Educational Objectives

At the end of this presentation, participants will be able to:

1. Describe the patterns and trends of methamphetamine use, both locally and nationally.

2. List at least three (3) short-term and three (3) long-term effects of methamphetamine use.

3. Summarize at least two specific behavioral interventions that have been proven effective in treating people with a stimulant use disorder.
Patterns and Trends in the Use of Methamphetamine
Greatest Drug Threat Represented Regionally as Reported by State and Local Agencies: 2013-2015

Source: National Drug Threat Summary, 2015 (slide courtesy of Jane C. Maxwell, PhD).
Methamphetamine Lab Incidents: 2004 vs. 2014

Calendar Year 2004
Total: 23,829

Total of All Meth Clandestine Laboratory Incidents Including Labs, Dumpsites, Chem/Glass/Equipment

SOURCE: El Paso Intelligence Center (EPIC), 2017.
Environmental Effects of Meth

• Methamphetamine production leaves behind 5 to 6 pounds of toxic waste per pound of meth produced.

• Toxic by-products contaminate production sites, posing serious health and environmental hazards to those who live and work nearby.

• The estimated cost to clean up 1 meth lab often exceeds $4,000.

SOURCE: Koch Crime Institute.
Methamphetamine Reports have Increased Nationally – NFLIS (2001-2007)

National Trends in Estimates for Heroin, Cocaine, Cannabis, and Meth, NFLIS, 2001-2017

In 2017, approximately **774,000 people** aged 12 or older were **current users** of methamphetamine, this number represents **0.3 percent** of the population aged 12 or older.
Primary Substance of Abuse at Admission: 2006-2016

SOURCE: SAMHSA, Treatment Episode Data Set, 2016 results.
Methamphetamine Use among Patients with Chronic Opioid Use is on the Rise

Stimulant Treatment Admissions, by Gender, Age, and Race/Ethnicity: 2014

SOURCE: SAMHSA, Treatment Episode Data Set, 2014 results.
Perceptions of Methamphetamine in Indian Country

- Methamphetamine continues to be a significant problem in Indian country.

- Seventy percent of respondents stated that casinos located in their jurisdictions are being used to facilitate drug sales and sex trafficking by organized criminal gangs.

- Law enforcement respondents reported that their greatest challenge was a lack of community support and resources, namely manpower, necessary to fulfill their duties.

- Social service providers reported that they lack funds to fulfill the needs of the clients they serve, such as housing, clothing, food, baby supplies, and health and hygiene products.

Past 30 Day Use of Stimulants among 8th, 10th, and 12th Graders: 2018

Methamphetamine Stats-at-a-Glance in South Dakota

SOURCE: South Dakota Department of Social Services Prevention Program Data Brief, January 2017.
Increasing Trend in Methamphetamine Treatment Admissions in SD

SOURCE: South Dakota Department of Social Services Prevention Program Data Brief, January 2017.
A Similar Trend is Seen in Neighboring States

SOURCE: South Dakota Department of Social Services Prevention Program Data Brief, January 2017.
Reported Drug Use for SWO Parents in the Three Months Before Becoming Pregnant
Stimulants: What are We Talking About?
The Broader Classification: Stimulants

Methamphetamine

Powder and Crack Cocaine
Methamphetamine

Methamphetamine Powder

Users’ Description: Beige/yellowy/off-white powder

Base / Paste Methamphetamine

Users’ Description: ‘Oily’, ‘gunky’, ‘gluggy’ gel, moist, waxy

Crystalline Methamphetamine

Users’ Description: White/clear crystals/rocks; ‘crushed glass’ / ‘rock salt’
Methamphetamine Manufacturing Processes – Three Methods

1. Ephedrine/Pseudoephedrine Based
   “Nazi Method”-lithium, anhydrous ammonia
   Cold method-red phosphorus, iodine crystals
   “One Pot” and “Shake and Bake” cooking using dry ammonia nitrite and cough syrup rather than liquid anhydrous ammonia

