Neurodevelopmental Disorders Associated with Prenatal Exposure to Alcohol (ND-PAE)

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Former Director of the Institute for Juvenile Research
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Former Professor of Psychiatry and Public Health (UIC)
Former C.E.O. Community Mental Health Council, Inc.

Jessie Aujla – M-4 St. James Medical School
Meharry Medical College - 1969, Dr. E. Perry Crump was the Chairman - Dept Pediatrics.

Dr. Crump taught me that the low-income children of North Nashville had a high prevalence of “mild mental retardation.”

Dr. Crump and Julius Richmond, M.D. (President’s Johnson’s and Carter’s Surgeon General) went on to form Head Start to address this national problem.)
The Critical Role of Self-Regulation

- Neuroscience and behavioral research are converging on the importance of self-regulation for successful development.
- Children who do not develop the capacity to inhibit impulsive behavior, to plan, and to regulate their emotion are at high risk for behavioral and emotional difficulties.

The Critical Role of Self-Regulation

- 1979 – 88.5% (246) of the 274 children in Pupil Service Center on Chicago’s Southside had Childhood Neurodevelopmental Disorders (CND).
- 1985 – 20% of inmates in Texas Department of Corrections were “mentally retarded.”
- 2011 - chart audit on 162 children in several nurse-based school clinics estimates 39% (63) of those children met the DSM-5 Condition for (ND-PAE).
- 2012 prior to the closure of the Community Mental Health Council, Inc. - chart audit of 330 randomly selected patients revealed that 12% (39 of 330 patients) met criteria for CND.
Social Determinants of Health

- Think about all the liquor stores in the African-American (ghettos) and Native American (reservations) communities all over the country.
- The plethora of liquor stores have a determination on the indigenous populations’ health.
Neurodevelopmental Disorders

- Autism and Autism Spectrum Disorders
- ADHD
- Intellectual Disability
- Specific Learning Disorders
- Communication Disorders
- Motor Disorders
- Newly defined DSM-5 ND - PAE
A. More than minimal exposure to alcohol during gestation, including prior to pregnancy recognition

- Confirmation of gestational exposure to alcohol from:
  - Maternal self-report of alcohol use in pregnancy
  - Medical or other records
  - Clinical observation (Ask for baby photos)
    - Patients report the following:
      - “I was taken from my mom when I was a baby”
      - “My mom was doing drugs”
      - “My grandmother told me my mom was drinking”
      - “I saw my mom drink when she was carrying my sister”
B. Impaired neurocognitive functioning as manifested by one or more of the following:

1. **Impairment in global intellectual performance**
   - i.e. IQ of 70 or below

2. **Impairment in executive functioning**
   - e.g. poor planning and organization, inflexibility, difficulty with behavioral inhibition

3. **Impairment in learning**
   - e.g. lower academic achievement than expected for intellectual level; specific learning disability
B - Impaired neurocognitive functioning as manifested by one or more of the following:

4. **Memory impairment**
   - e.g. problems remembering information learned recently; repeatedly making the same mistakes; difficulty remembering lengthy verbal instructions

5. **Impairment in visual-spatial reasoning**
   - e.g. disorganized or poorly planned drawings or constructions; problems differentiating left from right
C. Impaired self-regulation manifested by one or more of the following:

1. **Impairment in mood or behavioral regulation**
   - e.g. mood liability, negative affect or irritability, frequent behavioral outbursts

2. **Attention deficit**
   - e.g. difficulty shifting attention; difficulty sustaining mental effort

3. **Impairment in impulse control**
   - e.g. difficulty waiting turn; difficulty complying with the rules
D. Impairment in adaptive functioning as manifested by two or more of the following, one of which must be (1) or (2):

1. **Communication deficit**
   - e.g., delayed acquisition of or difficulty understanding spoken language

2. **Impairment in social communication and interaction**
   - e.g., overly friendly with strangers, difficulty reading social cues; difficulty understanding social consequences

3. **Impairment in daily living skills**
   - e.g., delayed toileting, feeding, or bathing; difficulty managing daily schedule

4. **Impairment in motor skills**
   - e.g., fine motor development; delayed attainment of gross motor milestones or ongoing deficits in gross motor function; deficits in coordination and balance.
DSM – 5: ND - PAE

