Basics of Addiction Counseling: Pharmacology of Psychoactive Substance Use Disorders

NAADAC 2018 Pre-Conference Workshop
Deborah Fenton-Nichols, EdD, LPC, LAC, NCC
Content Developer: Mita M Johnson, EdD, LMFT, LPC, LAC, MAC, ACS
NAADAC: Learning Objectives
Setting the Stage: Terminology
What’s a Drug??
### Table 1. Factors That Must Be Considered by the DEA Before a Drug Can Be Scheduled

1. The drug’s actual or relative potential for abuse
2. Scientific evidence of its pharmacologic effect, if known
3. The state of current scientific knowledge regarding the drug or other substance
4. Its history and current pattern of abuse
5. The scope, duration, and significance of abuse
6. What, if any, risk there is to the public health
7. Its psychic or physiological dependence liability
8. Whether the substance is an immediate precursor of a substance already controlled

*DEA: Drug Enforcement Administration. Source: Reference 10.*

### Table 2. Schedules of Controlled Substances

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Classification Criteria</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-I</td>
<td>Substances have a high potential for abuse, have no currently accepted medical use in treatment in the U.S., and have a lack of accepted safety for use under medical supervision</td>
<td>Ecstasy (MDMA), heroin, LSD, marijuana, methaqualone, peyote</td>
</tr>
<tr>
<td>C-II</td>
<td>Substances have a high potential for abuse, which may lead to severe psychological or physical dependence, and have a currently accepted medical use (with severe restrictions)</td>
<td>Hydromorphone, methadone, meperidine, oxycodone, fentanyl, morphine, opium, codeine, cocaine, amphetamine, methamphetamine, methylphenidate</td>
</tr>
<tr>
<td>C-III</td>
<td>Have less potential for abuse than substances in C-I or C-II, and abuse may lead to moderate or low physical dependence or high psychological dependence</td>
<td>Hydrocodone/acetaminophen (Vicodin), Tylenol with Codeine, buprenorphine, benzphetamine, phendimetrazine, ketamine, anabolic steroids (Depo-Testosterone)</td>
</tr>
<tr>
<td>C-IV</td>
<td>Have a low potential for abuse relative to substances in C-III</td>
<td>Alprazolam, carisoprodol, clonazepam, clorazepate, diazepam, lorazepam, midazolam, temazepam, triazolam</td>
</tr>
<tr>
<td>C-V</td>
<td>Have a low potential for abuse relative to substances listed in C-IV and consist primarily of preparations containing limited quantities of certain narcotics</td>
<td>Robitussin AC, Phenergan with Codeine, ezogabine</td>
</tr>
</tbody>
</table>

*LSD: lysergic acid diethylamide; MDMA: 3,4-methylenedioxymethamphetamine. Source: References 4, 5.*
Definitions Key Terminology

- Classifications of Substances:
  - CNS Depressants
  - CNS Stimulants
  - Hallucinogens
  - Cannabis
  - Inhalants & Performance Enhancers
  - Designer Drugs & Herbaceuticals
  - Over-the-Counter, Supplements
  - Prescribed Medications
Definitions: Key Terms

- Substance Use Disorder per DSM-5
- Continuum of Use & Abuse
- Addiction – Dependence
- Use Disorder – Abuse
- Gateway Drugs
- Licit versus Illicit

- Abstinence
- Harm Reduction
Routes: Introducing Substances into the Body

- Injection – Intravenous – Intra-arterial
- Oral – Mucosal - Sublingual
- Nasal - Inhalation
- Topical - Transdermal
- Subcutaneous
- Intrathecal - Intramuscular
- Vaginally
- Rectal – Vaginal
- Ophthalmic – Otic
Potential Physiological Effects

• Tolerance
• Dependence:
  – Physiological
  – Psychological/Emotional
• Withdrawal:
  – Acute
  – Post-Acute Withdrawal (PAWS)
  – Protracted
Drug Testing

- Urinalysis – quickest
- Breathalyzer – alcohol specific
- Blood – most accurate
- Saliva
- Patches
- Hair strand test
- Commercial EZ tests
Collaborative Care

• Integrated, multidisciplinary care team

• Psychoeducation: SUDs, comorbidity, relapse vs. remission

• Teaching pain management tools vs. opioids; MAT

• Confidentiality, ROIs, rights to privacy

• Empowering client to be part of care team
Ecstasy was 1st popularized by California psychotherapists who tried to use it for “empathy training” in marriage counseling. True or false?
Substances by Classification
DEPRESSANTS: EFFECTS

✓ Depressants include medications and street drugs. Depressants inhibit the function of the central nervous system (brain and nerves within spinal cord).

✓ Depressants are among the most widely used drugs in the world.

✓ These drugs operate by disrupting normal functioning of neurons – leading to symptoms such as drowsiness, relaxation, decreased inhibition, anesthesia, sleep, coma and possibly death.

✓ All depressants have the potential to be addictive.

✓ Stacking depressants is taking more than one type of depressant at the same time. Example: heroin + alcohol or other opiate and alcohol. The cumulative effect of stacking depressants is a depressed CNS, which leads to depressed heart and cardiovascular functioning, which could lead to death due to arresting the heart.
Depressant Drug Effects

Depressant drugs slow the body down...

- Major Depressants: opiates/opioids, sedative hypnotics (barbiturates, benzodiazepines, Z-hypnotics), and alcohol

- Minor Depressants: skeletal muscle relaxants (Soma, Flexeril), antihistamines (cold & allergy medications), over-the-counter depressants and look-alike depressants.
• Last month, 129 million Americans consumed an alcoholic beverage – 16 million are heavy drinkers.

• 25 – 30% of all U.S. hospital admissions were due to alcohol.

• Alcohol was the first psychoactive drug.

