

FETAL ALCOHOL SYNDROME

The Importance of Preventing Alcohol Consumption During Pregnancy

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FAS/FASD

- *History*
- Biomedical Science
- Diagnosis
- Screening
- Prognosis
- Treatment
- Prevention



Fetal Alcohol Syndrome Through the Ages

- Alcohol – Arabic 'al Kuhul'
- The oldest and most widely used drug in the world
- 7000 B.C. used for rituals and customs
- Greeks – "Moderation"
- Romans – Excessive

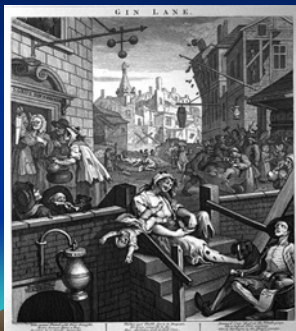


Fetal Alcohol Syndrome Through the Ages

- "Behold, thou shalt conceive and bear a son: and now drink no wine or strong drink."
- Judges 13:7
- "Foolish, drunken and harebrained women most often bring forth children like unto themselves, morose and languid."
- Aristotle



Fetal Alcohol Syndrome Through the Ages



William Hogarth, 1751

1726 - College of Physicians
Parental drinking "a cause of weak, feeble and distempered children."

1834 Alcohol Licensure Act
- infants born to alcoholic mothers sometimes had a "starved, shriveled, and imperfect look."



Fetal Alcohol Syndrome Through the Ages

- 1899 – William Sullivan
 - 120 female "drunkards" in prison compared to sober female relatives
 - Perinatal and infant mortality 2 ½ times greater in offspring of female "drunkards."
 - General perception was that this was due to germ-cell damage or poor home environment.

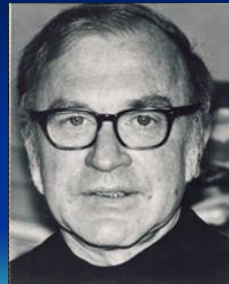


Fetal Alcohol Syndrome Through the Ages

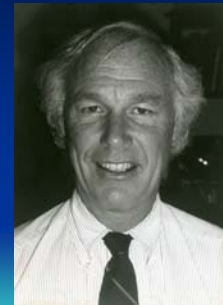
- 1968 – Paul Lemoine et al.
 - French medical journal, not well accepted
- 1973 – Kenneth Lyons Jones, David W. Smith, Christy Ulleland & Ann Streissguth publish “Pattern of Malformation in Offspring of Chronic Alcoholic Mothers.”
 - Lancet 1:1267
- 1973 – Jones & Smith coin term FAS
 - Lancet 2:999



Fetal Alcohol Syndrome



Dr. David W. Smith 1926-1981



Fetal Alcohol Syndrome Through the Ages



The Surgeon General advises women who are pregnant (or considering pregnancy) not to drink alcoholic beverages and to be aware of the alcoholic content of foods and drugs.



Fetal Alcohol Syndrome Through the Ages

- 1989 – Alcoholic Beverage Labeling Act
- 1989 – *The Broken Cord* by Michael Dorris is published.
 - Tells story of discovery about FAS in adopted son.
 - Made into major TV movie.
- 1993 – *Fantastic Antone Succeeds* by Kleinfeld and Wescott published.
 - Practical educational tools and strategies.
- 2000 - *Fantastic Antone Grows Up* by Kleinfeld, Morse and Wescott
 - Adolescents and adults with FAS



Fetal Alcohol Syndrome



“Fetal alcohol syndrome (FAS) now is recognized as the leading known cause of mental retardation in the United States, surpassing spina bifida and Down’s syndrome.”

- JAMA, 1991



Fetal Alcohol Syndrome

- 1996 Institute of Medicine Report
 - mandated by U.S. Congress
 - established 5 diagnostic categories
 - FAS with alcohol history
 - FAS without alcohol history
 - partial FAS with alcohol history
 - ARBD
 - ARND
 - concluded that FAS, ARBD and ARND are completely preventable and represent a “major public health concern.”



Fetal Alcohol Syndrome

- Even small amounts of alcohol harmful during pregnancy - *Pediatrics* August, 2001.
- Many current obstetric texts suggest and/or state that mild to moderate alcohol use during pregnancy is safe - CNN Fall, 2002.
- FAS remains a major health problem - *MMWR* May 24, 2002.



