



New England (HHS Region 1)

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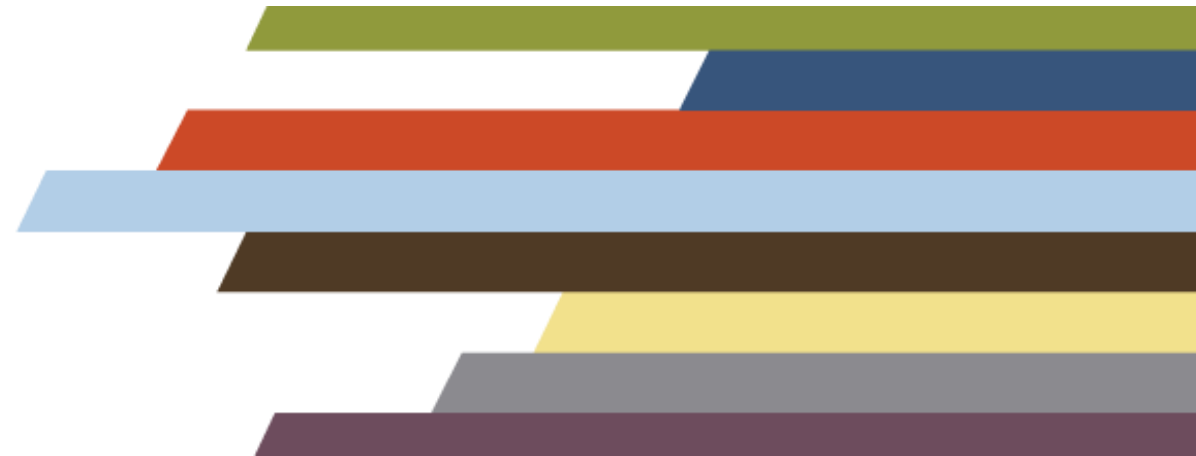
Addiction Technology Transfer Center Network  
Funded by Substance Abuse and Mental Health Services Administration