2. P2P/Phenylacetone (Illegal in US-Schedule II, precursors legal in Mexico). Now cooked in large laboratories in Mexico with expert chemists

3. New synthetic method emerging with P2P precursor and phenylacetic acid as pre-precursor—nitrostyrene

SOURCE: Slide courtesy of Jane C. Maxwell, PhD.
DEA Methamphetamine Profiling Program: National Data, 2006-2018

Production Routes
- P2P
- Pseudoephedrine

Purity and Potency
- Potency
- Purity

SOURCE: Slide courtesy of Jane C. Maxwell, PhD.
A Quick History of Methamphetamine

• **Before 1970**, amphetamine could be purchased over the counter

• **1970-1980**: Meth made using the P2P phenylpropanone method. Bikers carried the product in their “crank cases”

• **1980**: P2P becomes schedule II in the US but is still legal in Mexico. Meth in US is made from pseudoephedrine (PSE)

• **2005**: PSE regulated by CMEA in US and banned in Mexico

• **2009**: Significant shift from PSE to P2P as precursor

• **2014**: New alternative P2P recipe (nitrostyrene) – made by skilled chemists

SOURCE: Slide courtesy of Jane C. Maxwell, PhD.
## Differences in PSE and P2P Methods of Methamphetamine Manufacture

<table>
<thead>
<tr>
<th></th>
<th>PSE</th>
<th>P2P</th>
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<tbody>
<tr>
<td>Location</td>
<td>Made in homes and rural areas in small amounts; source is OTC medicines</td>
<td>Large-scale Mexican labs with expert chemists; source is local dealers</td>
</tr>
<tr>
<td>Source</td>
<td>OTC medicines</td>
<td>Local dealers</td>
</tr>
<tr>
<td>Distribution</td>
<td>Either cooked for personal use or brought from local dealers</td>
<td>Imported from Mexico and often sold by cartels (which often traffic heroin)</td>
</tr>
<tr>
<td>Costs</td>
<td>Costs include clean up of lab sites, burns and chemical reactions</td>
<td>P2P has no clean-up costs in the U.S.</td>
</tr>
</tbody>
</table>

Similar societal and public health costs

SOURCE: Slide courtesy of Jane C. Maxwell, PhD.
Let’s Take a Look at Normal Dopamine Functioning
Natural Rewards Elevate Dopamine Levels

**FOOD**

- NAc shell

<table>
<thead>
<tr>
<th>% of Basal DA Output</th>
<th>Time (min)</th>
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<tbody>
<tr>
<td></td>
<td>0</td>
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<tr>
<td>Empty</td>
<td>0</td>
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<tr>
<td>Box</td>
<td>0</td>
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<tr>
<td>Feeding</td>
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**SEX**

- DA Concentration (% Baseline)

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<tr>
<th>Sample Number</th>
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<tr>
<td>1</td>
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</table>

- Copulation Frequency

- Mounts
- Intromissions
- Ejaculations

Methamphetamine

Acute Physical Effects

Increases
• Heart rate
• Blood pressure
• Pupil size
• Respiration
• Sensory acuity
• Energy

Decreases
• Appetite
• Sleep
• Reaction time
How the Brain Responds to Meth
Effects of Drugs on Dopamine Release

**METHAMPHETAMINE**
- % Basal Release vs. Time After Methamphetamine

**COCAIN**
- % Basal Release vs. Time After Cocaine

**NICOTINE**
- % Basal Release vs. Time After Nicotine

**ETHANOL**
- % Basal Release vs. Time After Ethanol

Source: Di Chiara & Imperato, 1988; Shoblock et al., 2003.
Methamphetamine
Acute Psychological Effects

**Increases**
- Confidence
- Alertness
- Mood
- Sex drive
- Energy
- Talkativeness

**Decreases**
- Boredom
- Loneliness
- Timidity
Methamphetamine

Chronic Physical Effects

- Tremor
- Weakness
- Dry mouth
- Weight loss
- Cough
- Sinus infection

- Sweating
- Burned lips; sore nose
- Oily skin/complexion
- Headaches
- Diarrhea
- Anorexia
- Tooth decay
Methamphetamine