• Alcohol is a CNS depressant, reward, food, medicine, sacrament, water substitute, social lubricant, source of taxes, and emotional/mental tranquilizer.
Brain
- Headaches, Blackouts, Delusions, Paranoia, Forgetfulness, Impaired Judgement, Decline in IQ, Dementia, Epileptic fits, Wernickes disease (due to vitamin deficiency), Haemorrhage, Peripheral neuritis, Korsakoff’s psychosis & Death

Lungs
- A small amount of alcohol escapes unused via breath 2-4%

Liver
- Fatty cells, tissue scarring, jaundice, hepatitis, irreversible cirrhosis - the liver breaks down 90% of alcohol consumed

Kidneys
- A small amount of alcohol escapes unused via urine 2-4%

Pancreas
- Bad digestion, malnutrition, early diabetes

Sweat Glands
- A small amount of alcohol escapes unused via sweat glands 2-6%

Sex Organs
- Male: Depressed testicular production, impotence, breast growth due to female hormones not broken down by liver
- Female: Failure to ovulate, spontaneous abortion

Nervous System
- Peripheral neuritis - degeneration of the nervous system supplying limbs

Throat
- Pressure on portal circulation - risk of haemorrhage. Increased incidence of cancer - 40x if smoker

Gullet
- Corrosive effect - risk of cancer

Muscles
- Degeneration, weakness, pain

Heart
- Weak & “fatty” heart, weakening of heart muscles, high blood pressure. Anaemias due to decreased absorption of vitamnis.

Stomach
- Gastritis, peptic ulcer (direct corrosive effect)

Intestines
- Inflammation (corrosion from alcohol)

Nervous System
- Malfunctions, skakiness, tremors

Bones
- Degeneration - risk of fracture
Possible long-term effects of Ethanol

**Large consumption**
- Impaired development
- Wernicke-Korsakoff syndrome
- Vision changes
- Ataxia
- Impaired memory
- Psychological
- Cravings
- Irritability
- Antisociality
- Depression
- Anxiety
- Panic
- Psychosis
- Hallucinations
- Delusions
- Sleep disorders

- Mouth, trachea and esophagus:
  - Cancer
- Blood:
  - Anemia
- Heart:
  - Alcoholic cardiomyopathy
- Liver:
  - Cirrhosis
  - Hepatitis
- Stomach:
  - Chronic gastritis
- Pancreas:
  - Pancreatitis
- Peripheral tissues:
  - Increased risk of diabetes type 2

**Small to moderate consumption**
- Systemic:
  - Increases insulin sensitivity
  - Lower risk of diabetes
- Brain:
  - Atrophy
  - Reduce the number of silent infarcts
  - Decrease risk of dementia
- Blood:
  - Increases HDL
  - Decreases thrombosis
  - Reduces fibrinogen
  - Increases fibrinolysis
  - Reduces artery spasm from stress
  - Increases coronary blood flow
- Skeletal:
  - Higher bone mineral density
- Joints:
  - Reduced risk of rheumatoid arthritis
- Gallbladder:
  - Reduced the risk of developing gallstones
- Kidney:
  - Reduced risk of developing kidney stones

Effects linked with both small and large consumption
Normal 43-year-old

Alcoholic 43-year-old
One mixed drink with
• 1.5 fl oz (44 mL)
of 80-proof liquor
  (such as vodka,
gin, scotch, bourbon,
  brandy, or rum)

5 fl oz (148 mL)
of wine

12 fl oz (355 mL) of
  beer or wine cooler
Opiates - Opioids
Heroin is processed from morphine, a naturally occurring substance extracted from the seedpod of the Asian poppy plant. Heroin usually appears as a white or brown powder. Street names for heroin include "smack," "H," "skag," and "junk." Other names may refer to types of heroin produced in a specific geographical area, such as "Mexican black tar."

Heroin abuse is associated with serious health conditions, including fatal overdose, spontaneous abortion, collapsed veins, and, particularly in users who inject the drug, infectious diseases, including HIV/AIDS and hepatitis.
Opiates Act on Many Places in the Brain and Nervous System

Opiates can change the limbic system, which controls emotions to increase feelings of pleasure.

Opiates can block pain messages transmitted by the spinal cord from the body.

Opiates can change the brain stem, an area that controls automatic body functions, and depress breathing.

http://www.narconon.org/drug-information/heroin-information.html
Bad effects of OPIATES:
- drowsiness
- confusion
- memory loss
- fatigue
- hallucinations
- convulsions
- dilation of the blood vessels causing increased pressure in the brain
- pupil constriction
- slurred speech
- nausea
- vomiting
- weight loss
- sexual dysfunction
- respiratory depression
- constipation

Effects of using non-sterile needles and adulterants mixed with:
- brain abscesses
- skin abscesses
- infected and collapsed veins
- lung abscesses
- endocarditis (heart lining inflammation)
- diseases such as hepatitis and HIV
HOW DOES OXYCODONE WORK IN THE BODY?

You take Oxycodone.

Oxycodone enters the bloodstream in seconds. Then, the heart pumps the blood throughout the body, carrying the drug with it.

In the brain, Oxycodone undergoes several chemical reactions and changes back into morphine. Then, it binds rapidly to the opioid receptors to cause euphoria, pain relief, and diminished anxiety.

Oxycodone undergoes extensive first-pass metabolism in the liver before entering the body's circulation.

Oxycodone has a extremely rapid half-life of 2-6 minutes and is eliminated mainly through the urinary tract. 7% is excreted as unchanged morphine; 50-60% as glucuronides.

ADMINISTRATION ROUTES AND ONSET

<table>
<thead>
<tr>
<th>Route</th>
<th>Onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>10-30 minutes</td>
</tr>
<tr>
<td>Injecting</td>
<td>15-30 seconds</td>
</tr>
<tr>
<td>Snorting</td>
<td>2-4 minutes</td>
</tr>
<tr>
<td>Smoking</td>
<td>10 seconds</td>
</tr>
</tbody>
</table>
Hydrocodone

Side effects of Hydrocodone:
- Drowsiness
- Dizziness
- Lightheadedness
- Fuzzy thinking
- Anxiety
- Abnormally happy or sad mood

Side effects of Vicodin:
- Anxiousness
- Dizziness
- Drowsiness
- Headache
- Mood changes
- Fainting
- Confusion
- Fear
- Unusual thoughts or behavior
- Loss of appetite