# OUD and MAT 101: Understanding the Disorder and the Medications

A Training for Multidisciplinary Addiction Professionals

Module II – Opioids 101

Revised May 2019



# Disclosures

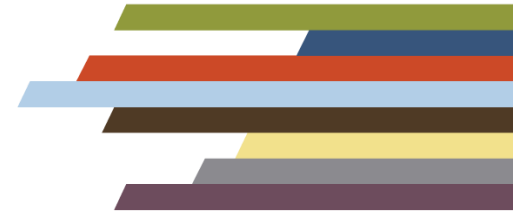
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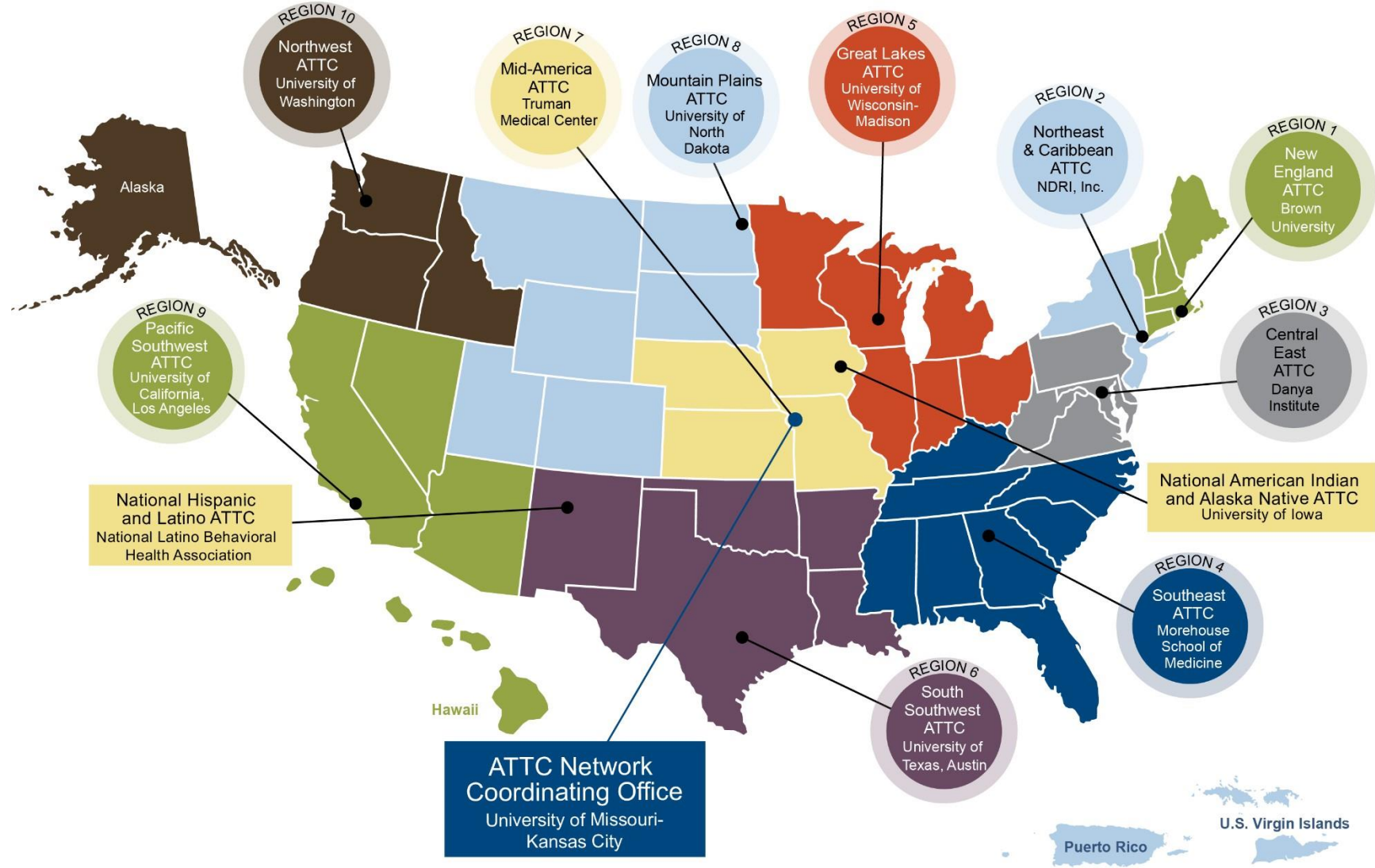




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# Goals for Module II

This module reviews the following:

- Basic Terminology
- Opioid addiction and the brain
- Descriptions of opioid agonists, partial agonists, and antagonists
- Receptor pharmacology

# Basic Terminology

- **Opiate**: A term that refers to drugs or medications that are derived from the opium poppy, such as opium, codeine and morphine.
- **Opioid**: A more general term that includes opiates as well as the synthetic drugs or medications, such as buprenorphine, methadone, meperidine (Demerol<sup>®</sup>), fentanyl—that produce analgesia and other effects similar to morphine

# Basic Terminology

- Addiction: According to ASAM, addiction is a primary, chronic disease of the brain reward system, motivation and related circuitry characterized by the inability to consistently abstain, impairment in behavior control, cravings, diminished recognition of significant problems in one's behavior and interpersonal relationships.
- Medically Supervised Withdrawal (aka: detoxification): Using an opioid agonist in tapering doses or other medications to help a client discontinue illicit or prescription opioid use.
- Receptor: Specific cell binding site or molecule: a molecule, group, or site that is in a cell or on a cell surface and binds with a specific molecule, antigen, hormone, or antibody
- Opiate Receptors: Proteins found on nerve cells in the brain and spinal cord, gastrointestinal tract and other organs of the body.
- Specific Receptor subtypes: Mu, kappa and delta naturally activated by endogenous opioid chemicals: endorphins and enkephalins.

# Basic Terminology

- Endorphin and enkephalin: The body's natural painkillers. When a person is injured, pain impulses travel up the spinal cord to the brain. The brain then releases endorphins and enkephalins. Both are morphine-like substances whose functions are similar to those of opium-based drugs.
  - ❖ Enkephalin: Either of two pentapeptides that bind to morphine receptors in the central nervous system and have opioid properties of relatively short duration. They block pain signals in the spinal cord.
  - ❖ Endorphin: Any of a group of peptide hormones that bind to opiate receptors and act as neurotransmitters. Endorphins reduce the sensation of pain and affect emotions and are thought to block pain principally at the brain stem.