FAS - Incidence

- Down syndrome.....1/800 births
- Cleft lip+/-palate.....1/800 births
- Spina bifida.....1/1000 births
- Fetal alcohol syndrome.....1-2/1000 births*
 - ~8800 U.S. babies with FAS per year
 - Many more with alcohol induced problems
- (Higher rates in some populations)



Fetal Alcohol Syndrome

- Diagnosis based upon history, physical features (face), growth retardation, and CNS abnormalities
- Leading known cause of mental retardation in U.S.
- All children should be screened
- Entirely preventable!



FAS/FASD – Societal Costs

- \$5.4 billion in lifetime health costs
- \$860,000 per child in health costs
- \$200,000 per child in lost potential wages
- Estimates do not include other services
 - Special education
 - Foster care
 - Incarceration

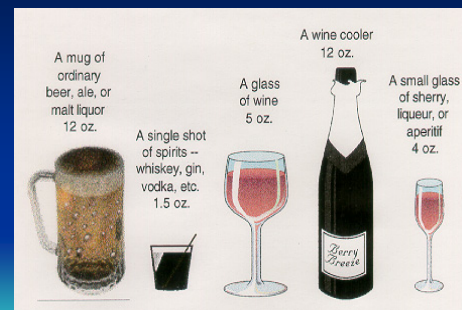


FAS/FASD

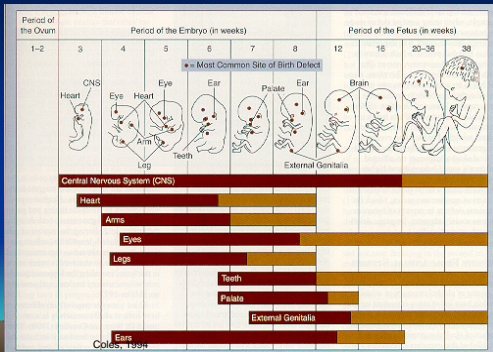
- History
- *Biomedical Science*
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What is a 'Drink'?



Embryonic Development



Animal models and prenatal alcohol

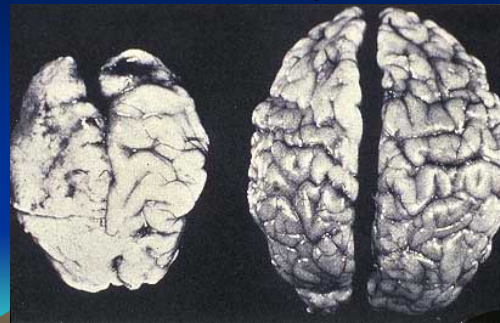


Many studies simply could not be done on humans
 Confounding factors can rarely be controlled in human studies
 Alcohol is rarely the only drug used
 Many abnormalities occur at low rates
 Epidemiological studies are extremely time consuming and expensive

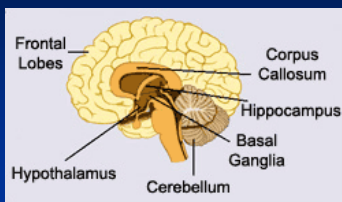
Neuronal Responses to Alcohol Exposure

- Neurogenesis – neuron ‘birth’
- Growth & Differentiation
- Migration
- Synaptogenesis
- Apoptosis
- Plasticity

Brain Damage From *In Utero* Alcohol Exposure



Brain Regions Affected



The Cerebral Cortex
The Hippocampus and Cerebellum
The Corpus Callosum

Cognitive & Behavioral Impairments

- Selected Impairments:
 - Memory
 - Attention
 - Learning
 - Verbal
 - Visual-Spatial
 - Reaction Time
 - Executive Functions

FAS – Biomedical Science

- Severity depends on:
 - dose
 - pattern of exposure
 - timing of exposure
 - duration of exposure
 - genetic susceptibility



Pathogenesis of FAS

“It has something to do with drinking alcohol. . .”



