

**PRENATAL OPIATE EXPOSURE**  
*IMPACT ON EARLY CHILDHOOD LEARNING AND BEHAVIOR*

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*Children grow and develop in the context of...*

Relationships  
 Relationships  
 Relationships

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**Attachment: Basic Concept**

- *Attachment is...*  
the interconnectedness between human beings.
- *Attachment requires...*
  - reading each other's cues
  - responding appropriately to each other's cues.

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**Attachment: *Where to start?***

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*When does risk happen?*

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**Embryonic Period**

- Embryonic
  - First 12 weeks after conception
  - Cells are "undecided" (stem cells)
  - Cells become imprinted during this phase
- Early gestational stress marks the genes
  - Adds a methyl group to the gene (methylation)
  - Becomes fixed as memory: epigenetic memory

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**Fetal Period**

- Genes can be changed through fetal experiences
- Serotonin
  - Shapes neuronal circuits in the frontal brain
  - Provided to frontal brain via the placenta
- Cortisol
  - Response to maternal fear, anxiety
  - Transmitted to fetus via placenta
- Fetus is learning what to expect in the outer world

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**Two Essential Caregiver Qualities**

- Accessibility
- Responsiveness

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**Six Factors Affecting Relationships in Chemically Dependent Women**

- Negative heritage
- Emotional instability
- Lack of social support
- Cognitive functioning
- Psychological functioning
- Substance abuse

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Chronic administration of drugs of abuse, such as opiates or cocaine, substantially reduces oxytocin levels in the hypothalamus.

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*Just in case you didn't get it...*

Relationships  
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**Attachment: What about the baby?**

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Biological Basis of the Effects of Prenatal Drug Use:  
The Catecholamine System

Catecholamines

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Biological Basis of the Effects of Prenatal Drug Use:  
Methamphetamine

Catecholamines

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Biological Basis of the Effects of Prenatal Drug Use:  
Cocaine

Catecholamines

Cocaine

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**The nucleus accumbens**  
Three types of neurons participate in opiate action:  
1. opiates (green) bind to opiate receptors (yellow)  
2. this decreases GABA release (inhibits dopamine release)  
3. this sends a signal to the dopamine terminal to release more dopamine.

\*gamma-Aminobutyric acid acid

**The Action of Opiates**

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Prenatal opiate exposure

- Prenatal opiate exposure → increased rates of:
  - Low birth weight
  - Low birth length
  - Small birth head circumference
  - Stillbirth
  - SIDS

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*Some key questions...*

- What is true neonatal withdrawal? Is it the same as abstinence?
- How does NAS differ from neurobehavioral difficulties?
- What factors affect diagnostic labeling?
- Is it in fact important to differentiate NAS and neurobehavioral difficulties? Does the diagnosis affect treatment?

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*Some definitions....*

- **Addiction**
  - a state in which an organism engages in a compulsive behavior
    - the behavior is reinforcing
    - loss of control in limiting intake
- **Dependence**
  - a state in which an organism functions normally only in the presence of a drug
    - manifested as a physical disturbance when the drug is removed
- **Abstinence**
  - the practice of restraining oneself from indulging in something
- **Withdrawal**
  - the unpleasant physical and mental effects that result when you stop doing or taking something
- **Neurobehavioral**
  - of or relating to the relationship between the action of the nervous system and behavior

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*Why is the question of withdrawal vs. neurobehavior so difficult to address?*

- Small or highly selected samples
- Difficulty of prospectively collecting measures of substance use
- Lack of control for potential confounders with varying levels of adjustment
- Differences in study design and outcome measures
- Variance in terminology (addiction vs. dependence, abstinence vs. withdrawal, NAS vs. NDS)
- Polydrug use
- Physiology of adults does not necessarily translate to understanding physiology of the fetus or newborn

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- Physiologic effect in fetus is more complex than in adults
  - Immature neurologic development
  - Immature neurologic processing
  - Complex maternal/fetal/placental pharmacokinetics
  - Prolonged half-life in fetus

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**Neonatal Abstinence Syndrome**

- NAS
  - the collection of signs and symptoms that occur when a newborn prenatally exposed to opiates experiences opioid withdrawal.
  - Develops in 2-11-55-94% of opioid drug-exposed infants
- Does not represent “addiction” in the newborn
- Does it represent “dependence”?

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**Neonatal Abstinence Syndrome**

- Onset: may be present at birth
- Peak: three to four days
- Acute phase: up to six weeks
- Subacute phase: up to 7 to 8 months

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Nonnarcotic Drugs That Cause Neonatal Psychomotor Behavior Consistent With Withdrawal

- Alcohol
  - Hyperactivity, crying, irritability, poor suck, tremors, seizures, onset of signs at birth, poor sleeping pattern, hyperphagia, diaphoresis
- Barbiturates
  - Irritability, severe tremors, hyperacusis, excessive crying, vasomotor instability, diarrhea, restlessness, increased tone, hyperphagia, vomiting, disturbed sleep
- SSRIs
  - Irritability, constant crying, shivering, increased tonus, eating and sleeping difficulties and convulsions
- Diazepam
  - Hypotonia, poor suck, hypothermia, apnea, hypertonia, hyperreflexia, tremors, vomiting, hyperactivity, tachypnea

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Neurobehavior

- of or relating to the relationship between the action of the nervous system and behavior
- interactions with and response to internal and external environment

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Substances associated with neurobehavioral changes

- Nicotine
- Alcohol
- Marijuana
- Cocaine
- Methamphetamine
- PCP
- Opiates

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Neurobehavior: Information Processing Model

Four domains of information processing

- Input (recording information)
- Integration (interpreting input)
- Memory (storing input for later use)
- Output (appropriate use of language and motor skills)

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Neurobehavior

- Key domains
  - Orientation
    - the ability to attend to specific stimuli (auditory and visual)
  - State regulation
    - the ability to regulate state of arousal

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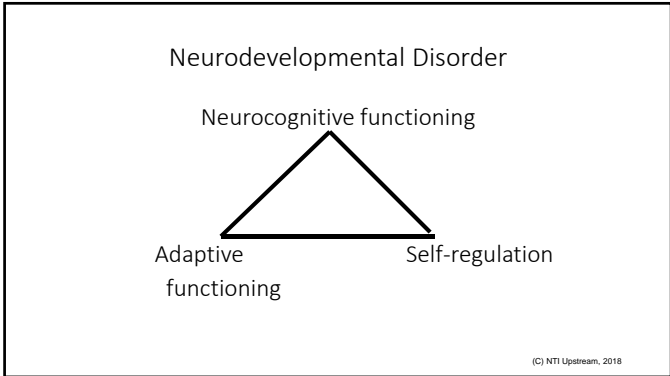
Management


- Supportive
  - Swaddling
  - Pacifier
  - Low lighting
  - Oscillating crib
  - Avoidance of abrupt changes
- Frequent small feedings
- NAS only: Pharmacologic

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*So what is the difference between "withdrawal" and neurobehavioral deficits?*

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- Impact of Regulatory Difficulties
- ❖ State Regulation and Arousal
  - ❖ Sleep States
  - ❖ Habituation
  - ❖ Reflex Development
  - ❖ Self-soothing
  - ❖ Attention
  - ❖ Transitions
  - ❖ Modulation of Affect
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