# Basic Terminology

- Tolerance: The loss of or reduction in the normal response to a drug or other agent, following use or exposure over a prolonged period.
- Withdrawal: A period during which somebody dependent on a drug or other addictive substance stops taking it, causing the person to experience painful or uncomfortable symptoms.



# Basic Terminology

- Agonist: A chemical that binds to a receptor and activates the receptor to produce a biological response.
- Partial Agonist: A compound which binds to a receptor but is not successful at facilitating the same level of reaction as a full agonist at the same receptor site or puts out only a portion of the action put out by the endogenous neurotransmitter which it imitates.
- Antagonist: A substance that tends to nullify the action of another, as a drug that binds to a cell receptor without eliciting a biological response, blocking binding of substances that could elicit such responses.
- Opioid Use Disorder (OUD): A disorder characterized by the loss of control of opioid use, risky opioid use, impaired social functioning, tolerance and withdrawal.

# Basic Terminology

- Recovery: A process of change through which individuals improve their health and wellness, live self-directed lives and strive to reach their potential.
- Relapse: A process in which a person with OUD who has been in remission experiences a return of symptoms and/or loss of remission.
- Remission: A medical term meaning a disappearance of signs and symptoms of a disease. It's an essential element of recovery.
- Opioid Misuse: The use of prescription opioids in any way other than as directed by the prescriber; the use of any opioid in a manner, situation, amount or frequency that can cause harm to self or others.
- Return to Opioid Use: one or more instances of opioid misuse without the return of symptoms. May lead to a relapse.

# Basic Terminology

- Maintenance Treatment: Providing medications to achieve and sustain clinical remission of s/sx of OUD and support the individual process of recovery without a specific endpoint.
- OBOT: Office-Based Opioid Treatment.
- OTP: Opioid Treatment Program (Methadone Clinic, but also prescribing Buprenorphine).
- Induction: Process of initial dosing with medication until the person reaches a state of stability; aka initiation.

# Basic Terminology

- Abuse Liability: the likelihood that a medication with CNS activity will cause desirable psychological effects (euphoria, mood changes, etc.) that promote potential misuse.
- Bioavailability: Proportion of medication administered that reaches the bloodstream.
- Cross-tolerance: Potential for people tolerant to one opioid to be tolerant to another.
- Dissociation: Rate at which a drug uncouples from the receptor. The longer the rate, the longer the duration of action.
- Half-life: Rate of removal of a drug from the body. One half-life removes 50% from the plasma. After a drug is stopped, it takes 5 half-lives to remove about 95% from the plasma. If a drug is continued, it takes about 5 half-lives for a drug to reach steady-state concentrations in the plasma.

# Basic Opioid Facts

- Description: Opium-derived, or synthetics which relieve pain, produce morphine-like addiction, and relieve withdrawal from opioids
- Medical Uses: Pain relief, cough suppression, diarrhea
- Methods of Use: Intravenously injected, smoked, snorted, or orally administered

# Basic Opioid Facts

- When Opiate Receptors are activated, they reduce the perception of pain and produce a sense of well-being.
- They can also cause drowsiness, mental confusion, nausea and constipation.
- With repeated illicit use, the production of endogenous opioids is inhibited and atrophies.
- With repeated use, tolerance sets in which results in need for more of the drug to achieve the desired effect. Some deaths due to lapse/relapse are related to tolerance; the user's tolerance decreased during recovery.

