



# Updates in Autism

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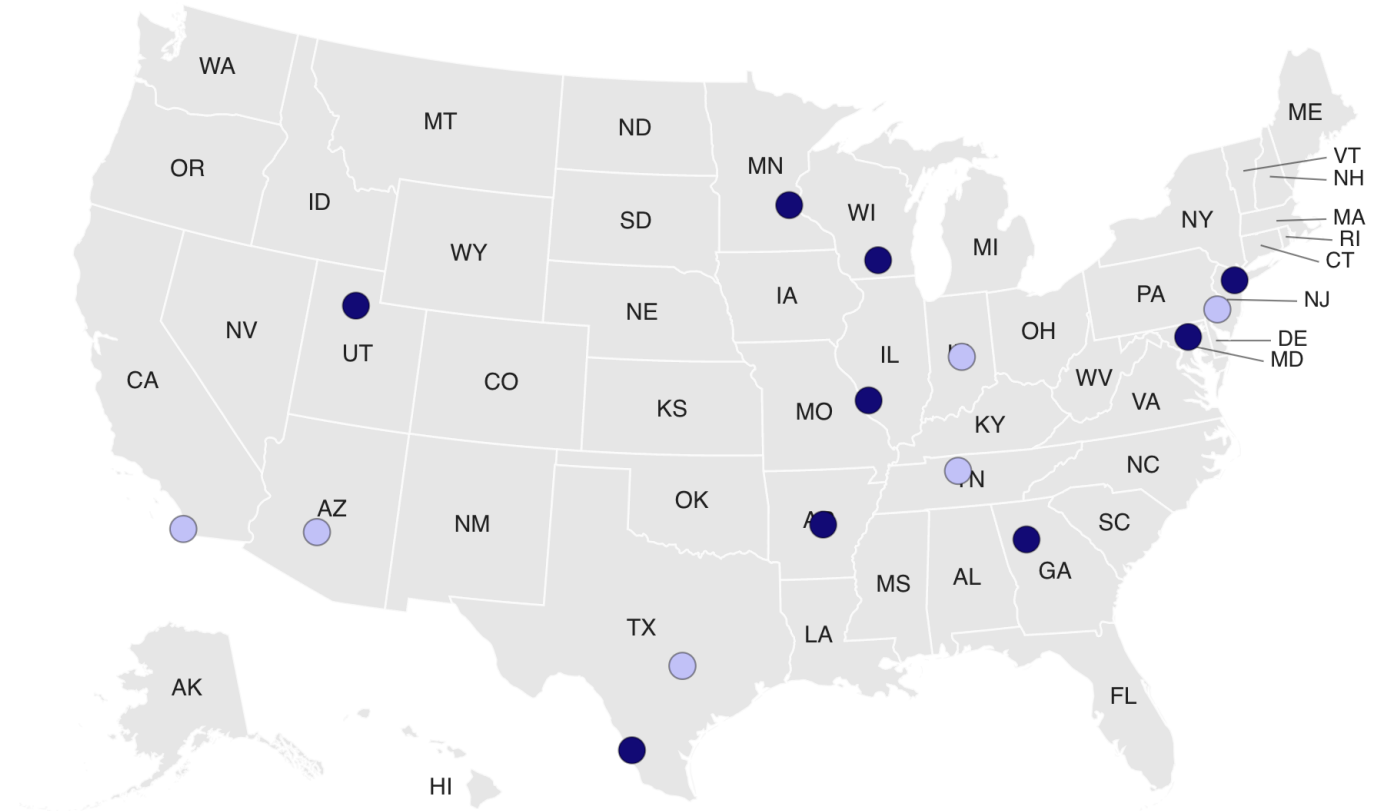
I have no disclosures

# OVERVIEW

- Etiology
  - Genetics
  - Neuroinflammation
  - Girls
  - Gut
  - Parental age
- Treatment
  - ABA
  - Alternative interventions
  - Advocacy