FAS/FASD

- History
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FAS - Diagnosis

- A *clinical* diagnosis
 - CDC Criteria (2004)
 - IOM Criteria (1996)
 - Revised IOM (Hoyme et al, 2005)
 - 4 Digit Diagnostic Code (Astley & Clarren)
 - History & Physical

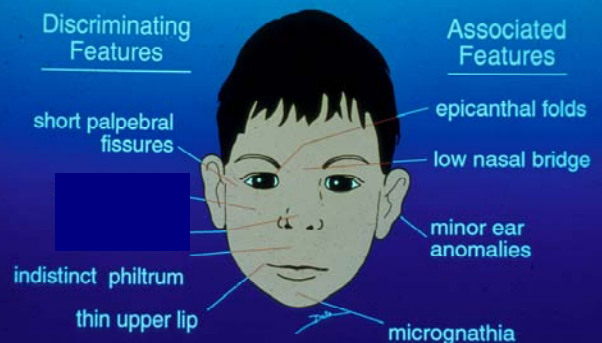


FAS - Diagnosis

- Diagnostic criteria exist only for FAS
- There are no diagnostic schemes for:
 - ARND
 - ARBD
 - FASD



Facies in Fetal Alcohol Syndrome



Diagnosis

- CDC criteria* (2004)
 - All 3 facial abnormalities
 - Growth deficits
 - CNS or neurobehavioral disorders
 - Rule out other possible diagnoses

*CDC/NCBDDD Scientific Working Group, 2004

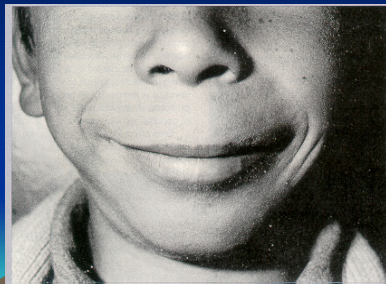


CDC Criteria (2004)

- Face
 - Smooth philtrum
 - Lip philtrum guide 4 or 5
 - Thin vermilion
 - Lip philtrum guide 4 or 5
 - Palpebral fissures
 - $\leq 10^{\text{th}}$ centile



Diagnosis – Philtrum & Vermilion



Diagnosis – Palpebral Fissures



Diagnosis – Palpebral Fissures

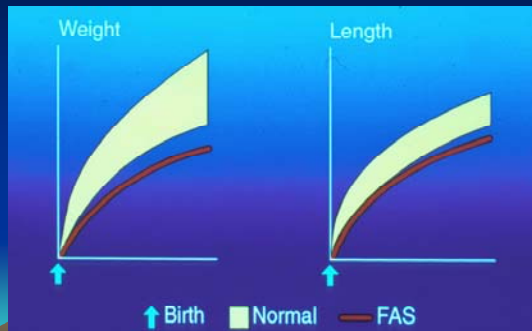


CDC Criteria (2004)

- Growth
 - Prenatal or postnatal weight and/or height $\leq 10^{\text{th}}$ centile
 - Adjusted for age, gender, gestational age, race and ethnicity



Growth in FAS



CDC Criteria (2004)

- Central Nervous System or Neurobehavioral Disorders
 - Structural
 - OFC $\leq 10\%$
 - Neurological
 - Functional
 - Executive functions, ADHD, memory

CDC Criteria (2004)

- Maternal Alcohol Exposure
 - Confirmed alcohol exposure
 - Unknown alcohol exposure
 - Confirmed absence of alcohol exposure

IOM - 1996

- FAS with confirmed maternal alcohol exposure
- FAS without confirmed maternal alcohol exposure
- Partial FAS with confirmed maternal alcohol exposure
- ARBD
- ARND

Astley & Clarren

- 4-Digit Diagnostic Code
 - Growth
 - Face
 - CNS
 - Maternal Alcohol History
- Reflects magnitude of expression
- Utilizes standards for ethnicity

FAS/FASD

- History
- Biomedical Science
- Diagnosis
- **Screening**
- Prognosis
- Treatment
- Prevention

FAS/FASD Screening

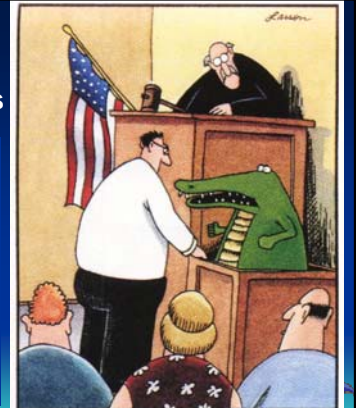
- Maternal age > 30
- Low socioeconomic status
- Ethnic group
- Previous child with FAS/FASD
- Poor nutrition
- Genetic background



Healthcare providers often ignore the obvious

WASHINGTON -- A leading substance-abuse center today urged the nation's doctors to focus more closely on alcohol and drug use by their patients after finding that more than nine out of 10 physicians didn't diagnose alcohol abuse when presented with its early symptoms.