## Opiates Act on Many Places in the Brain and Nervous System

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

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

# Opioid Agonists

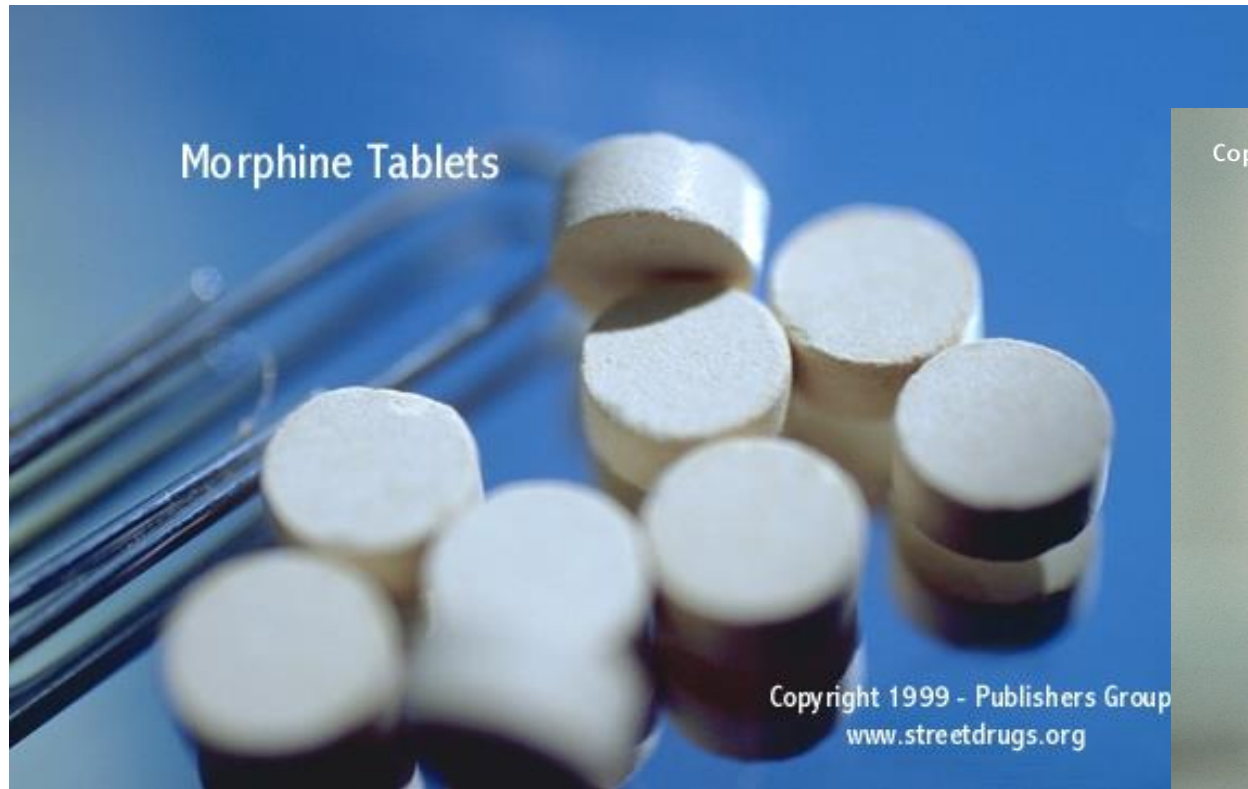
- Natural derivatives of opium poppy
  - ❖ Opium
  - ❖ Morphine
  - ❖ Codeine



# Opium



# Morphine

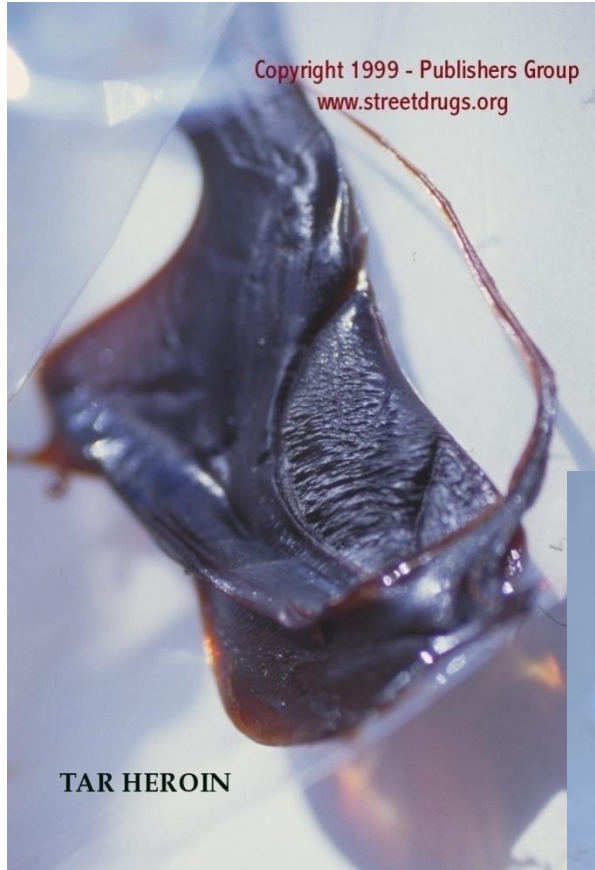


(www.streetdrugs.org)