Chronic Psychological Effects

- Confusion
- Concentration
- Hallucinations
- Fatigue
- Memory loss
- Insomnia

- Irritability
- Paranoia
- Panic reactions
- Depression
- Anger
- Psychosis
Effects of Maternal Methamphetamine Use

- Increased rates of premature delivery
- Placental abruption
- Small size and lethargy
- Cardiac and brain abnormalities
- Neurological problems
  - Decreased arousal
  - Increased stress
  - Attention impairments

Dopamine Transporters in Methamphetamine Abusers

Normal Control

Methamphetamine Abuser

\[ p < 0.0002 \]
Differences between Stimulant and Comparison Groups on Tests Requiring Perceptual Speed

SOURCE: Simon et al., 2002.
Memory Difference between Stimulant and Comparison Groups

SOURCE: Simon et al., 2002.
Control Subjects and Methamphetamine Abusers Activate Emotion & Face Processing Areas

D Payer et al., Abstr. Soc. Neurosci., 2005
Partial Recovery of Brain Dopamine Transporters in Methamphetamine Abuser After Protracted Abstinence

Effective Treatment Interventions for Stimulant Use Disorders
What Treatments are Effective for Stimulant Users?

• Stimulant use and addiction is a complex problem involving biological changes in the brain as well as a myriad of social, familial, and environmental factors.

• Treatment strategies need to assess the psychobiological, social, spiritual, and pharmacological aspects of the patient's drug abuse.

What about Pharmacological Interventions?

• To date, there are **NO** FDA-approved pharmacological interventions for stimulant use disorders.

• Several medications are currently being investigated for their safety and efficacy in treating cocaine and methamphetamine addiction.

• These medications will hopefully:
  • Block/reduce effects of the stimulant
  • Alleviate severe craving
Medications for Methamphetamine Use Disorder

Positive/Under Consideration

• bupropion (better in low severity users)
• mirtazapine
• naltrexone
• methylphenidate
  ➢ d-amphetamine (craving/WD)
• topiramate*
  (better if abstinent at treatment entry)
Clinical Challenges with Stimulant Dependent Individuals

- Limited understanding of stimulant addiction
- Ambivalence about need to stop use
- Cognitive impairment and poor memory
- Short attention span
- Anhedonia
- Powerful Pavlovian trigger-craving response
- Sleep disorders
- Poor retention in outpatient treatment
- Elevated rates of psychiatric co-morbidity
Behavioral Treatments

- Cognitive/Behavioral Therapy (CBT)
- Matrix Model of Outpatient Treatment
- Motivational Interviewing (MI)
- Contingency Management (CM)
- 12-Step Facilitation Therapy
- Community Reinforcement Approach (CRA)
- Red Road to Wellbriety
- Traditional Healing
Getting Off: A Behavioral Treatment Intervention for Gay and Bisexual Male Methamphetamine Users

Contingency Management (CM):
- Provide increasingly valuable reinforcers for successive urine samples documenting drug abstinence

Gay-specific Cognitive Behavioral Therapy (GCBT):
- Cognitive Behavioral strategies for instilling abstinence and preventing relapse in a gay-specific HIV risk reduction intervention

SOURCE: Reback et al., 2014.
Exercise Study Results (Rawson et al., 2015)

- Lower severity methamphetamine users had significantly fewer positive urine results at the 3 follow-up points.

- Exercise group participants had significantly lower scores on a measure of depression compared to the educ. group over the 8-week treatment period.

- Exercise group participants had significantly lower scores on a measure of anxiety compared to the educ. group over the 8-week treatment period.
Treatment Works, Long-Term Recovery is Possible
Thank you for your time!

For more information:
Beth Rutkowski: brutkowski@mednet.ucla.edu
Pacific Southwest ATTC: http://www.psattc.org