Associated Press, May 10, 2000
"Missed Opportunity: The CASA National Survey of Primary Care Physicians and Patients"



"Well, of course I did it in cold blood, you idiot! ... I'm a reptile!"

FAS/FASD

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Lifespan View of FASD

- Much of what we know is anecdotal
- "Behavioral phenotype": development progresses somewhat predictably
- IQ may not predict functional performance
- Prevention of secondary disabilities is paramount
- Treatment implications follow



Difficulties in Infancy & Early Childhood

- Poor habituation
- Irritability in infancy
- Poor visual focus
- Sleep difficulties
- Mild developmental delays
- Distractibility and hyperactivity
- Difficulty adapting to change
- Difficulty following directions



Difficulties in Middle Childhood

- Difficulty predicting and/or understanding consequences
- Appearance of capability without actual ability to perform
- Potential for emerging discrepancy between comprehension skills and expressive language
- Hyperactivity, memory deficits, impulsivity
- Poor comprehension of social rules/expectations



FAS – Developmental Profile

Skill	Developmental Age
Expressive Language	20
Physical maturity	18
Reading ability	16
Living skills	11
Money/time concepts	8
Social skills	7
Emotional maturity	6
Comprehension	6

Adapted from the work of Ann Streissguth and Sterling Clarren

Behaviors & Outcomes

Behavior

Poor judgment
 Attention deficits
 Arithmetic disability
 Memory impairment
 Difficulty abstracting
 Disoriented in time/space
 Impulsivity

Outcomes

Easily victimized
 Unfocused/distractible
 Difficulty handling money
 Difficulty learning from experience
 Difficulty understanding consequences
 Difficulty perceiving social cues
 Poor frustration tolerance

Difficulties in Adulthood

- Not as much known about this
- Secondary disabilities may predominate
- Natural support network may fall away
- Available services may be crisis oriented, not prevention or support based
- Employment failure likely

Difficulties in Adulthood

- Vigilance needed for addictions
- Poor comprehension of social expectations
- Vulnerable to social, sexual, financial exploitation by others
- Need for supervised employment and housing

Potential Secondary Disabilities

- Mental health problems (over 90%)
- Trouble with the law (60%)
- Sexual misconduct (49%)
- Disrupted school experiences (60%)
- Problems with alcohol and/or drug use (35%)
- Confinement (50%)

Streissguth, 1997

Protective Factors

Associated with lower rates of secondary disabilities

- Stable, nurturing home (particularly ages 8 -12)
- Dx before age 6
- Not being a victim of violence
- Not having frequent change of households
- Appropriate interventions/IEP
- Having dx of FAS
- IQ below 70



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Pharmacotherapy – Neuropsychiatric Issues

- Attention problems
- Depression and mood swings
- Sleep
- Aggression and impulse control



FAS/FASD

- History
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- Treatment
- **Prevention**



FAS/FASD Prevention

- Awareness
 - Know the problem(s)
- Recognition
 - FAS in children
 - Alcohol abuse in women
- Intervention
 - Treatment not punishment
- **FUNDING!!!**



WARNING: SIGNS
DRINKING ALCOHOLIC BEVERAGES DURING PREGNANCY MAY CAUSE BIRTH DEFECTS.

PUBLIC HEALTH
Today's decisions may harm your unborn child's future

When you're Pregnant the best drink is no

ALCOHOL HURTS UNBORN BABIES
Born on the bottle...

Drunk for life

Avoid alcohol during pregnancy.
Alcohol use during pregnancy may cause birth defects such as Fetal Alcohol Syndrome.

"She's had three miscarriages in the last two years. Still she drinks Johnnie Warper."

Good taste is always in abundance.

- FASD are common
- Recognize the signs
- Ask about maternal alcohol usage
- Screen and refer
- Multidisciplinary care
- Prevent future cases

MAD Magazine 311:50, 1992.



FAS/FASD

- We see what we look for and we look for what we know...
- The best practices in the care of a child with an FASD are early recognition and early intervention