# Opioid Agonists

- Semi-synthetics: Derived from chemicals in opium
  - ❖ Diacetylmorphine – Heroin
  - ❖ Hydromorphone – Dilaudid<sup>®</sup>
  - ❖ Oxycodone – Percodan<sup>®</sup>, Percocet<sup>®</sup>
  - ❖ Hydrocodone – Vicodin<sup>®</sup>

# Heroin



# BAYER

## PHARMACEUTICAL PRODUCTS.

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# ASPIRIN

The substitute for the Salicylates, agreeable of taste, free from unpleasant after-effects.

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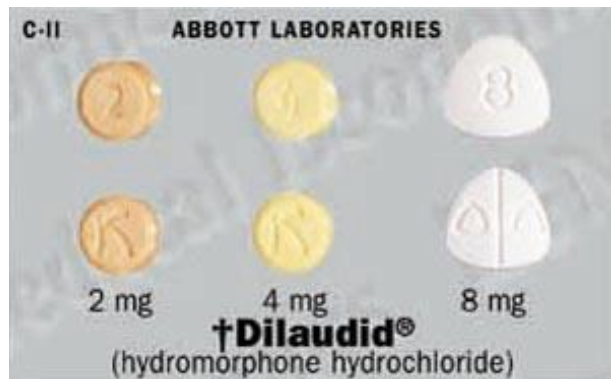
Write for literature to

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SOLE AGENTS

# Opioid Agonists



# Opioid Agonists

- Synthetics
  - ❖ Propoxyphene – Darvon<sup>®</sup>, Darvocet<sup>®</sup>
  - ❖ Meperidine – Demerol<sup>®</sup>
  - ❖ Fentanyl citrate – Fentanyl<sup>®</sup>
  - ❖ Methadone – Dolophine<sup>®</sup>
  - ❖ Levo-alpha-acetylmethadol – ORLAAM<sup>®</sup>

# Methadone



# Fentanyl



# Darvocet



([www.methadoneaddiction.net/m-pictures.htm](http://www.methadoneaddiction.net/m-pictures.htm))



# What is Fentanyl?

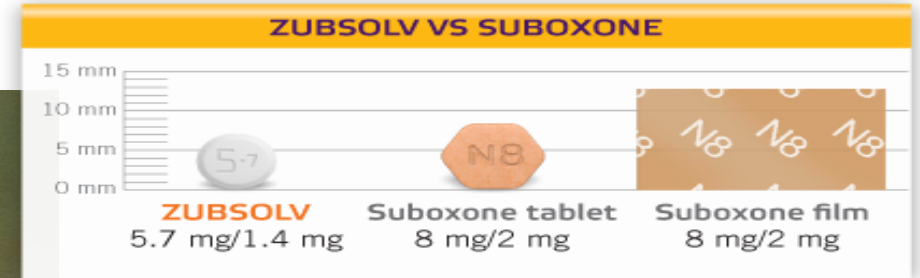


- Pharmaceutical fentanyl is a synthetic opioid pain reliever, approved for treating severe pain, typically advanced cancer pain. It is 50 to 100 times more potent than morphine. It is prescribed in the form of transdermal patches or lozenges and can be diverted for misuse and abuse in the United States.
- However, most recent cases of fentanyl-related harm, overdose, and death in the U.S. are linked to illegally made fentanyl. It is sold through illegal drug markets for its heroin-like effect. It is often mixed with heroin and/or cocaine as a combination product—with or without the user's knowledge—to increase its euphoric effects.

# Opioid Partial Agonists

- Buprenorphine – Buprenex<sup>®</sup>, Suboxone<sup>®</sup>, Subutex<sup>®</sup>
- Pentazocine – Talwin<sup>®</sup>

# Buprenorphine/Naloxone Combination and Buprenorphine Alone



Available in 2, 4, 8 and 12 mgs.