# Epidemiology

ADDM Network Sites, Surveillance Years 2022 and 2024



Territories **PR**



Tracks ASD Among Children Aged

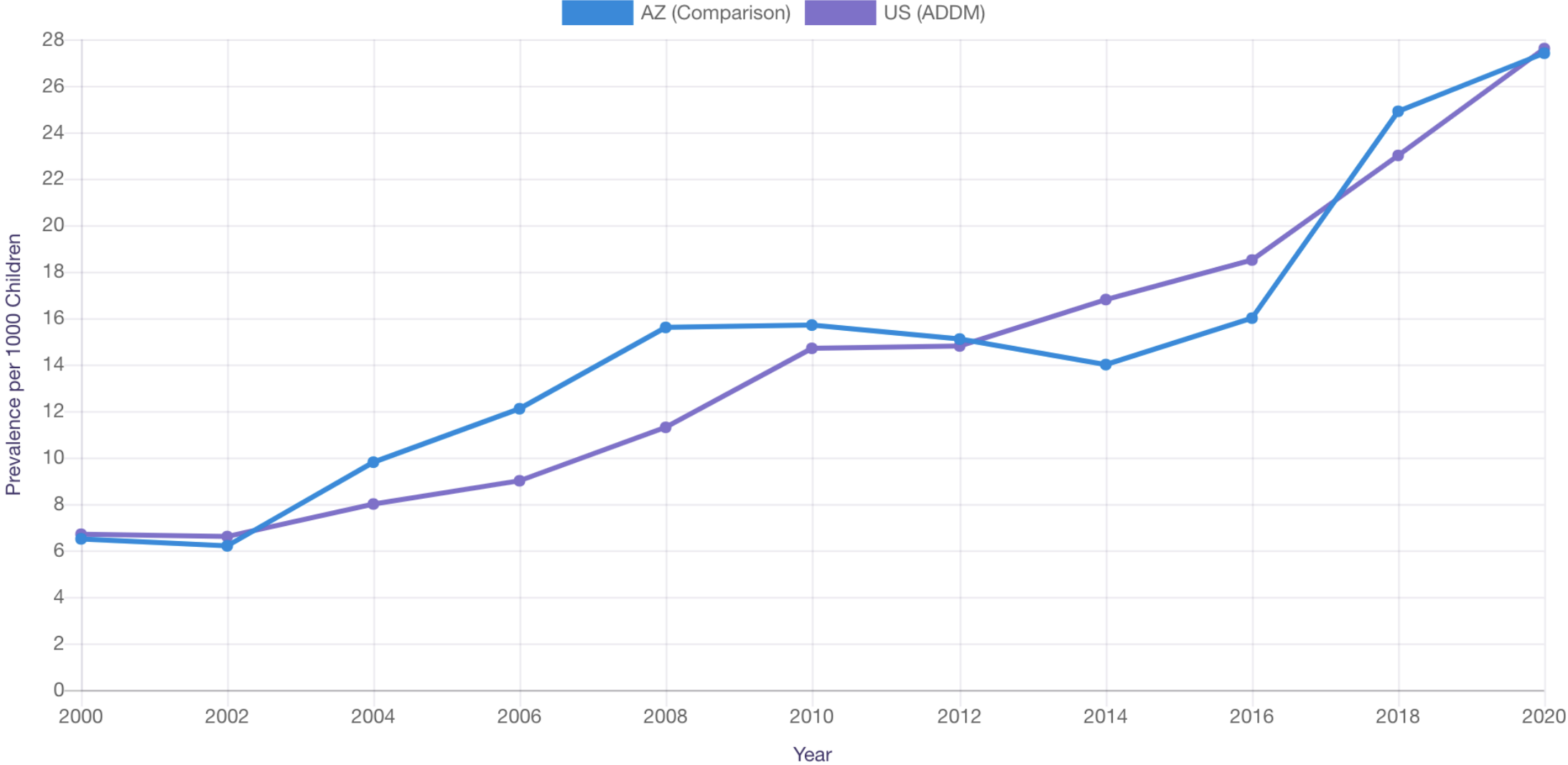
