

# The Impact of Methamphetamine Exposure on Children

Bonnie E Stephens, MD, FAAP  
Neonatologist and Developmental-Behavioral Pediatrician  
NICU Medical Director  
Community Childrens' at Community Medical Center  
Missoula, MT



# Background

- Methamphetamine is a central nervous system stimulant that blocks dopamine reuptake leading to increased levels of dopamine in the brain
  - Initial effects: Intense Euphoria (increased experience of pleasure)
  - Chronic abuse: Paranoia, delusions, hallucinations, insomnia, weight loss
- Methamphetamine use continues to increase worldwide
  - Rates in pregnant women have also continued to climb
- The methamphetamine in use today is more pure/potent than in the past
  - Anecdotally, chronic effects are seen more quickly

# Effects on Developing Fetus

- Biological
- Neonatal
- Developmental
- Psychosocial
- Parenting

# Biological Effects on Developing Fetus

- Direct effect (neurotoxicity)
  - Crosses the blood brain barrier and impacts brain growth and function

# Biological Effects on Developing Fetus

- Indirect effects
  - Changes in blood flow to fetus (vasoconstriction)
    - Fetal hypoxia, ischemia, malnutrition
  - Lack of other healthy behaviors
    - Prenatal vitamins
    - Prenatal care
  - Higher rates of stress, violence, polysubstance use
  - Maternal weight loss/nutritional deficits
    - Fetal malnutrition/restriction of nutrients
  - Maternal high blood pressure
    - Vasoconstriction
    - Fetal high blood pressure

# Biological Effects on Developing Fetus

- Lower birth weights
- Lower birth lengths
- Small head sizes at birth
- Higher rates of prematurity
- Higher rates of small size for gestational age (SGA)

# Biological Effects on Developing Fetus

- Decreased brain volumes (caudate and thalamus)
- Higher incidence of birth defects
  - cardiac defects
  - cleft lip
  - biliary atresia
  - Cerebral hemorrhage
  - Undescended testes
- Higher incidence of stillbirth

# Neonatal Effects

- Increased rates of NICU admission
- Does NOT cause neonatal abstinence (withdrawal)
- Does cause a common behavioral profile
  - increased stress responses
  - lower arousal
  - less excitability
  - lethargy
- Feeding problems



# Developmental Effects

- Difficult to measure
  - Many mothers use multiple different substances (including alcohol)
  - Doses/Method of ingestion are extremely variable
  - Substance-abusing women often have other characteristics and behaviors that can result in fetal/neonatal/infant harm
  - Poor follow-up rates/small numbers

# Confounders...

- Children of drug abusing parents are at increased risk for
  - Child abuse and neglect
  - Exposure to violence/witnessing violence
  - Disrupted continuity of primary caregiving/parental absence
- Parents who use methamphetamine are more likely to experience
  - Parental stress
  - Depression and other co-occurring mental health disorders
- Children of drug abusing parents are more likely to
  - Lack basic needs/resources
  - Experience negative life events

# Developmental Effects

- Decreased effects after controlling for pre/postnatal environment
  - Maternal lifestyle
  - SES
- Indicates large influence of other environmental factors
  - Education
  - prenatal care
  - social supports
  - health literacy
  - smoking

# What we know....

- Increased aggressive behaviors (age 4-8), decrease with age
- Increased ADHD symptoms at 5, attention problems increase with age
- Increased school problems
- Increase somatic complaints and withdrawal. Decreases over time
- Fine motor deficits
- Deficits in visual-motor integration
- Poor inhibitory control
- Executive functioning and working memory deficits
- Lower IQ scores in all domains

# IDEAL Study

- Behavioral effects longitudinally from 3-7 were not associated with methamphetamine exposure, but rather the quality of the home and psychological health of mom
  - Current substance use
  - Exposure to domestic violence
  - SES

# Early Intervention – home based

- Improves home environment
- Improves parenting behaviors
  
- Higher language scores
- Possibly higher early cognitive scores?

# Placement

- Infants placed in non-kinship care
  - Higher cognitive scores
  - Higher language scores
  - Better social emotional development
- More educated, less depressed care givers

# Educational support

- Critical transition periods
  - 1<sup>st</sup>, 4<sup>th</sup>, 6<sup>th</sup>-7<sup>th</sup> grades
  - More subtle learning and behavioral problems can result in functional impairment



# Effects of childhood exposure

- Methamphetamine production involves a number of other very dangerous chemicals
- Toxic effects from chemicals used in production can remain in the environment around a lab for a long time after the lab has been shut down, causing a wide range of health problems for people living in the area
- Children exposed to home-based methamphetamine labs and toxic chemicals used during production are at greater risk of:
  - Poisoning
  - Burns
  - Physical injury
  - Infections
  - Respiratory issues
- These chemicals can also result in deadly lab explosions and house fires Production of Methamphetamine
- Children who ingest meth may exhibit agitation, inconsolability, tachycardia, respiratory problems (such as asthma), nausea, protracted vomiting, hyperthermia, ataxia, roving eye movements, seizures, and headaches

# Take Away

- Mothers who use methamphetamine during pregnancy lead a high risk lifestyle
- Methamphetamine and these other risky behaviors all impact fetal, neonatal, infant and child development
- It's difficult to tease apart the direct effects of each
- Because they co-exist, teasing apart these effects may be less important than the known, combined impact of the whole picture

**Questions?**