# Opioid Antagonists

- Naloxone – Narcan®
- Naltrexone – ReVia®, Trexan®
- Vivitrol



# DSM 5 Criteria for Substance Use Disorder

- Substance use disorders span a wide variety of problems arising from substance use, and cover 11 different criteria:
  - ❖ Taking the substance in larger amounts or for longer than the you meant to
  - ❖ Wanting to cut down or stop using the substance but not managing to
  - ❖ Spending a lot of time getting, using, or recovering from use of the substance
  - ❖ Cravings and urges to use the substance
  - ❖ Not managing to do what you should at work, home or school, because of substance use
  - ❖ Continuing to use, even when it causes problems in relationships



# DSM 5 Criteria, Continued

- ❖ Giving up important social, occupational or recreational activities because of substance use
  - ❖ Using substances again and again, even when it puts the you in danger
  - ❖ Continuing to use, even when the you know you have a physical or psychological problem that could have been caused or made worse by the substance
  - ❖ Needing more of the substance to get the effect you want (tolerance)
  - ❖ Development of withdrawal symptoms, which can be relieved by taking more of the substance.
- The DSM 5 allows clinicians to specify how severe the substance use disorder is, depending on how many symptoms are identified. Two or three symptoms indicate a mild substance use disorder, four or five symptoms indicate a moderate substance use disorder, and six or more symptoms indicate a severe substance use disorder. Clinicians can also add “in early remission,” “in sustained remission,” “on maintenance therapy,” and “in a controlled environment.”

# Opioids, Opioid Use Disorder and the Current Epidemic in Massachusetts

Symptoms of Substance Use Disorder	Cluster
<ol style="list-style-type: none"><li>1. Uses more than intended</li><li>2. Efforts to control or cut back were unsuccessful</li><li>3. Large amounts of time spent obtaining, using or recovering from use</li><li>4. Cravings (the presence of a strong desire to use)</li></ol>	Impaired control
<ol style="list-style-type: none"><li>5. Recurrent use resulting in problems at work, home or school</li><li>6. Continued use despite social or interpersonal problems related to use.</li><li>7. Curtailing important activities in favor of using</li></ol>	Social Impairment
<ol style="list-style-type: none"><li>8. Use despite hazardous outcomes</li><li>9. Continued use despite knowledge that it is causing persistent physical or psychological problems</li></ol>	Risky Use
<ol style="list-style-type: none"><li>10. Tolerance or a need for increased amounts</li><li>11. Withdrawal symptoms</li></ol>	Pharmacological Criteria

# Opioids and the Brain: Pharmacology and Half-Life



# Opioid Agonists: Pharmacology

- Stimulate opioid receptors in central nervous system & gastrointestinal tract
- Analgesia – pain relief (somatic & psychological)
- Antitussive action – cough suppression
- Euphoria, stuporousness, “nodding”
- Respiratory depression



# Opioid Agonists: Pharmacology

- Pupillary constriction (miosis)
- Constipation
- Histamine release (itching, bronchial constriction)
- Reduce libido
- Tolerance, cross-tolerance
- Withdrawal: acute & protracted



# Possible Acute Effects of Opioid Use

- Surge of pleasurable sensation = “rush”
- Warm flushing of skin
- Dry mouth
- Heavy feeling in extremities
- Drowsiness
- Clouding of mental function
- Slowing of heart rate and breathing
- Nausea, vomiting, and severe itching

