Effects of Marijuana Use in the Newborn

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Common Drugs of Abuse
- Opiates
- Tobacco/Nicotine
- Cannabis
- Alcohol
- Cocaine
- Methamphetamine

36 weeks gestation

32 weeks gestation
In nature there are neither punishments nor rewards -- there are consequences. 

*Ingersoll*

**Plasticity**

“Brain plasticity refers to the ability of the brain to persistently change its structure and function according to genetic code in response to environmental changes.”

Maquet, Smith, Stickgold

The brain is shaped by the environment.

- Gene expression is influenced by the environment.

**Long Term Impact of Maternal Substance Abuse on Babies**

- In utero effects on fetal development
- Environmental effects on infant/childhood development
  - Family structure
  - Socio-economic status

**In Utero**

- Maternal health: comorbidities, mental health, complications of pregnancy
- Hostile in utero environment
- Toxic metabolites impact brain development
- Altered gene expression in the brain

**Home Environment**

- Life style: chaos, support, isolation, poverty
- IQ/verbal abilities
- Psychopathology
- Will the environment exacerbate or mitigate the behavioral disorders that arise from the in-utero CNS injury?
Neonatal Abstinence Syndrome

- Clinical symptoms of withdrawal after delivery due to fetal exposure to maternal opiate use during pregnancy
- Maladaptation to extra-uterine life
- Symptoms assessed by using Finnegan scoring
- Treatment based on scores:
  - <8 non-pharmacologic
  - >8 medications
  - morphine vs methadone vs clonidine vs buprenorphine

Eat, Sleep, Console

- ESC an alternative to FNASS
  - Yale New Haven Children's Hospital
  - Grossman et al; Hospital Pediatrics Jan 2018, Vol 8/Issue 1
  - ESC 6 infants (12%) were treated with morphine vs
  - 31 infants (62%) predicted to be treated by FNASS
  - ESC started or increased morphine on 8 days (3%) vs
  - 76 days (26%) predicted by FNASS
  - p<0.001
  - No readmissions or adverse events reported

Cannabis

- Mild withdrawal symptoms
- Delayed state regulation
- Reading, spelling difficulty
- Executive function impairment: problem solving, memory planning impulsivity, attention

Cannabis

- Increased depressive symptoms
- Increase risk of tobacco/cannabis use
- fMRI altered neural functioning

Tobacco

- Nicotine (1 of 4000+ compounds cigarette smoke)
- Nicotine levels: fetal compartments > maternal serum
- Preterm birth
- Low birth weight
- Abruption
- Increase risk of SIDS x5
Tobacco
- Deficits in self-regulation (soothe/calm self)
- Lower IQ
- MRI: reduced cortical gray matter/parenchyma vol
- ADHD
- Conduct disorders
- Depression/anxiety (childhood - adolescence: substance abuse)
- Aggression
- Impulsivity

Gene expression
- Smoking exposure during the prenatal period was directly associated with differential expression of 14 genes; in contrast, during adulthood, despite a much larger sample size, only two genes showed significant differential expression.

US 2017
- 4,000,000 births
- 1 in 14 women smoked during pregnancy (7%)
- 280,000 newborns exposed

Maternal Interventions
- Prenatal screening
- Education on risks
- Mental health treatment
- Substance use treatment

Child Interventions
- Child Protective Services referral if baby positive for marijuana.
- Generally CPS will only get involved if mom is breastfeeding or has other risk factors
- Long history of drug use
- History of mental illness
- Lack of supplies
- CPS will do home evaluation and safety checks
Maternal Symptoms

Newborn Symptoms
- Higher incidence of tremors
- Altered visual responses

Marijuana and the Developing Brain
- Disrupts normal brain development
- Disrupts function
- Interferes with synaptogenesis and neuronal connections
- Effects on hippocampal, prefrontal cortex, and white matter volume

Neurodevelopmental Outcome
- Associated with detrimental neurobehavioral outcomes
  - Impaired:
    - Sustained attention
    - Visuospatial function
    - Hyperactivity
    - Problem solving

Long-term Child Interventions
- Specific individual therapy
- Speech/language
- Occupational
- Behavioral
- Early intervention/enrichment
- Ongoing cognitive & behavioral assessments

Role of the Nurse
- Physician will order drug screening
- Nurse will collect
- Social will notify CPS and results
- Educate on adverse effects to the baby
- Mothers should receive information on community resources
References