Psychological

Ears
- Ringing sound

Throat
- Swelling

Eyes
- Blurred vision
- Yellowing

Face, lips or tongue
- Dryness
- Swelling

Muscular
- Seizures

Heart
- Slowed heart rate

Stomach
- Nausea
- Vomiting
- Distress
- Pain

Skin
- Hives
- Itching
- Yellowing

Lungs
- Difficulty breathing
- Shallow breathing

Intestinal
- Constipation
- Clay-colored stools

Urinary
- Problems urinating
- Dark urine

Pupils
- Narrowing

Throat
- Dryness

Skin
- Rash
- Itching

Respiratory
- Slowed or irregular breathing
- Chest tightness

Gastric
- Nausea
- Vomiting

Urinary
- Difficulty urinating

Red = more serious
Tramadol

Side effects of Tramadol

Central:
- Hallucinations
- Dizziness
- Drowsiness
- Insomnia
- Headache
- Nervousness
- Agitation

Nose:
- Sores

Mouth:
- Swollen tongue or lips
- Sores
- Dryness

Skin:
- Hives
- Rash
- Itching
- Sweating
- Chills

Respiratory:
- Difficulty breathing

Intestinal:
- Diarrhea
- Constipation

Systemic:
- Flu-like symptoms

Eyes:
- Sores
- Swelling

Face:
- Swelling

Throat:
- Sores
- Difficulty swallowing
- Swelling
- Hoarseness

Muscular:
- Seizures
- Tremor
- Tightness
- Weakness

Gastric:
- Heartburn or indigestion
- Nausea
- Vomiting

Hands, feet, ankles, or lower legs:
- Swelling
Heroin: Short & Long Term Effects

Short-term effects of Heroin:
- **Central**
  - Euphoria
  - Alternately alert and drowsy state
- **Mouth**
  - Dryness
- **Skin**
  - Warm flushing
- **Respiratory**
  - Slowed breathing
- **Muscular**
  - Weakness

Long-term effects of Heroin:
- **Central**
  - Addiction
  - Tolerance
  - Dependence
- **Respiratory**
  - Pneumonia
- **Heart**
  - Infection of heart lining and valves
- **Circulatory**
  - Collapsed veins
- **Liver**
  - Decreased function
- **Systemic**
  - Abscesses
Krokodil = Desomorphine
Sedative-Hypnotics

- Its major therapeutic use is to cause sedation (with concomitant relief of anxiety) or to encourage sleep.

- Sedative: a drug that reduces anxiety without affecting motor or mental functioning.

- Hypnotics: drugs that produce drowsiness and encourage the onset and maintenance of a state of sleep.
3 classes of Sedative-Hypnotics

• Barbiturates

• Benzodiazepines (benzos)

• Z-Hypnotics
Top 10 Adverse Reactions

- Completed Suicide
- Cardio-Respiratory Arrest
- Drug Abuse
- Poisoning
- Drug Toxicity
- Toxicity to Various Agents
- Overdose
- Respiratory Arrest
- Cardiac Arrest
- Death
Xanax = Alprazolam

Side effects of Alprazolam:
- Drowsiness
- Light-headedness
- Dizziness
- Irritability
- Talkativeness
- Changes in sex drive or ability
- Changes in appetite
- Sleep disturbances
- Memory problems
- Confusion
- Hallucination
- Severe skin rash
- Other
- Weight changes
- Red = more serious
- Yellowing of the skin or eyes
- Dry mouth
- Increased salivation
- Seizures
- Weakness
- Problems with coordination
- Stomach problems
Effects of Stimulants

- Wakefulness
- Alertness
- Increased energy
- Restlessness
- Euphoria
- Confusion
- Reduced appetite, increased talkativeness
- Increased breathing and heart rate
- Elevated blood pressure
Coca Leaf

- The coca leaf is grown mostly on the Andes Mountains in South America.
- Cocaine constitutes 0.5% to 1/5% of the leaf.
- Columbian cartels grow and control most of the cocaine in the world, although much of the smuggling into the U.S. is by Mexican gangs.
- The coca leaf is chewed with life or ash, and the stimulating juice is absorbed through the buccal mucosa in the mouth in three to five minutes.
• Cocaine is associated with high levels of aggression and violence.

• Inhibitions are suppressed, emotional triggers are overstimulated, and the fright/flight center is hyperactive, especially when cocaine and alcohol are used together which creates cocaethylene.

• Cocaine’s cardiovascular effects include raised heart rate and blood pressure and damage to heart muscles, coronary arteries, and other blood vessels. Weakened vessel walls scar the heart with constriction bands.
Freebase Cocaine = Base, Crack or Rock

Main physiological effects of Crack cocaine:

- **Systemic:**
  - Increased temperature

- **Pupils:**
  - Dilation

- **Sense of balance:**
  - Vertigo

- **Blood vessels:**
  - Constriction
  - Increased blood pressure

- **Heart:**
  - Increased heart rate
  - Risk of cardiac arrest

- **Lungs:**
  - Risk of respiratory arrest

- **Muscles:**
  - Tremor
  - Twitches
Amphetamines
Adverse (negative) effects of Methamphetamine

**Psychological**
- Insomnia
- Aggressive behavior
- Paranoia
- Incessant conversations
- Decreased appetite
- Increased alertness
- Irritability
- Slurred speech
- Dizziness
- Confusion
- Hallucinations
- Obsessive behaviors
- Depression
- Panic attacks

**Systemic**
- Hyperthermia
- Malnutrition
- Impaired immune system

**Circulatory**
- High blood pressure
- Vessel damage in brain
- Clotting and stroke

**Heart**
- Chest pain
- Rapid heart rate
- Heart attack

**Liver**
- Damage

**Mouth**
- Grinding of teeth

**Skin**
- Sweating
- Numbness

**Eyes**
- Dilated pupils

**Respiratory**
- Shortness of breath

**Muscular**
- Jerky movements
- Increased activity
- Convulsions
- Loss of coordination

**Kidneys**
- Damage
The “Faces of Meth” project began in Oregon and Montana.

Colorado Meth Project: http://colorado.methproject.org/

Not everyone looks like the people in these posters so be careful – attempting to scare clients has been shown to be counterproductive and ineffective.