● 4 and 8 Years

● 4, 8, and 16 Years

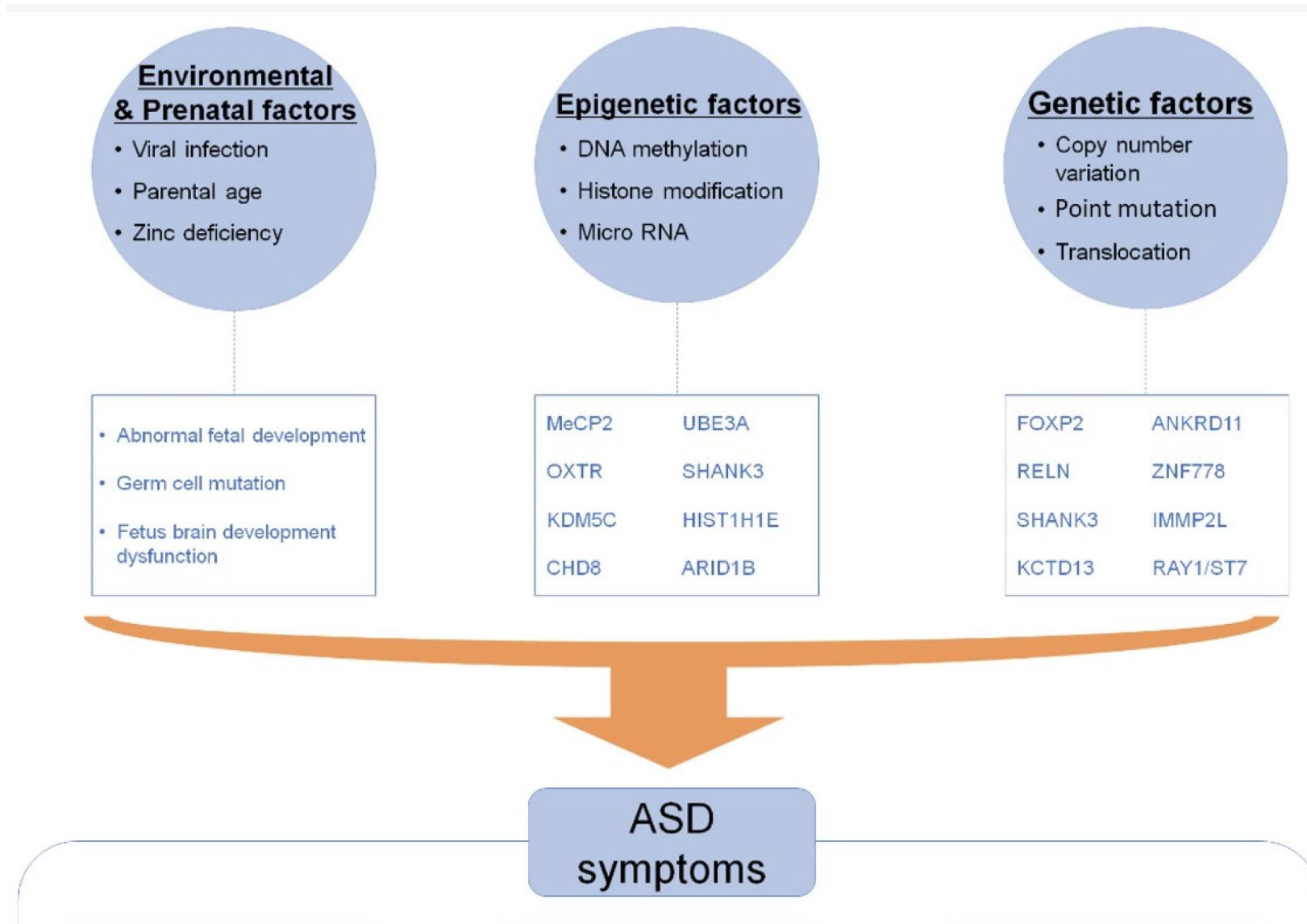
<https://www.cdc.gov/ncbddd/autism/addm-network-sites.html>

