

# the MARBLES STUDY

## WHY WE ARE DEDICATED TO STUDYING AUTISM

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utism is a lifelong, pervasive neurodevelopmental disorder. According to the Centers for Disease Control and Prevention, 1 in 150 children in the United States has autism or a closely related disorder. In California, the number of persons with autism eligible for state services has increased five-fold over an eight-year period. The causes of autism – and how to prevent it – are unknown. Parents, teachers and health-care providers all look forward to breakthroughs in understanding this serious disorder. Our team is committed to making those breakthroughs.

### Finding the causes and earliest indicators of autism

The MARBLES (Markers of Autism Risk in Babies – Learning Early Signs) study was launched in 2007 to study how autism unfolds during its earliest phases, beginning with pregnancy. The goals of the study are to:

- Identify early signs of autism
- Understand the earliest possible causes of autism
- Develop diagnostic tests and interventions that can limit the effects of autism or prevent it altogether

### Who can participate

Women can participate in MARBLES if they are:

- At least 18 years old
- The biological mother of at least one child with an autism spectrum disorder, since such women are far more likely to have another child with an autism spectrum disorder
- Living within a two-hour drive of the Davis-Sacramento area
- Pregnant, or planning or considering a pregnancy now or in the future

### What participants are asked to do

MARBLES participants undergo a series of evaluations during pregnancy, birth and the first three years of the child's life.

- Participants keep diaries about their health, diets and household product use
- Environmental samples such as dust are taken in their homes using a high-powered vacuum designed specifically for this purpose
- Information on consumer products and chemicals in the home is recorded
- Blood and urine samples are taken at different time points from the mother while she's pregnant and from the child once he or she is born through 3 years of age
- Umbilical cord blood is collected at birth along with placental tissue
- Breast milk is collected from participants who breastfeed
- Trained staff evaluate the child's behavioral development

Most of the sample collection is conducted in participants' homes and in the hospital when their babies are born.

### What participants receive

- Results of child developmental evaluations
- Information on ways to reduce chemical exposures
- The satisfaction of contributing to finding the causes of autism
- \$200 in compensation over the course of the study

### Comprehensive analyses

Samples are analyzed in laboratories at UC Davis and the UC Davis M.I.N.D. Institute for genetic and immune markers and for toxin levels. Children with autism will be compared with children who do not have autism for any differences that could contribute to the onset of the disorder.

## THE RESEARCH TEAM

*Irva Hertz-Picciotto*, MARBLES principal investigator, is a world-renowned epidemiologist and expert on environmental chemicals and their effects on pregnancy and early childhood health and development.

*Robin Hansen* is a developmental-behavioral pediatrician, clinician and researcher who studies medical factors and early childhood health and development.

*Cheryl Walker* is an obstetrician and specialist in reproductive health and infectious diseases.

*Sally Rogers* is a child clinical psychologist and pioneer in developing behavioral interventions for very young children with autism.

*Sally Ozonoff* is a child clinical psychologist and leading researcher on early indicators of autism.

*Deborah Bennett* is an expert in assessing exposures to environmental pollutants.

*Isaac Pessah* is a neurotoxicologist conducting research on the molecular and cellular mechanisms by which environmental chemicals influence autism susceptibility.

*Frank Sharp* is a neurologist, molecular biologist and expert on gene expression profiles in blood and corresponding mechanisms in the brain.

*Judy Van de Water* is an immunologist working on the potential role of immune dysfunction in autism.

*Kristine Shedd*, MARBLES project manager, is a researcher interested in nutrition, biology and child development.

*Lihong Qi and Danh Nguyen* are biostatisticians engaged in the analysis of MARBLES study data.

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### Study sponsors

UC Davis Center for Children's Environmental Health – a multi-disciplinary research center looking at how toxic chemicals may influence child development, including autism. The center's research team includes experts in pediatrics, child development, molecular biology, epidemiology, immunology, obstetrics and gene expression.

UC Davis M.I.N.D (Medical Investigation of Neurodevelopmental Disorders) Institute – a collaborative center that brings together parents, scientists, clinicians and educators for research on autism, fragile X syndrome, attention-deficit/hyperactivity disorder, Tourette's syndrome and other neurodevelopmental disorders.

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