These posters also exhibit qualities of people who are malnourished and dehydrated – they could also be suffering from polydrug effects and/or other health conditions.
Crystal or Ice
Amphetamine Congeners

- Amphetamine congeners emulate the effects of amphetamine but have different chemical structures. Many diet pills and mood elevators (amphetamine congeners) mimic the actions of amphetamines but are not as strong.

- Congeners include Ritalin, Concerta, and Cylert and are used to treat ADHD.
- Adderall, Vyvanse, and Dexedrine have amphetamine structures.

- Between 3 and 7% of all school-age children, in the U.S., have ADHD.
- Non-stimulant drugs used to treat ADHD include Strattera, Intuniv and Texex.
Health effects of caffeine

**Positive effects**
- increased attention and alertness, decreased fatigue
- lower risk of cardiovascular disease
- lower risk of diabetes
- increased metabolic rate

**Negative effects**
- anxiety and addiction
- increased vasoconstriction and blood pressure
- reduced control of fine motor movements
- stimulation of urination
Caffeine Content of Popular Drinks

- Wired X505 (24oz)
- Fixx (20oz)
- Starbucks Brewed Coffee (Venti)
- Starbucks Brewed Coffee (Grande)
- Starbucks Brewed Coffee (Tall)
- No Fear (16oz)
- Rockstar (16oz)
- Monster (16oz)
- Latte (Grande/Venti)
- Full Throttle (16oz)
- Brewed Coffee (6oz)
- Coca Cola
- Red Bull (8oz)
- Latte (Tall)
- Tea (Brewed, Imported)
- Mountain Dew can (12oz)
- Tea (Brewed)
- Coca Cola can (12oz)
- Tea (Green)
Nicotine: Chemical Gateway

Smoking cigarettes causes nicotine to enter the brain, where it activates neural pathways that lead to the reward centre. Here, the brain releases dopamine, a chemical that makes us feel good. This process is meant to reward us for positive behaviors such as eating, drinking and having sex.

Imaging studies show that smoking tobacco affects the whole body

PET scans reveal reduced enzyme activity in smokers’ vital organs. Adapted from Fowler et. al., "Low monoamine oxidase B in peripheral organs in smokers." PNAS, 2003
Side Effects & Adverse Effects

**Side effects of Nicotine**
- Blood: Increased clotting tendency
- Lungs: Bronchospasm
- Muscular: Tremor, Pain
- Gastrointestinal: Nausea, Dry mouth, Dyspepsia, Diarrhea, Heartburn
- Joints: Pain
- Central: Lightheadedness, Headache, Sleep disturbances, Abnormal dreams, Irritability, Dizziness
- Heart: Increased or decreased heart rate, Increased blood pressure, Tachycardia, More (or less) arrhythmias, Coronary artery constriction
- Endocrine: Hyperinsulinemia, Insulin resistance

**Common adverse effects of Tobacco smoking**
- Larynx cancer
- Esophagus cancer
- Myocardial infarction
- Systemic atherosclerosis
- Bladder cancer
- Oral cavity cancer
- Lung cancer
- Chronic bronchitis
- Emphysema
- Peptic ulcer
- Pancreas cancer
Delivery: Smokeless Tobacco

• **Snus:** a moist powder tobacco product containing tobacco, salt, and sodium bicarbonate. It is consumed by placing it under the upper lip for extended periods of time.

• **Snuff:** a smokeless tobacco made from ground or pulverized tobacco leaves. It is insufflated or snuffed in to the nasal cavity, delivering a swift hit of nicotine and a lasting flavored scent.

• **Chew or dip:** a smokeless tobacco product consumed by placing a portion of the tobacco between the check and gum or upper lip teeth and chewing. Dipping tobacco is ground up. Chew is not ground and must be manually crushed with the teeth to release flavor and nicotine.

• **Hookah:** a water pipe that is single or multi-stemmed for vaporizing and smoking flavored tobacco in which the vapor or smoke is passed through a water basin before inhalation.
• Smokeless tobacco is as addicting and as damaging as tobacco that is smoked, but causes less lung damage. Oral diseases are more common.

• 15% of pregnant women smoke. Reduced oxygen to the fetus can cause low birth weight, and miscarriage. Risk of crib death (SIDS) is also increased.

• Tobacco companies spend $13.1 billion per year on advertising and marketing = $36 million per day.

• Reasons for continued use: social context; ritual aspects/conditioned behavior; perception of being an adult and cool; desire to manipulate mood; desire to be rebellious; and/or perception that smoking is sexually attractive.
Cigarettes vs. Vaping

**DANGER POISON!**

- Acetone (solvent)
- *Naphtylamine* (used as rocket fuel)
- Methanol (used as rocket fuel)
- *Pyrene* (moth-repellent)
- Naphtalène (moth-repellent)
- Ammoniac (detergent)
- *Urethane*
- Toluene (industrial solvent)
- Arsenic (lethal poison)
- *Dibenzacridine*
- *Polonium 210* (a radioactive element)
- Carbon monoxide (found in exhaust fumes)
- Vinyl chloride (used in plastic materials)
- Cyanhydric acid (was used in the gas chambers)
- *Known carcinogenic substances*

**STOP SMOKING!**

**Inside of Electronic Cigarette**

- LED
- Blu
- Smart Chip Controller
- Lithium Ion Battery
- Cartridge
- Atomizer heats the eliquid
- Heating Vapor Cell
- Flavor liquid or eliquid
- Silicone Tip
Plant Stimulants
Betel Nut
Physical effects of Lysergic acid diethylamide (LSD)

Systemic:
- Increased temperature

Pupils:
- Dilation

Mouth:
- Dryness

Blood:
- High blood pressure

Skin:
- Profuse sweating

Heart:
- Increased heart rate

Muscles:
- Numbness
- Weakness
- Tremors

Gastric:
- Nausea
San Pedro Cactus
(Mescaline)

Copyright - www.streetdrugs.org
Brain Areas Affected by Ecstasy

- Neocortex
- Basal ganglia
- Amygdala
- Hypothalamus
- Hippocampus
Bodily effects of Cannabis