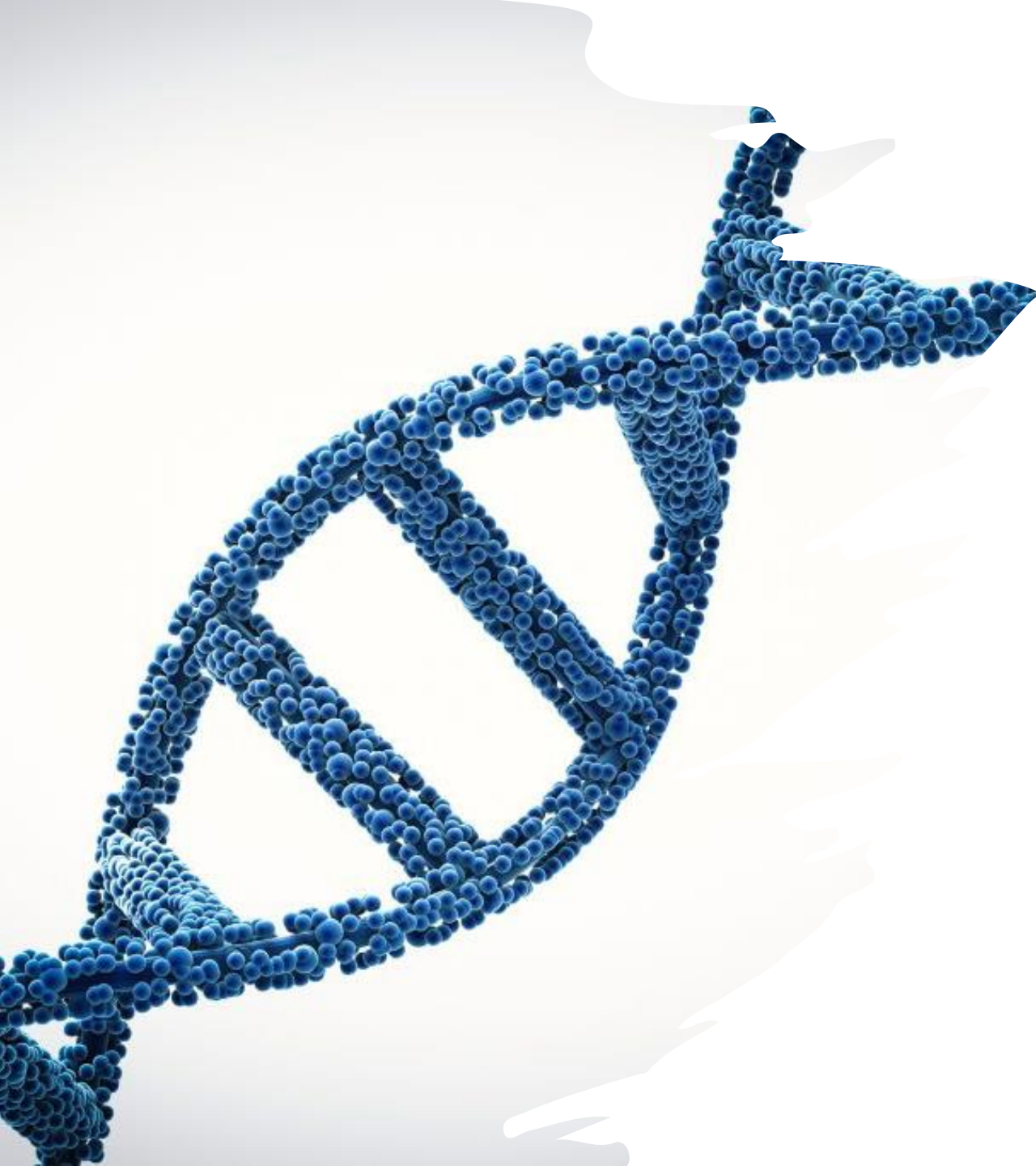
# ADDM Network estimates for overall ASD prevalence in US over time

*compared to prevalence estimates in AZ*



# Measured Intelligence





# Genetics in Autism

- Accounts for 10-20%
- Autism is more common in all genetic conditions
  - Down syndrome, 16p11.2 dup/del, PWS, Fragile X, Angelman, Rett
- Twin studies: (both genetics and environment)
  - MZ twins: 60-90%
  - DZ twins: 25%



# Epigenetics

- Video



# Environment

- Pollutants: Polychlorinated biphenyls (PCBs- insulating fluids in transformers and capacitors, vacuum pump fluids, hydraulic fluid) air pollutants, phthalates,
- Medications
- Parental Age
- Microbiome-incidence of autism in siblings decreases as years increase between births.
- Maternal immune activation



An illustration featuring a white stork with black wings and red legs, flying from left to right. The stork is carrying a large, flowing red bundle in its beak. The background is a teal, textured landscape. In the upper right, a large, pale moon is visible. On the left side, a large, stylized clock face is partially shown, with the number '12' and some other numbers visible. A dashed white line trails behind the stork, suggesting its path.