- E. Onset of disorder occurs in childhood.
- F. The disturbance causes clinically significant distress or impairment in social, academic, occupational or other important areas of functioning.
- G. The disorder is not better explained by the direct physiological effects associated with postnatal use of a substance (e.g. medication, alcohol or other drugs); medical condition (traumatic brain injury, delirium, dementia);
The Fetal Alcohol Exposure Picture

- Mild mental retardation
- Specific learning disorders
- Speech and language deficits
- ADHD
- Special education classes
- Seizure Disorders
- Explosive emotionality - Low frustration tolerance / explosive temper; Short-lived affective outbursts wrongfully referred to as moods the reality is their emotional stability is labile
The Fetal Alcohol Exposure Picture

- Often childlike and naïve, they really want people to like them
- They have been ostracized most of their lives because they are "slow"
- Poor judgment, planning ability, capacity to foretell consequences of their behavior
- Difficulty doing simple math
  - e.g. Serial 7’s: 100-7= … 93-7= … 86-7= …
The Fetal Alcohol Exposure Picture

- Prior diagnoses: Bipolar, schizophrenia, ADHD, major depression
- Patients report being on a wide variety of medications that they do not find helpful.
- Patients may or may not continue to have the characteristic facial characteristics of FAE
  - widely set eyes, epicanthal folds in their eye lids, flat mid-face, short palpebral fissures, indistinct philtrum, small chin, irregularly shaped ears, small head - of course these features go away as the child ages
Discriminating Features

- short palpebral fissures
- flat midface
- short nose
- indistinct philtrum
- thin upper lip

Associated Features

- epicanthal folds
- low nasal bridge
- minor ear anomalies
- micrognathia

In the Young Child
Prevalence of Drinking while Pregnant in the US

- 13% knowingly drink
- 1% drink heavily
- 3-4% binge drink (SAMHSA)
- 12% of pregnant women consume 5 or more drinks per month
- 50% of pregnancies are unplanned
FETAL ALCOHOL SPECTRUM DISORDER TERMINOLOGY

- Different organizations, different terms
  - SAMHSA, ICD-10, APA, IOM, etc.
- **FASD**: “an umbrella term describing the range of effects that can occur in an individual whose mother drank during pregnancy.”
- Growth retardation – facial dysmorphology – CNS abnormalities (OFC); pFAS: partial FAS; NL growth vv ht/wt; ARND: alcohol-related neurodevelopmental dx (NL growth); ARBDs: alcohol-related birth defects (Major structural abnormalities)
Three most common research methodologies to discover prevalence of FASD

- Clinic-based studies
- Positive surveillance of existing records often limited to a geographical area
- Active Case Ascertainment
Prevalence of Fetal Alcohol Spectrum Disorders – U.S.

- Fetal Alcohol Syndrome (FAS) occurs far more frequently than generally believed
  - 1 per 1000 live births

- Although estimates vary widely, when combined with the milder afflictions of Fetal Alcohol Spectrum Disorders (FASD), the Centers for Disease Control puts the frequency of FAS/FASD as high as 1 in 100.

Study in a 160,000 Midwestern community (Median income $51,800, with 11% below poverty) surveyed 70% of 2,033 1st graders.

They found between 2.4 to 4.8% had FASD.
Patients seen at Jackson Park Hospital’s Family Medicine Clinic serving 143,000. Median income $33,809 & 95% Public Assistance for Medical Care

| Total patients with Neurodevelopmental Disorders | 297 (49%) |
| Total Patients without Neurodevelopmental Disorders | 314 (51%) |
| Total | 611 (100%) |

This is a rate of 338/1,000!!!!
Susan Astley, Ph.D., & colleagues
- rates of FASD in Washington state’s foster care population were 10-15/1,000

Dr. Pat Rojmahamongkol, et al
- 17% of physicians correctly identified FAS
- 74% were able to correctly identify Williams Syndrome

Williams Syndrome occurs in only 1/7,500.
Prevalence of Fetal Alcohol Spectrum Disorders – U.S.

- Chasnoff, et al
  - 547 youth referred for severe behavioral disorders
    - 50.6% African American
    - 1.3% Asian
    - 32.2% White
    - 0.7% Native American
    - 12.2% Biracial
    - 3% Other/unknown
  - **28.5% of these youth had FASD** (86.5% had never been diagnosed or were misdiagnosed; 26.4% of these youth were misdiagnosed as having ADHD)
Prevalence of Fetal Alcohol Spectrum Disorders – South Africa

- In a low SES, highly rural of South Africa in the Western Cape Province, FASD occurs in 182 – 259 per 1,000 children or 18-26 percent
In a remote Aboriginal community of the Fitzroy Valley in Western Australia, FASD occurs in 120 per 1,000 children or 12 percent.