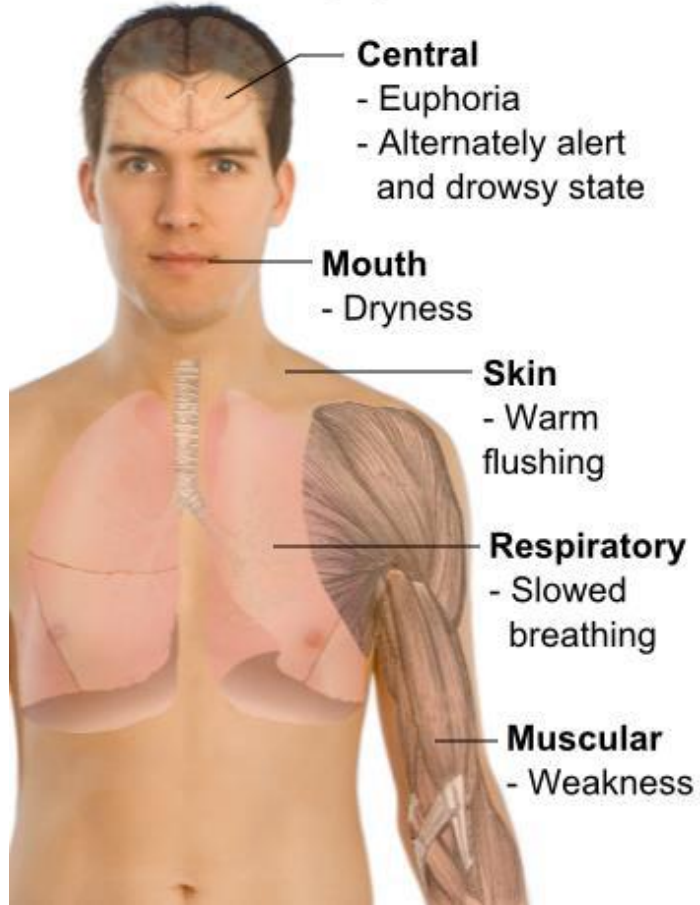
# Consequences of Opioid Use

(Not an exhaustive list)

- Addiction
- Overdose
- Death
- Use related (Hep B, C, D, HIV infection, malnutrition)
- Negative consequences from injection:
  - ❖ Infectious diseases (e.g., HIV/AIDS, Hepatitis B and C)
  - ❖ Collapsed veins
  - ❖ Infection of heart lining and valves
  - ❖ Arthritis and other rheumatologic problems
  - ❖ Bacterial infections
  - ❖ Abscesses

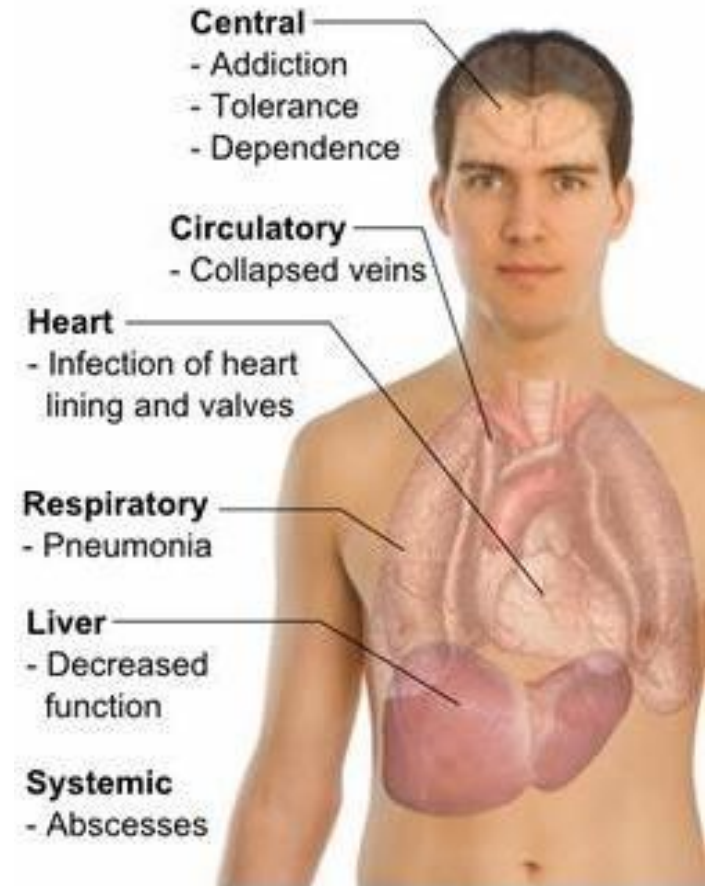
# Short Term Effects

Short-term effects of Heroin



# Long Term Effects

Long-term effects of Heroin



# Abscesses from IV Use



# Heroin Withdrawal Syndrome

- Intensity varies with level & chronicity of use
- Cessation of opioids causes a rebound in function altered by chronic use
- First signs occur shortly before next scheduled dose
- Duration of withdrawal is dependent upon the half-life of the drug used:
  - ❖ Peak of withdrawal occurs 36 to 72 hours after last dose
  - ❖ Acute symptoms subside over 3 to 7 days
  - ❖ Protracted symptoms may linger for weeks or months