# Parental Age

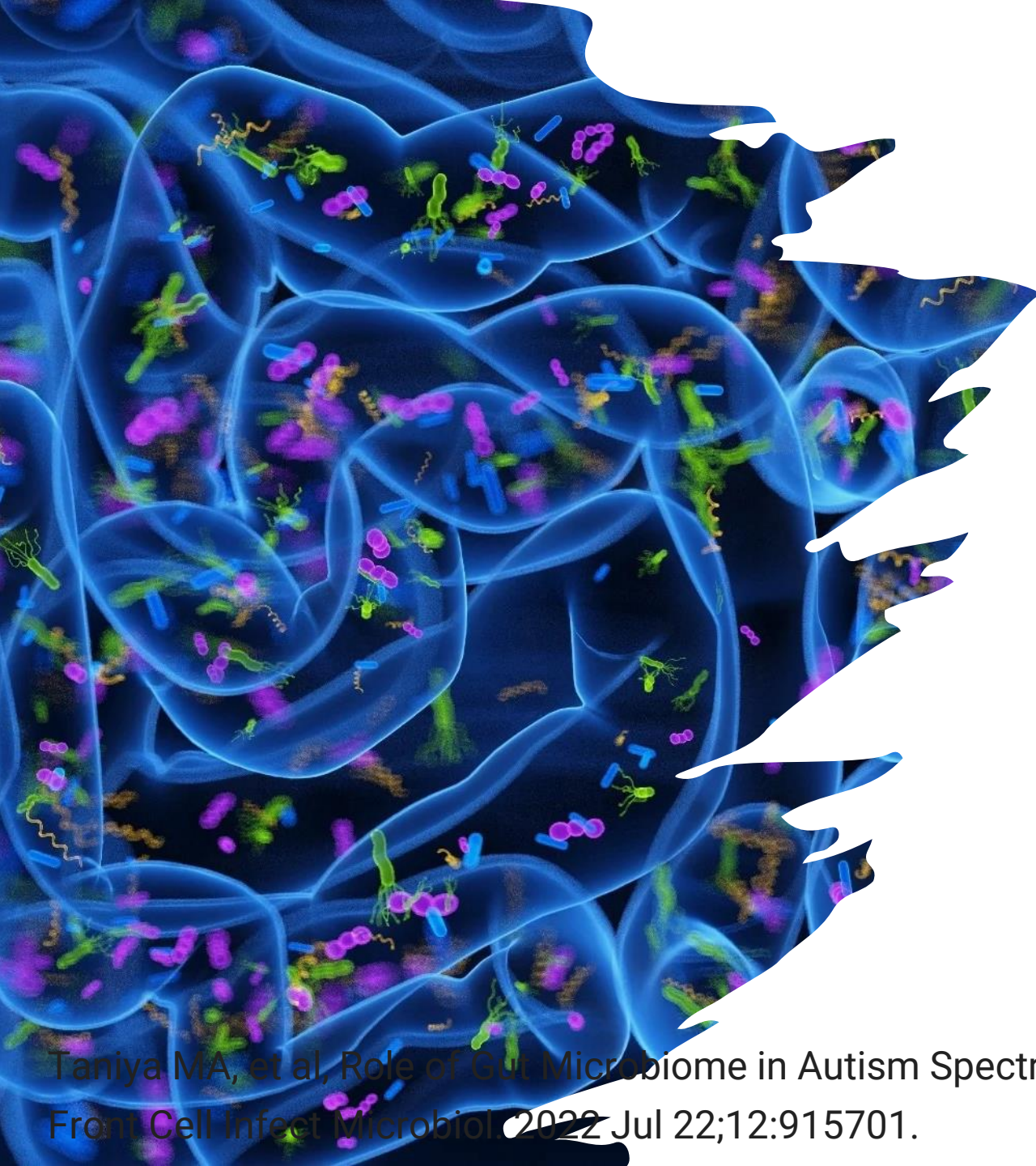
- Increased copy number variants
- Age cutoff?



# Maternal Immune Activation

- First recognized in the 1970's
  - Rubella, influenza
- Inflammatory response rather than infection
- Induction of maternal cytokines, IL6 in fetal brain
- Microglial activation/depletion





