, setting the stage for finding new interventions to improve quality of life.

Adapting and disseminating interventions to reduce disparities in access – Proven behavioral intervention methods developed by center investigators, such as the Early Start Denver Model, can have a significant impact on outcomes for those on the autism spectrum. Yet, for many people in low-resource communities in the U.S. and worldwide, these interventions are out of reach. Center investigators have published research showing that caregiver coaching can be delivered effectively via telehealth by non-specialist providers, and that this coaching can be effectively applied to school age children. Ongoing studies could open the door to greater access to scientifically proven interventions and supports for those living in socio-economically disadvantaged and rural communities worldwide.

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Geraldine Dawson, Ph.D.
Director,
Duke Center for Autism and Brain Development
William Cleland Professor of
Psychiatry and Behavioral Sciences,
Duke University School of Medicine

geraldine.dawson@duke.edu
autismcenter.duke.edu

We invite you to partner with us.

Your philanthropic support is critical to our ability to continue to conduct ground-breaking research that leads to innovative tools and therapeutic treatments.

To support our efforts, contact:

Morgan Pope, Director of Development,
Duke Health Development and Alumni Affairs
morgan.pope@duke.edu or 919-451-5093

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