Eyes:
- Reddening
- Decreased intra-ocular pressure

Mouth:
- Dryness

Skin:
- Sensation of heat or cold

Heart:
- Increased heart rate

Muscles:
- Relaxation
✓ smoked:
   • initial effect = 20 to 30 minutes
   • peak effect = 1 to 2 hours
   • length of effect = 2 to 4 hours
✓ eaten:
   • initial effect = ½ to 2 hours
   • peak effect = 1 to 6 hours
   • length of effect = 5 to 12 hours
✓ half-life:
   • in fatty tissues = 8 days
   • chronic users = 27 hours
   • casual users = 56 hours

DURATION OF EFFECTS
- ideas seem to flow more easily
- racing thoughts
- deeper connection to surroundings
- mood lift – euphoria
- anxiety
- disrupted linear thinking
- amotivational syndrome
- paranoia in some users
Inhalants
Nitrites are a group of chemicals including cyclohexyl nitrite, amyl nitrite, and butyl nitrite. Nitrites are used mainly to enhance sexual experiences rather than to achieve a euphoric effect. Cyclohexyl nitrite is found in room deodorizers. Amyl nitrite comes in small, mesh-covered, sealed capsules that are popped or snapped in order to release the vapors. Because of this popping or snapping, these capsules are frequently called poppers or snappers. Butyl nitrite is often sold in small bottles that, like amyl nitrite capsules, are referred to as poppers. Nitrites are available in adult bookstores and shops and over the Internet.
Steroids
Steroids
The Paradox of Power
Biology of Addiction: The Brain
we are not created equally ...

THE FEMALE BRAIN

INDECISION NUCLEAS
TELEPHONE SKILLS
NEED FOR COMMITMENT HEMISPHERE
CHOCOLATE CENTRE
LISTENING
SHOE/HANDBAG CO-ORDINATION
SENSE OF DIRECTION NEURON
SEX (see note)
SHOPPING
JEALOUSY

FOOTNOTE: Note how closely connected the small sex cell is to the listening gland.

THE MALE BRAIN

Crotch Scanning Area
Toilet Aiming Cell
Domestic Skills
T.V. and Remote Control Addiction Centre
Sex
SEX
SEX
Listening Particle
Attention Span
"Avoid Personal Questions at All Costs" Area
Lame Excuses Gland
Ironing

SEX

FOOTNOTE: the "Listening to children cry in the middle of the night" gland is not shown due to its small and underdeveloped nature. Best viewed under a microscope.
Welcome to your internal hard drive!

- Motor Cortex (Movement)
- Central Sulcus
- Sensory Cortex (Pain, heat, and other sensations)
- Parietal Lobe (Comprehension of language)
- Temporal Lobe (Hearing)
- Occipital Lobe (Primary visual area)
- Wernicke’s area (Speech comprehension)
- Cerebellum (Coordination)

- Frontal Lobe (Judgment, foresight, and voluntary movement)
- Broca’s Area (Speech)
- Frontal Lobe (Smell)
- Temporal Lobe (Intellectual and emotional functions)
- Brainstem (Swallowing, breathing, heartbeat, wakefulness center and other involuntary functions)
LEFT-BRAIN FUNCTIONS

Analytic thought
Logic
Language
Reasoning
Science and math
Written
Numbers skills
Right-hand control

RIGHT-BRAIN FUNCTIONS

Art awareness
Creativity
Imagination
Intuition
Insight
Holistic thought
Music awareness
3-D forms
Left-hand control
the nervous system ...

- houses 100 billion neurons (nerve cells)
- each brain cell could have one or thousands of connections to other brain cells
- the right side of your brain controls left side of body
- the left side of brain controls right side of body
- your brain is full of nerve cells & no pain receptors.
  - doctors can operate on your brain while you're awake – you won't feel a thing
- messages from your brain to any part of your body can travel as fast as 250 mph
• the limbic system is where your emotions live
• memories are created by the limbic system
• drug memories & emotions are easily accessible
Drugs negatively impact systems

Prefrontal Cortex Problems:
- short attention span, impulsivity, procrastination, disorganization
- poor judgment, lack of empathy and insight

Anterior Cingulate Problems:
- gets stuck, worries, holds grudges, obsesses
- compulsions, addictions, oppositional/argumentative

Basal Ganglia Problems:
- increased anxiety, panic, conflict avoidance, pessimism, excessive motivation
- decreased: add-like symptoms, decreased motivation

Temporal Lobe Problems:
- emotional instability, memory problems, feelings of panic, aggression, headaches, learning problems

Deep Limbic System Problems:
- sad, moody, negative thoughts, low motivation, social isolation, loss of libido

Cerebellum Problems:
- gait/coordination problems, slowed thinking, slowed speech, impulsivity, poor conditioned learning
Natural Rewards:

- Food
- Water
- Sex
- Nurturing
reward pathway in brain ...
behavioral brain...

Tobacco
Nicotine
Medical Marijuana
E-Cigarettes
dopamine is “the ultimate reward”
GABA pathways in a normal brain: GABA is the main inhibitory neurotransmitter in the central nervous system.
sleep deprivation & the brain ...

Effects of Sleep deprivation

- Irritability
- Cognitive impairment
- Memory lapses or loss
- Impaired moral judgement
- Severe yawning
- Hallucinations
- Symptoms similar to ADHD
- Impaired immune system
- Increased heart rate variability
- Risk of heart disease
- Decreased reaction time and accuracy
- Tremors
- Aches
- Risk of diabetes Type 2

Other:
- Growth suppression
- Risk of obesity
- Decreased temperature
Module 2: The Central Nervous System
nerve cell = neuron

- **Cell body** (the cell’s life-support center)
- **Dendrites** (receive messages from other cells)
- **Axon** (passes messages away from the cell body to other neurons, muscles, or glands)
- **Terminal branches of axon** (form junctions with other cells)
- **Myelin sheath** (covers the axon of some neurons and helps speed neural impulses)
- **Neural impulse** (electrical signal traveling down the axon)
Information flow through neurons

Dendrites Collect electrical signals

Cell body Integrates incoming signals and generates outgoing signal to axon

Axon Passes electrical signals to dendrites of another cell or to an effector cell

Figure 45-2b Biological Science, 2/e © 2005 Pearson Prentice Hall, Inc.

nerve cells communicating
Dopamine transporter blocked by cocaine

Transmitting neuron

Dopamine

Dopamine receptor

Cocaine

Receiving neuron

Intensity of effect
neurotransmitters ...