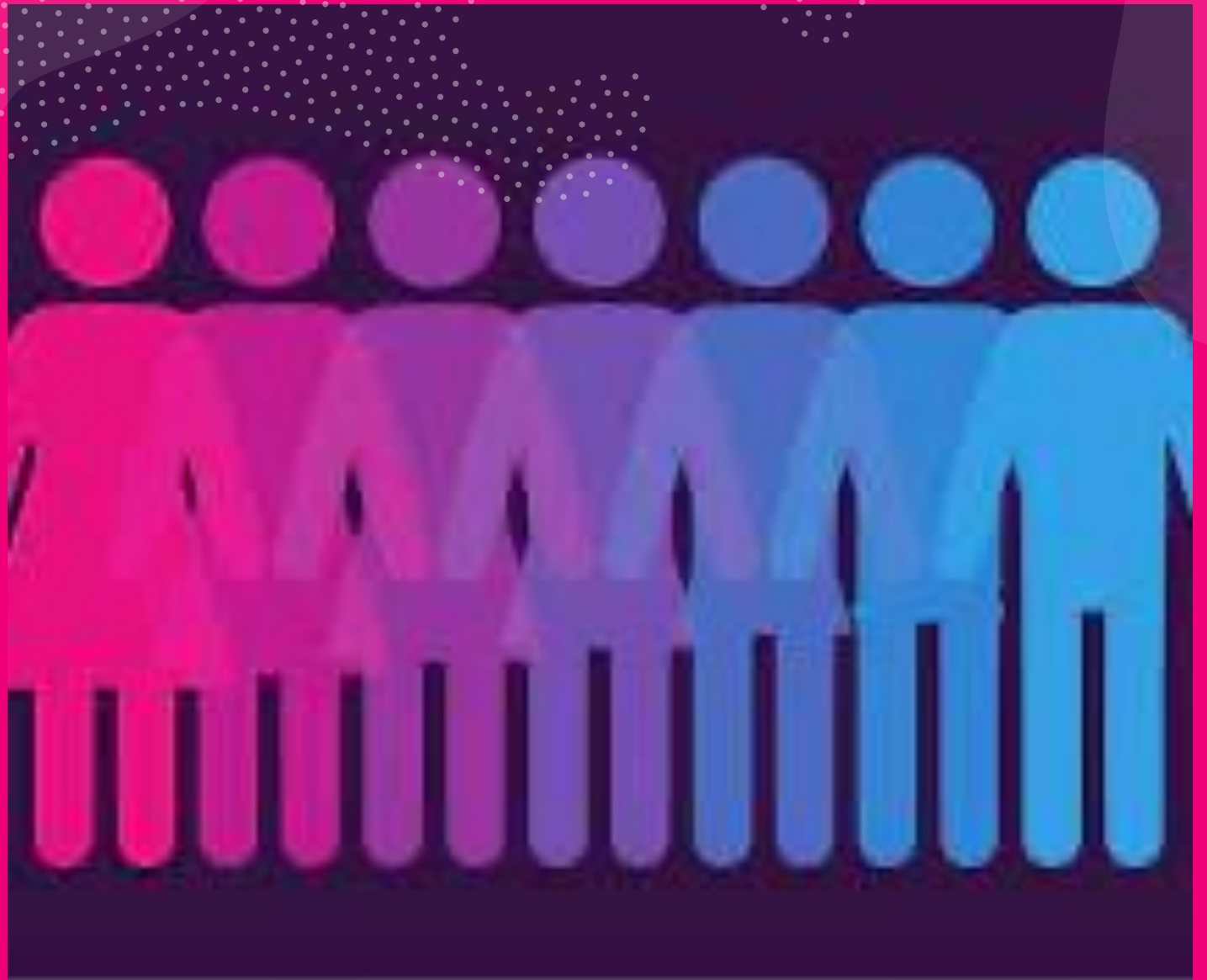
# Microbiome

- Mode of delivery
- Usage of antibiotics
- Stress
  
- Probiotics/probiotics
- Microbial transplant therapy

Taniya MA, et al, Role of Gut Microbiome in Autism Spectrum Disorder and Its Therapeutic Regulation.  
Front Cell Infect Microbiol 2022 Jul 22;12:915701.

# Females

- Identification
- Female Protective Effect
- Extreme male brain





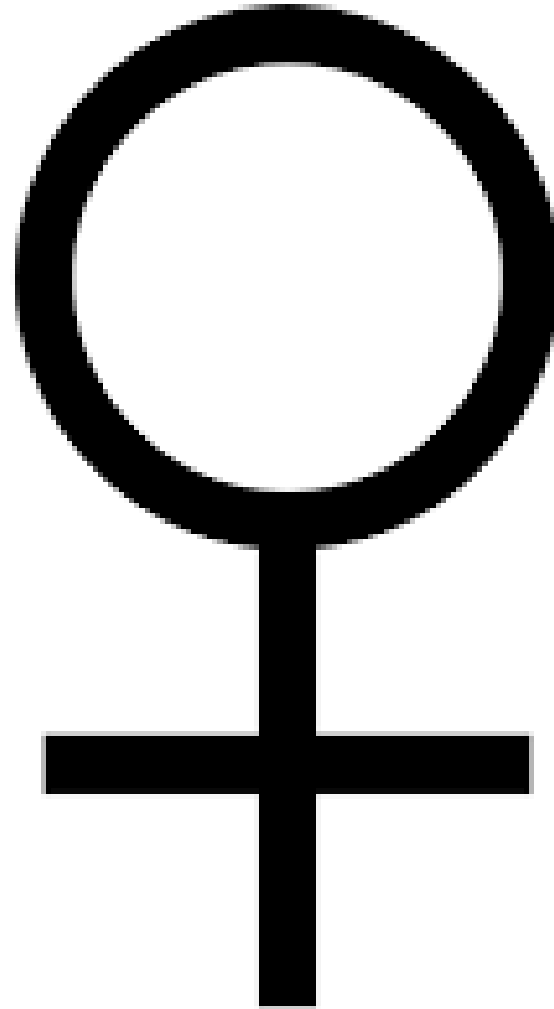
# Fewer Females: Historical Perspective

- Females with autism have more severe symptoms
- More likely to have intellectual disability
- Higher overall autism scores
- Higher risk for siblings
- Diagnosed later



Where are the females?

