I have no conflicts of interest to disclose.

My Clinic: G1, 38 weeks

- Me:
  “Your blood pressure is high, and it is time to have a baby. We need to induce your labor.”

- My patient:
  “OK…as long as I don’t have to have Pitocin.”
My Clinic: G1, 38 weeks

- **Me:**
  "Pitocin is how we induce your labor."

- **My patient:**
  "I don’t want any Pitocin.
  I don’t want my kid to have autism."

---

Your clinic: G1, 38 weeks

- **Me:**
  ...try to conjure a brief, compelling, evidence-based answer....

  And say, "Pitocin doesn’t cause autism."

---

Your clinic: G1, 38 weeks

- **Me,** after further thought:
  "Your preeclampsia is a lot more serious than a theoretic risk of autism."

- **My patient:**
  "I don’t want any Pitocin."

---

Why do you need to know about autism?

- Perinatal risk factors are big news in the autism story
- Your patients are afraid of it and will ask about it
- New prevention and treatment strategies may be ‘obstetrician-centric’
What is autism?
How often does it occur?
What causes it?
What doesn’t cause it?
Prenatal acetaminophen exposure linked to autism symptoms in boys

2016: Autism and Prenatal Acetaminophen

International Journal of Epidemiology

Acetaminophen use in pregnancy and neurodevelopment: attention function and autism spectrum symptoms

Claudia B Avella-García, Jordi Julve*, Joan Fortuny, Cristina Rebordosa, Raquel García-Esteban, Isolina Riaño Galán, Adonina Tardón, Clara L Rodríguez-Bernal, Carmen Iñíguez, Alinara Andiarena ...

Published June 2016, International J. Epid.

Association between acetaminophen use in pregnancy and autism in boys

2018: Autism and Ultrasound

JAMA Pediatrics | Original Investigation

Association of Prenatal Ultrasonography and Autism Spectrum Disorder

N. Paul Rosenman, MD; Rachel Vassar, MD; Cheungdei Donos, PhD; James Dellora, MPH; Allison Froneman, MPH; Audrey D'Matra, MD, PhD; Sherry Santiago, MD; Judi Albright, MD

Published April 2018, JAMA Pediatrics

Negative study – no association between ultrasound number, duration, or indices of ultrasound energy

Reported as positive, with an association between ultrasound depth in the 1st and 2nd trimesters and autism
We need the tools to be able to talk about autism with our patients, no matter what association next hits the news.

Resources

- Autism and Developmental Disabilities Monitoring Network (ADDM)
- Centers for Disease Control (CDC)
What is autism spectrum disorder?

- A ‘spectrum’ of developmental disabilities
  - Autism disorder
  - Asperger disorder
  - Pervasive developmental disorder, NOS
- 1/3 have intellectual disability

What is the age at diagnosis?

- Age 2: Earliest possible diagnosis
- Age 4: Average age at diagnosis
- Age 8: Clinical gold standard
  - CDC ascertainment

How is it diagnosed?

- There is no single medical test
- Requires a detailed exam by a qualified professional
  - Comprehensive psychological & behavioral eval
  - Clinical and parental observation
  - Speech and language assessment

What is the current prevalence of autism in the U.S.?

A. 1 in 1009
B. 1 in 129
C. 1 in 59
D. 1 in 29
Increased 150% between 2002-2014

CDC ADDM Network, 2018
A child with ASD might:

- Not respond by name by 12 mo.
- Not point at objects with interest by 14 mo.
- Not play “pretend” by 18 mo.
- Avoid eye contact and prefer to be alone
- Have trouble understanding feelings
- Have delayed speech and language

A child with ASD might:

- Repeat words and phrases over and over
- Get upset by minor changes in routine
- Have obsessive interests
- Do hand-flapping, spinning in circles, rocking
- Have unusual reactions to the way things look, sound, taste, or feel

What doesn’t cause it?

- Vaccinations (MMR)
  - Immune system compromise / autoimmune rxn
  - Mercury-based preservatives (thimerosal)
  - Soundly refuted by medical research
    - >20 peer-reviewed negative epidemiologic studies
    - Dr. Wakefield’s original 1998 study discredited (falsified data)

What causes it?

Genetic Risk

+ Environmental Risk
Which of the following is NOT a risk factor for autism?

A. Advanced paternal age
B. High parity
C. Preeclampsia
D. Cesarean delivery

Risk Factor Adjusted Effect Estimate

- Advanced maternal age (>35): 1.6 (1.3-2.0)
- Advanced paternal age (>35): 1.3 (1.2-1.5)
- Parity (first vs. ≥3): 1.6 (1.4-1.8)
- Antepartum bleeding: 1.8 (1.1-2.9)
- Preeclampsia: 1.7 (1.3-2.3)
- Diabetes: 2.1 (1.2-3.5)


Prenatal Risk Factors

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Adjusted Effect Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prematurity</td>
<td></td>
</tr>
<tr>
<td>&lt;37 weeks</td>
<td>2.2 (1.5-3.5)</td>
</tr>
<tr>
<td>&lt;28 weeks</td>
<td>2.8 (1.6-3.9)</td>
</tr>
<tr>
<td>Breech presentation</td>
<td>2.1 (1.1-4.0)</td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td></td>
</tr>
<tr>
<td>All indications</td>
<td>1.6 (1.1-2.3)</td>
</tr>
<tr>
<td>Scheduled</td>
<td>1.8 (1.3-2.5)</td>
</tr>
<tr>
<td>Fetal distress</td>
<td>1.5 (1.1-2.1)</td>
</tr>
</tbody>
</table>


Perinatal Risk Factors

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Adjusted Effect Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small for gestational age</td>
<td>2.1 (1.1-3.9)</td>
</tr>
<tr>
<td>Low 5 minute Apgar</td>
<td>3.2 (1.2-8.2)</td>
</tr>
<tr>
<td>NICU transfer</td>
<td>1.8 (1.3-2.7)</td>
</tr>
<tr>
<td>Neonatal encephalopathy</td>
<td>5.6 (2.3-13.5)</td>
</tr>
<tr>
<td>Birth defects</td>
<td>1.9 (1.1-3.5)</td>
</tr>
</tbody>
</table>


Neonatal Risk Factors
Which sex is more likely to be diagnosed with autism?

A. Male  
B. Female

Risk Factors

- Consistent epidemiologic finding
- Reasons are unclear
  - Diagnostic bias
  - Female protective effect – higher biologic threshold
- Need to stratify analyses by sex

CDC ADDM Network, 2018

Confounding in Autism Research

- AMA ↑ autism
- AMA ↑ induction of labor

If you don’t account for maternal age in analyses, it may look like induction of labor is associated with autism
What about the ultrasound article?

- Obesity / wt gain ↑ ultrasound depth
- Obesity / wt gain ↑ autism
- If you don’t account for maternal obesity in analyses, it may look like ultrasound depth is associated with autism
- No biologic plausibility, since ultrasound energy gets weaker at greater depths

Interpret these studies with caution and skepticism!

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Summary

- U.S. incidence of autism is now 1 in 59
- Environmental and genetic risk factors both contribute to risk
- Perinatal and neonatal risk factors have been identified
- Best available research shows no compelling link between autism & induction, tylenol, ultrasound…what will it be next?