(Source: Deplin, http://www.deplin.com/LifeWithDepression/Causes)
each NT has its own receptor
release and reuptake
blocking reuptake ...
opioid receptor sites
cocaine receptor sites
cannabinoid receptor sites
Addictive Brain Response

If Alcohol or Other Drugs Makes You Feel Really Good You’re At High Risk Of Addiction.

- Floods The Brain With Pleasure Chemicals
- Deprives The Brain Of Warning Chemicals
- Creates Intense Euphoria
- Inhibits Anxiety and Fear Even When In Real Threat
- Impairs Judgment and Impulse Control

drugs & brain imaging
ct scans

- healthy surface
- daily drinking

scans pickup nt activity
Normal Control

METH Abuser (1 month abstinence)

METH Abuser (14 months abstinence)
• 38 year old – 17 years of heavy weekend use alcohol – right side surface view.

• 48 year old – 22 years daily use of alcohol with history of past head injury – marked scalloping – overall decreased activity. Underside surface view.

• 18 year old – 3 year history of 4 times/week use of marijuana – underside surface view – decreased prefrontal cortex & temporal lobe activity.

• 16 year old – 2 year history of daily marijuana abuse – underside surface view – prefrontal & temporal lobe activity.

• Underside active view – off THC – increased deep left temporal activity.

• Underside active view – on THC – overall calming of activity.

• Top-down activity – on THC – overall calming of activity.

• Top-down active view – off THC – patchy increased uptake.

• Normal view – top down surface view – full symmetrical activity.

• 39 yr. old – 25 years of frequent heroin use – front on surface view – marked overall decreased activity.

• 40 year old – 7 years on methadone – heroin 10 years prior – top down surface view – marked decrease in overall activity.

• 52 year old – 28 year history of frequent meth use – top down surface view – multiple holes across cortical surface.

• 24 year old – 2 year history of frequent cocaine use – top down surface view – multiple holes across cortical surface.

• 28 year old – 8 years heavy meth use – front on surface view – marked overall decreased activity.

• 45 year old – 25 year history of daily abuse – underside surface view – marked overall decreased activity.

• 45 year old – 27 year history of heavy use – smoking 3 packs of cigarettes & drinking 3 pots of coffee daily.

• Underside surface view – marked decreased overall activity.

Normal

Former Ecstasy User
Short Term Effects after Ecstasy is Gone

Normal

During Ecstasy
  elevated mood

After Ecstasy
  depression-like feelings, irritability
New knowledge about which parts of the brain are involved in drug abuse and addiction has revealed new targets for medications development. These medications aim to:

- interfere with a drug’s reinforcing effects
- increase the value of natural rewards
- strengthen executive function/inhibitory control
- interfere with conditioning/create new memories
- counteract stress responses that lead to relapse
The Adolescent Brain
the adolescent's brain...
**Nerve Proliferation...**

- By age 11 for girls and 12 for boys, the neurons in the front of the brain have formed thousands of new connections. Over the next few years most of these links will be pruned.

**...and Pruning**

- Those that are used and reinforced — the pathways involved in language, for example — will be strengthened, while the ones that aren’t used will die out.

Growing a Grown-up Brain

Scientists have long thought that the human brain was formed in early childhood. But by scanning children’s brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don’t finish the pruning process until the early 20s.

Gray matter: Nerve cell bodies and fibers that make up the bulk of the brain’s computing power.

Occipital lobe: Vision

Temporal lobe: Memory, hearing, language

Parietal lobe: Spatial perception

Frontal lobe: Planning, emotional control, problem solving

Gray matter density: Gray matter becomes less dense as the brain matures.

More dense

Less dense

Age: 5

Adolescence

20

“If a teen is doing music, sports or academics, those are the connections that will be hard wired. If they’re lying on the couch or playing video games or MTV, those are the cells and connections that are going to survive.”
Adolescent Addiction

Drug abuse starts early and peaks during the teen years. This increased risk is partly due to adolescents’ heightened sensitivity to social influences (friends) and their still developing brain, particularly areas critical to judgment and impulse control.
Medication-Assisted Therapies
## Should Referral for Detoxification be Considered?

| **NO** | Opioids | No approved medicine to ease withdrawal  
Acute intoxication, overdose, or comorbid medical problems may require detoxification |
|---------|---------|-------------------------------------------------------------------------------------|
| Marijuana, Cocaine, Methamphetamine, Ecstasy, Anabolic steroids, LSD, Ketamine and PCP | Withdrawal unpleasant but not life threatening  
Well managed by approved medicine\(^1\-\^2\)  
Withdrawal without medication not recommended in current practice standards |

| **RECOMMENDED** | Opioids | Withdrawal potentially life threatening  
Assess risk of withdrawal and consider referral for detoxification  
Well managed by approved medicine |

| **YES** | Alcohol, Benzodiazepines, Sedative hypnotics, GHB, Inhaled intoxicants |

**Eric Devine, Ph.D.** is an Assistant Professor of Psychiatry at the Boston University School of Medicine and training Faculty for the Boston Center for Treatment Development and Training (BCTDT).
Effective treatment generally requires many facets. Treatment providers are important in helping the patients to:

- manage physical withdrawal symptoms
- understand the behavioral and cognitive changes resulting from drug use
- achieve long-term changes and prevent relapse
- establish ongoing communication between physician and community provider to ensure coordinated care
- engage in a flexible treatment plan to help them achieve recovery
Medication Assistance:
Maintenance of Changes

Several different are available that may aid clients in the maintenance of changes:

- Sensitizing Agents (*Antabuse*)
- Agonists (*Methadone*)
- Partial Agonists/Partial Antagonist (*Chantix, Suboxone*)
- Antagonists (*Naltrexone*)
Maintenance of Changes: Agonist Medications

- have similar structure and bind to same receptor sites as drug of abuse
- provide full activation at receptor site where it binds
- Methadone – a synthetic opioid that binds to the receptors activated by heroin and other opioids
  - occupies mu opioid receptor
  - provides relief from craving and withdrawal
  - user does not experience euphoria or intoxication