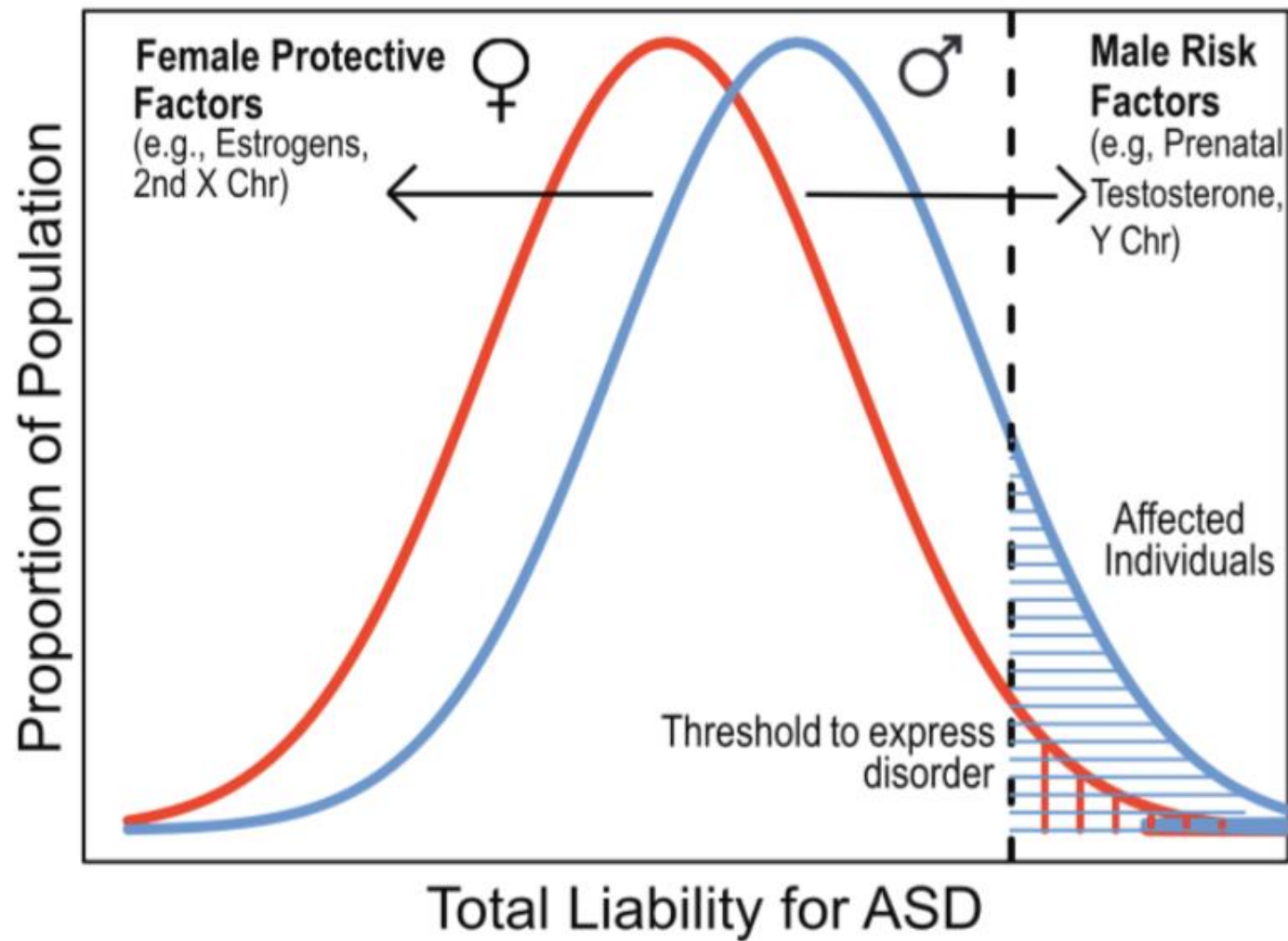
- Differences in presentation
- Other diagnostic categories
- Masking





# Female Protective Effect

- Joseph D. Dougherty et al, Can the “female protective effect” liability threshold model explain sex differences in autism spectrum disorder?, Neuron, Volume 110, Issue 20, 2022, Pages 3243-3262,



# Therapeutics

- ABA
- Alternative interventions
- Advocacy



# National Autism Center

Home » National Standards » Phase 2 (2015)

Summary

Significant  
Findings

What Makes  
Phase 2 Unique?

Dissemination

Relevance &  
Replication

Expert  
Panel

Results /  
Reports

Articles  
Reviewed in  
Phase 2

## National Standards Project, Phase 2

**[Download the free report now!](#)**

In April 2015, the National Autism Center released its review and analysis of interventions for autism spectrum disorder (ASD) based on research conducted in the field from 2007 to 2012. This publication provides an update to the summary of empirical intervention literature (published in the National Standards Report in 2009) and includes studies evaluating interventions for adults (22+), which have never been systematically evaluated before now.