# Opioid Withdrawal Syndrome

## Acute Symptoms

- Pupillary dilation
- Lacrimation (watery eyes)
- Rhinorrhea (runny nose)
- Muscle spasms (“kicking”)
- Yawning, sweating, chills, gooseflesh
- Stomach cramps, diarrhea, vomiting
- Restlessness, anxiety, irritability



# Opioid Withdrawal Syndrome

## Protracted Symptoms

- Deep muscle aches and pains
- Insomnia, disturbed sleep
- Poor appetite
- Reduced libido, impotence, anorgasmia
- Depressed mood, anhedonia
- Drug craving and obsession

# Physical Signs of W/D and Time to Onset

Stage	Grade	Physical Signs and Symptoms
<u>Early Withdrawal</u> : Short-acting opioids: 8-24 hours after last use. Long-acting opioids: up to 36 hours after last use.	1	Lacrimation, rhinorrhea or both, Diaphoresis, yawning, restlessness, insomnia.
<u>Early Withdrawal</u> : (see above)	2	Dilated pupils, Piloerection, Muscle twitching, Myalgia, Arthralgia, Abdominal pain
<u>Fully-developed Withdrawal</u> : Short-acting opioids: 1-3 days after last use. Long-acting opioids: 72-96 hours after last use.	3	Tachycardia, Hypertension, Tachypnea, Fever, Anorexia or nausea, Extreme restlessness.
<u>Fully-developed Withdrawal</u> : (see above)	4	Diarrhea, vomiting or both, Dehydration, Hyperglycemia, Hypotension, Curled-up position.

Total duration of withdrawal:

Short-acting opioids: 7-10 days Long-acting opioids: 14 days or more

## Opioid Overdose: Risk, Prevention, Identification, and Response

### Overdose risk

- Using heroin (possibly mixed with illicitly manufactured fentanyl or fentanyl analogs)
- Using prescription opioids that were not prescribed
- Using prescription opioids more frequently or at higher doses than prescribed
- Using opioids after a period of abstinence or reduced use (e.g., after medically supervised withdrawal or incarceration)
- Using opioids with alcohol, benzodiazepines, or both

### Overdose prevention

- Don't use opioids that were not prescribed.
- Take medications only as prescribed.
- Don't use drugs when you are alone.
- Don't use multiple substances at once.
- Have naloxone available and make sure others know where it is and how to use it.
- Use a small "test dose" if returning to opioid use after a period of abstinence, if the substance appears altered, or if it has been acquired from an unfamiliar source. Beware: This doesn't guarantee safety; illicitly manufactured fentanyl or other substances may be present in the drug, and any use may be fatal.

### Overdose identification

- Fingernails or lips are blue or purple.
- Breathing or heartbeat is slow or stopped.
- The person is vomiting or making gurgling noises.
- The person can't be awakened or is unable to speak.

### Overdose response

- Call 9-1-1.
- Administer naloxone (more than one dose may be needed to restore adequate spontaneous breathing).
- Perform rescue breathing. If certified to provide cardiopulmonary resuscitation, perform chest compressions if there is no pulse.
- Put the person in the "recovery position," on his or her side and with the mouth facing to the side to prevent aspiration of vomit, if he or she is breathing independently.
- Stay with the person until emergency services arrive. Naloxone's duration of action is 30–90 minutes. The person should be observed after this time for a return of opioid overdose symptoms.

# Treatment of Opioid Addiction

# Treatment Options for Opioid-Addicted Individuals

BIOPSYCHOSOCIALFAMILIALECONOSPIRITUAL  
DISORDER/DISEASE

- Behavioral treatments educate patients about the conditioning process and teach relapse prevention strategies.
- Medications such as Methadone, Naltrexone and Buprenorphine operate on the opioid receptors to relieve craving.
- ***Combining the two types of treatment enables patients to stop using opioids and return to more stable and productive lives.***

# Module II – Summary

- Opioids attach to receptors in the brain, causing pleasure. After repeated opioid use, the brain becomes altered, leading to tolerance and withdrawal.
- Medications operating through the opioid receptors prevent withdrawal symptoms and help the person function normally.
- Behavioral treatment can also address cravings that arise from environmental cues.