Prevalence of Fetal Alcohol Spectrum Disorders - Russia

- The prevalence of FAS among adopted children from Eastern Europe/Russia) living in US 15 to 70/1,000
- Children Russian adoptees diagnosed ARND = 34%
- Records of alcohol-exposed pregnancy were significantly higher and constituted 19% to 41%
- Prospective adopting parents are concerned about the high risk of FASD among children adopted from Russia
  - Popova et al 2014.
Public Mental Health

- **Biotechnical Prevention**
  - There is a biotechnical prevention/intervention for Fetal Alcohol Spectrum Disorder – Choline 500mg BID.

- **Psychosocial Prevention**
CHOLINE

- Precursor to acetylcholine, phosphatidylcholine
- Contributes to the integrity of the cell membrane
CHOLINE

- The current recommended choline intake for pregnant women is 450 mg/day

<table>
<thead>
<tr>
<th>Prenatal Vitamin</th>
<th>Choline Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Megafood Baby &amp; Me Prenatal Multivitamin</td>
<td>- None</td>
</tr>
<tr>
<td>2) Garden of Life Vitamin Code Raw Prenatal Multivitamin</td>
<td>- None</td>
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<tr>
<td>3) Zahler Prenatal Vitamin and DHA</td>
<td>- None</td>
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<tr>
<td></td>
<td>- Marteklife’s DHA 250 mg (Other ingredients = Sunflower Lecithin)</td>
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<tr>
<td>4) Thorne Research Basic Prenatal Multivitamin</td>
<td>- None</td>
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<tr>
<td>Prenatal Vitamin</td>
<td>Choline Content</td>
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<td>5) New Chapter Perfect Prenatal</td>
<td>- None</td>
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<td></td>
<td>- Breast support blend (sprouted seeds)</td>
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<tr>
<td></td>
<td>100mg = organic broccoli and cauliflower</td>
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<tr>
<td>6) Rainbow Light Prenatal Petite Mini</td>
<td>- Choline (as bitartrate) 10mg</td>
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<tr>
<td>7) Deva Vegan Prenatal Vitamin</td>
<td>- Choline (bitartrate) 50mg</td>
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<tr>
<td>9) Rainbow Light Prenatal One</td>
<td>- Choline (as bitartrate) 10mg</td>
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<tr>
<td>10) Twinlab Prenatal Care</td>
<td>- Choline (as Choline Bitartrate) 10mg</td>
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<td>PRENATAL VITAMIN</td>
<td>CHOLINE CONTENT</td>
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<tr>
<td>The Honest Company Prenatal Multivitamin</td>
<td>Choline (as Bitartrate) 30 mg</td>
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<td>New Chapters Wholemega Prenatal</td>
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<td>Garden of Life Ocean’s mom Prenatal DHA</td>
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<tr>
<td>Naturemade Prenatal Multi + DHA</td>
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<tr>
<td>Similac Prenatal Multivitamin</td>
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<tr>
<td>Naturemade Prenatal Multivitamin</td>
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<tr>
<td>Bellybar Chewable Prenatal Vitamin</td>
<td>None</td>
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<tr>
<td>PRENATAL VITAMIN</td>
<td>CHOLINE CONTENT</td>
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<td>Labdoor an independent online scientific company that is financially supported by the Mayo Clinic</td>
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<tr>
<td>18) Nature’s Way Completia Prenatal Multivitamin</td>
<td>Choline (as choline bitartrate): serving = 2mg / day = 4mg</td>
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<tr>
<td>19) Spectrum Essentials Prenatal; DHA</td>
<td>None (Other = Sunflower Lecithin)</td>
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<td>20) One a Day Women’s Prenatal Vitamin with DHA</td>
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<td>21) Enfamil Expecta Prenatal Multivitamin</td>
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<td>22) Vitafusion Prenatal Gummy MV</td>
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<td>23) Centrum Specialist Prenatal Multivitamin</td>
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<td>24) Spring Valley Prenatal Multivitamin</td>
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<td>25) Happy Health Smart Prenatal Multivitamin</td>
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