The 14 Established Interventions for children, adolescents, and young adults (under 22 years of age) identified in the National Standards Report, Phase 2 (2015) are:

- Behavioral Interventions
- Cognitive Behavioral Intervention Package
- Comprehensive Behavioral Treatment for Young Children
- Language Training (Production)
- Modeling
- Natural Teaching Strategies
- Parent Training
- Peer Training Package
- Pivotal Response Training
- Schedules
- Scripting
- Self-Management
- Social Skills Package
- Story-based Intervention



**ABA can NEVER be:**

- Reformed
- "Changed from the inside"
- Neurodiversity affirming
- Trauma informed

**International Day of Protest Against ABA  
August 31st**

## Applied Behavioral Analysis

- Lovaas, 1970's published in 1987.
- Most research is single subject.
- Anti-ABA movement



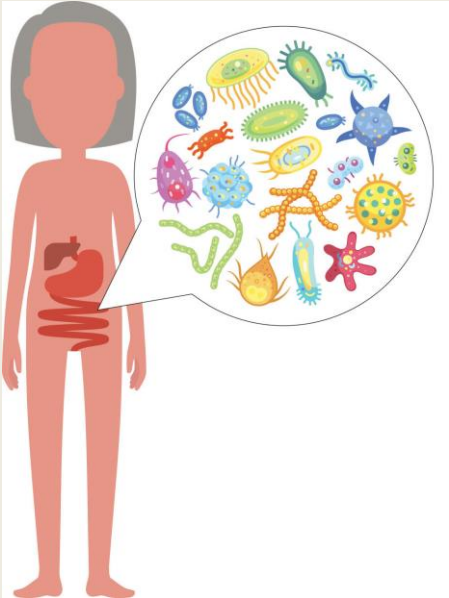


# Alternative

- Diet
- Stem Cells
- Hyperbaric oxygen
- Brain stimulation

Brondino N, Fusar-Poli L, Rocchetti M, Provenzani U, Barale F, Politi P. Complementary and Alternative Therapies for Autism Spectrum Disorder. Evid Based Complement Alternat Med. 2015;2015:258589

# Diet





# Stem Cells



- Hematopoietic stem cell transplantation
- Mesenchymal stem cell therapy
- **Embryonic stem** cell therapy uses stem cells from embryos to treat a variety of conditions
- **Umbilical cord stem** cells differentiate into a smaller number of cells
- **Induced pluripotent stem cell** therapy, which uses adult cells that have been reprogrammed to an embryonic stem cell-like state to treat a variety of conditions



# Stem Cells

**Table 2.** Published registered clinical trials of cell therapies in autism spectrum disorder

	Clinicaltrials.gov registration number	Study design	Country	n	Participant age (y)	Cell source(s)	Route(s)
Lv et al. <sup>49</sup>	NCT01343511	Nonrandomized	China	37	3–12	Allogeneic CBMNC +/- UC-MSCs	Intravenous and intrathecal
Sharma et al. <sup>53</sup>	NCT01974973	Single arm, open label	India	32	3–33	Autologous BM-MSK	Intrathecal
Riordan et al. <sup>46</sup>	NCT02192749	Single arm, open label	Panama	20	6–15	Allogeneic UC-MSCs	Intravenous
Chez et al. <sup>44</sup>	NCT01638819	RCT	US	29	2–6	Autologous CB	Intravenous
Dawson et al. <sup>43</sup>	NCT02176317	Single arm, open label	US	25	2–5	Autologous CB	Intravenous
Dawson et al. <sup>45</sup>	NCT02847182	RCT	US	180	2–7	Autologous or allogeneic CB	Intravenous
Sun et al. <sup>47</sup>	NCT03099239	Single arm, open label	US	12	4–9	Allogeneic UC-MSCs	Intravenous

CBMNC, cord blood mononuclear cells; UC-MSC, umbilical cord derived mesenchymal stromal cells; BM-MSK, bone marrow-derived mesenchymal stromal cells; RCT, randomized controlled trial; CB, umbilical cord blood.

# Hyperbaric Oxygen

- 40-80 sessions per treatment
- Not approved by the FDA
- Not covered by health insurance
- Home units
- Research pending

Podgórska-Bednarz J, Perenc L. Hyperbaric Oxygen Therapy for Children and Youth with Autism Spectrum Disorder: A Review. *Brain Sciences*. 2021; 11(7):916.

# Summary

- More individuals with normal to high intelligence
- Genetics
- Epigenetics
- Autoimmune
- Microbiome
- Female protective effect