Eric Devine, Ph.D. is an Assistant Professor of Psychiatry at the Boston University School of Medicine and training Faculty for the Boston Center for Treatment Development and Training (BCTDT).
Maintenance of Changes: Antagonist Medications

- have similar structure and bind to same receptor sites as drug of abuse
- provide no activation at receptor site where it binds
- block full and partial agonists from binding at receptor sites
- decrease pleasure and reward from drug use
- may induce withdrawal symptoms when full agonist drugs are displaced by antagonist medication
Maintenance of Changes: Partial Agonist Medications

✓ have similar structure and bind to same receptor sites as drug of abuse
✓ provide partial activation at receptor site where it binds
✓ provide relief from craving and withdrawal
✓ degree of activation less than a full agonist
✓ block full agonists from binding at receptor sites
✓ limit drug’s effect if substance is subsequently used
Agonist or Antagonist

**Before Drug**
- Natural chemical
- Receptor site
- Normal cellular activity

**Agonist Drug**
- Natural chemical
- Agonist drug
- Receptor site
- Enhanced cellular activity

**Antagonist Drug**
- Natural chemical
- Antagonist drug
- Receptor site
- Blocked cellular activity
**Agonists and Antagonists**

**Agonists**
Drugs that occupy receptors and activate them.

**Antagonists**
Drugs that occupy receptors but do not activate them. Antagonists block receptor activation by agonists.

- **Agonist alone**
  - Full activation

- **Agonist + antagonist**
  - Less activation

- **Antagonist alone**
  - No activation

**Diagram:**
- **Receiving neuron**
  - Neurotransmitter molecule
  - Receptor site on receiving neuron
  - Agonist mimics neurotransmitter
  - Antagonist blocks neurotransmitter
Naltrexone

Chewing or crushing force results in the release of the sequestered Naltrexone.

Naltrexone blocks the Opioid receptor.
**Naltrexone** is a long-acting opioid antagonist. It works by blocking the opioid receptors in the brain and, therefore, blocks the effects of heroin and other opioids. People who are under naltrexone protection can't achieve the "high" from using heroin. Naltrexone neither produces euphoria nor creates a new drug addiction.

Read more: naltrexoneimplant.com

What is Naltrexone

Drug addiction Alcohol treatment centre Europe
Treatment for addiction Alcohol dependence
Detoxification Naltrexone Rehabilitation programs
Vivitrol

Alcohol stimulates the release of β-endorphins... that bind to μ-opioid receptors... thereby releasing dopamine.

Ingestion of alcohol begins a neural cascade leading to the release of dopamine.

Dopamine release is associated with the pleasurable, reinforcing, and rewarding effects of alcohol.

VIVITROL contains naltrexone, which:
- Is an opioid antagonist with the highest affinity for the μ-opioid receptor.
- Blocks β-endorphin binding, which may prevent dopamine release.

VIVITROL blocks the binding of β-endorphins to μ-opioid receptors, which may... prevent dopamine release.
Naloxone (also known as Narcan®) is a medication called an “opioid antagonist” used to counter the effects of opioid overdose, for example morphine and heroin overdose. Specifically, naloxone is used in opioid overdoses to counteract life-threatening depression of the central nervous system and respiratory system, allowing an overdose victim to breathe normally. Naloxone is a nonscheduled (i.e., non-addictive), prescription medication. Naloxone only works if a person has opioids in their system; the medication has no effect if opioids are absent. Although traditionally administered by emergency response personnel, naloxone can be administered by minimally trained laypeople, which makes it ideal for treating overdose in people who have been prescribed opioid pain medication and in people who use heroin and other opioids. Naloxone has no potential for abuse. Naloxone may be injected in the muscle, vein or under the skin or sprayed into the nose. Naloxone that is injected comes in a lower concentration (0.4mg/1mL) than Naloxone that is sprayed up the nose (2mg/2mL). It is a temporary drug that wears off in 20-90 minutes.

http://harmreduction.org/issues/overdose-prevention/overview/overdose-basics/understanding-naloxone/
How Buprenorphine Works

Opioid receptor is empty. As someone becomes tolerant to opioids, they become less sensitive and require more opioids to produce the same effect. Whenever there is an insufficient amount of opioid receptors activated, the patient feels discomfort. This happens in withdrawal.

Opioid receptor filled with a full-agonist. The strong opioid effect of heroin and painkillers can cause euphoria and stop the withdrawal for a period of time (4-24 hours). The brain begins to crave opioids, sometimes to the point of an uncontrollable compulsion (addiction), and the cycle repeats and escalates.

Opioids replaced and blocked by buprenorphine. Buprenorphine competes with the full agonist opioids for the receptor. Since buprenorphine has a higher affinity (stronger binding ability) it expels existing opioids and blocks others from attaching. As a partial agonist, the buprenorphine has a limited opioid effect, enough to stop withdrawal but not enough to cause intense euphoria.

Over time (24-72 hours) buprenorphine dissipates, but still creates a limited opioid effect (enough to prevent withdrawal) and continues to block other opioids from attaching to the opioid receptors.
In order for Suboxone to work, it must occupy EMPTY opiate receptors or you could suffer from precipitated withdrawal.
Other medications used to help clients:

• Varenicline (Chantix) for nicotine dependence
• Bupropion (Wellbutrin) for cravings & triggers
• Nicorette (Nicotine) for nicotine dependence
• Acamprosate (Campral) for cravings
• Pregabalin (Lyrica) for cravings & triggers
• Duloxetine (Cymbalta) for anxiety associated with early recovery
Disulfiram/Antabuse for alcohol metabolism and cocaine cravings

- **Disulfiram** (Antabuse®) is an FDA-approved sensitizing agent for alcohol dependence.

- Designed to sensitize the body to drug consumption -- causes adverse physical reaction when alcohol is consumed or otherwise administered.

- Antabuse®, a sensitizing medication, is designed for maintenance of changes, i.e., abstinence.
Treating Alcohol Dependence

Acamprosate:
- Quieting of physiological aspects of craving
- Less effective than Naltrexone in U.S. trials
- Most effective when used with people who have a minimum of 7-10 days abstinence
- Naltrexone averse patients may benefit from Acamprosate

Disulfiram:
- Strong deterrent to drinking
- Causes unpleasant physical effects when alcohol is consumed; reaction can be life threatening.
- Greatest benefit when combined with a psychosocial treatment than emphasizes medication compliance
- Can be effective as deterrent to returning to drinking
Treating Alcohol Dependence: Acamprosate (Campral)

- Acamprosate is believed to reduce the physiological aspects of craving.
- Mechanism of action is not fully understood.
  - Certain withdrawal symptoms and cravings are linked to hyper-excitability of the glutamate receptor
  - Acamprosate is thought to alleviate cravings for people in early sobriety by normalizing glutamate function
Dopamine Deficit

Parkinson-like Symptoms
- slow reaction time
- anergia

Anhedonia
- “pleasure center” dysfunction

Depression & Craving

Serotonin Deficit

OCD-like Symptoms
- obsessive thoughts
- compulsive behaviors

Impulsivity
- suicide/aggression
- susceptibility to “cue triggers”

- decreased synaptic DA
- altered DA transporter function
- postsynaptic receptor changes

- decreased synaptic 5-HT
- decreased 5-HT cell activity
- decreased synaptic DA
Stabilize Other Disorders

- Medication may serve to aid in the stabilization of the high rates of comorbid psychiatric diagnoses present in alcohol and drug use disorders.

- Presence of comorbid psychiatric disorder:
  - found in 45% of those with alcohol use disorder and 72% of those with drug use disorder
  - found in 78% of men and 86% of women with alcohol use disorder
Contextual Sensitivity
Brain Recovery: What Can Help?

Components of Recovery

- Hope
- Self-Direction
- Individualized and Person-Centered
- Empowerment
- Holistic
- Non-Linear
- Strengths-Based
- Peer Support
- Respect
- Responsibility
You don’t have to face your problems alone.
BRAIN RECOVERY WITH PROLONGED ABSTINENCE

Healthy Person

METH Abuser
1 month abstinence

METH Abuser
14 months abstinence
HEALTHY EATING PLATE

Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

The more veggies—and the greater the variety—the better. Potatoes and french fries don't count.

Eat whole grains (like brown rice, whole-wheat bread, and whole-grain pasta). Limit refined grains (like white rice and white bread).

Eat plenty of fruits of all colors.

Choose fish, poultry, beans, and nuts; limit red meat; avoid bacon, cold cuts, and other processed meats.

STAY ACTIVE!

Harvard School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publications
www.health.harvard.edu
Changes in who is starting to inject drugs

Percent of new PWID by race suggests fewer blacks, and more whites, are starting to inject drugs

- 2005:
  - White: 38%
  - Hispanic/Latino: 19%
  - Black: 38%
- 2009:
  - White: 44%
  - Hispanic/Latino: 21%
  - Black: 29%
- 2012:
  - White: 44%
  - Hispanic/Latino: 21%
  - Black: 28%
- 2015:
  - White: 54%
  - Hispanic/Latino: 21%
  - Black: 19%

Heroin use has increased more than 60% (114% in whites) in recent years. The heroin and prescription opioid epidemics could lead to new HIV outbreaks.

SOURCE: National Survey on Drug Use and Health, 2002-2013

53% of inmates in state prisons have a drug use disorder. Less than 15% receive treatment.
Types of Behavior Addictions

- Codependency
- Internet & Games
- Food & Eating
- Debit
- Gambling
- Shopping
- Sex
- Work
- Love
Youth At Risk For Substance Abuse

According to a University of Washington at Seattle research team, there are 16 factors that place adolescents at-risk for substance abuse, including abuse of prescription drugs.

**Within the Community:**
- Availability of drugs and firearms.
- Community laws and norms favorable toward drug use.
- Transitions and mobility (frequent relocation).
- Low neighborhood attachment and community disorganization.
- Extreme economic and social deprivation.

**Within the Family:**
- Family history of high-risk behavior.
- Family management problems.
- Family conflict.
- Parental attitudes favorable toward drug use and parental substance abuse.

**Within the School:**
- Early and persistent antisocial behavior.
- Academic failure in elementary school.
- Lack of commitment to school.

**Individual/Peer Group:**
- Alienation and rebelliousness.
- Friends who engage in substance abuse.
- Favorable attitudes toward the problem behavior.
- Early initiation of the problem behavior.

Source: Arkansas Prevention Needs Assessment Survey, Fall 2012, by the Arkansas Department of Human Services, Division of Behavioral Health Services, Office of Alcohol and Drug Abuse Prevention.
Spheres of Influence

Addiction Cycle
- Emotional Trigger
- Craving
- Using
- Ritual
- Guilt

Historical
- Previous History
- Expectation
- Learning

Drugs
- Genetics
- Circadian Rhythms
- Disease States
- Gender

Biological

Brain Mechanisms

Environment
- Social Interactions
- Family
- Stress
- Conditioned Stimuli

Cycle of Addiction
- Abstinence
- Penance
- Triggers
- Tempting Thoughts
- Guilt
- Defeated Thoughts
- SUDs
- Indulgence
Drugs Fool Your Brain
Impact of Drug Abuse

- attention, consciousness
- learning & memory
- critical thinking skills
- executive functioning skills
- problem solving skills, goal setting, motivation
- social skills & life skills
Treatment Implications
DSM-5 and SUD

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), no longer uses the terms substance abuse and substance dependence, rather it refers to substance use disorders, which are defined as mild, moderate, or severe to indicate the level of severity, which is determined by the number of diagnostic criteria met by an individual.

http://www.samhsa.gov/disorders/substance-use
What is our goal as counselors, with a client struggling with a SUD?
The Power of Therapy
Screening and Assessment

- co-occurring MH & SU/AB disorders
- trauma (PTSD, TBI)
- addictive behaviors and SUDs: what, why
- psych eval
- cultural formulation interview
- resources and supports
Treatment Planning

- determining stage of change
- case conceptualization: biopsychosocial
- case conceptualization: spiritual/emotional
- determining client’s motivation
- harm reduction versus abstinence
- relapse prevention (triggers & cravings)
- is MAT needed
Motivational Interviewing

http://neurofav.com/how-does-a-brain-work/
CBT
Motivational Enhancement Therapy
Medication Assisted Treatment