Is Addiction About Drugs? Or Is It More About Brains?

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Fox Valley Healthcare Emergency Readiness Coalition
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Addiction Medicine Fellowship Program
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## Disclosures

<table>
<thead>
<tr>
<th>Michael M. Miller, MD, Consulting, LLC</th>
<th>Expert Witness consultations, consultations to federal and state agencies, consultations to health systems and other provider organizations, et al.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammon Labs</td>
<td>Consulting and outreach re: clinical urine drug testing</td>
</tr>
<tr>
<td>Addictive Disease Consultations</td>
<td>Private Practice of Addiction Medicine, specializing in the evaluation, treatment and case management of licensed professionals under monitoring and evaluation/treatment of family members of health professionals</td>
</tr>
</tbody>
</table>
Psychiatry (MD, DO)

(General, Adult, Child/Adolescent, Geriatric, Forensic, Addiction)

A medical specialty of physicians devoted to the diagnosis and treatment of mental disorders, using psychotherapy, medications, and other somatic therapies
Clinical Psychology (PhD, PsyD)

A mental health discipline in which individuals with a doctoral degree in psychology from an accredited professional school of psychology (the scientific study of the behavior of individuals and their mental processes) evaluate and treat children, adolescents, and adults using clinical interviews, psychological testing, and various individual, group, couples and family therapies.
Addiction Medicine (MD, DO)

(Certified by ABPM, ABAM, ASAM, ABPN, or the AOA)

The specialty of medicine devoted to diagnosis, treatment, prevention, education, epidemiology, research, and public policy advocacy regarding addiction and other substance-related health conditions
Physician Specialty Associations

- American Osteopathic Academy of Addiction Medicine -- 1976
- American Academy of Addiction Psychiatry -- 1987
The newest multispecialty subspecialty certification program in the American Board of Medical Specialties:
www.theabpm.org
Addiction Medicine (MD, DO)  
(Certified by ABPM, ABAM, ASAM, ABPN, or the AOA)
Certification for RNs: C.A.R.N.
The Title You Thought You’d Get

• American, Wisconsin, and the Fox Valley have a Drug Problem
The More Appropriate Titles

• American, Wisconsin, and the Fox Valley have a Drug and Alcohol and Tobacco and ENDS Problem...and a Gambling Problem too!
• American, Wisconsin, and the Fox Valley have an Opioid Prescribing and Opioid Use and Opioid Overdose and Opioid Mortality Problem
• American, Wisconsin, and the Fox Valley have a Problem in Access to High Quality Addiction Treatment, Prescribers of Addiction Treatment Medications, and Comprehensive Multimodality Pain Treatment
  • There is a workforce shortage
  • There is a major shortage of physician specialists
  • There is a health care delivery system misalignment of resources
The Title You Got

Is Addiction About Drugs?
Or Is It More About Brains?
Principles

• Substance Use and Addiction are important conditions -- but they are not the same.
• “Using a lot” and “Using often” are not what makes a person someone with addiction.
• The difference between a person with addiction and a person who uses, is a qualitative, not a quantitative, difference: it’s about what happens when the person uses, what the drug does to the person’s brain, and what the person’s brain does to affect the person’s behavior.
Addiction is only one of the Substance-Related Disorders

- Addiction (formerly Substance Dependence)
- Problem Use (formerly Substance Abuse)
- Intoxication States
- Withdrawal States
- Substance-Induced Medical Problems
- Substance-Induced Psychiatric Problems
- Health Problems linked to Secondary Use
- Codependency and ACOA Syndromes
Principles

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Principles

• Addiction is a health problem
  • Not just a social problem
  • Not just a moral problem
  • Not just a criminal justice problem

• Addiction is not a desired state
Principles

• Substance use can have health implications
  • You don’t have to have addiction to have your health impacted, or the public health impacted
• “Passive use” can have health implications
What is Addiction?
American Society of Addiction Medicine • April 2011

• Definition of Addiction:
  “Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.”
Definition of Addiction
American Society of Addiction Medicine • April 2011

“Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.”
The DSM system of diagnosis does things differently

• Everything is substance-specific
• They have gotten rid of the terms “abuse” and “dependence”
• They consider that there is a smooth continuum between “mild” and more severe forms of SUD

• DSM “Addiction and Related Disorders” chapter:
  • Substance Use Disorders
  • Substance Related Disorders
    • Substance Intoxication, Substance Withdrawal, Substance-Induced Disorders
    • Not-substance conditions (Gambling Disorder)
Substances (categorized by “drug class”)

- Alcohol
- Sedatives (benzos, barbs, propofol, others including GHB)
- Cocaine
- Stimulants (methamphetamine, psychostimulants, MDMA, PEAs)
- Opioids (heroin, Rx drugs, methadone, fentanyl & analogs, kratom)
- Nicotine (tobacco, ‘products’, ENDS)
- Cannabinoids (THC, synthetics, CBD)
- Hallucinogens (LSD, psilocybin, MDMA/PEAs, Salvia divinorum)
- Inhalants (nitrous oxide, hydrocarbons, fluorocarbons)
- “Club Drugs” (cross pharmacological classes)
“Gateway Drugs”

- Alcohol
- Nicotine
- Pot
- Pills

- availability, legality, affordability
- low perceived risk-of-harm
- recall that ‘club drugs’ are perceived as new / fun / safe
NIDA has great information for you

• www.drugabuse.gov gets you there easier than nih.nida.gov

• [https://www.drugabuse.gov/related-topics/drugs-brain](https://www.drugabuse.gov/related-topics/drugs-brain)

• Great info on cannabis effects on the brain, and brain effects of other drugs by drug class

But there is a different way to look at it

• It’s not just about drugs
  • Many more people use drugs than have a problem with their use
  • “Drug Abuse” is a bit more common than “Drug Addiction”
  • There must be something other than the intrinsic action of the drug that results in a person developing addiction

• And...addiction isn’t about “people behaving badly”
• Addiction is about persons whose brains function differently than people who don’t have addiction
Addiction

Results from *interactions among*

• Agents
• Biology
• Context
  • Substances
  • Hosts
  • Environments
Addiction occurs as a result of interactions among:

• **Agent factors** (substances)
• **Host factors** (genetics, vulnerabilities, comorbidities)
• **Environmental factors** (culture, neighborhood, household/family)
Host Factors

- Vulnerabilities – impulsive, risk-taking, harm-avoidant
- Co-morbidities – psychiatric conditions, esp. PTSD
- Inherited differences in metabolism
- Inherited differences in response to intoxicating effects
- Inherited differences in cue response and inherent ability to control use
- Developmental status of the brain/psychology
Host Factors

• Genetic Risk (Family History, LR)
  60% of the likelihood of developing addiction is due to your GENES!

• Personality Traits

• Co-morbidities
  A major factor in treatment response for addiction treatment is the presence of co-occurring psychiatric disorder and participating in/response to psychiatric treatments
Variance of Risk

Genetics: 60%
Environment: 40%

(Heterogeneous and Polygenic)
And you thought addiction was about drugs!

• It’s not about drugs (agents alone)
• It’s about brains (hosts/vulnerabilities/resiliencies)

• “Drug Control” won’t control addiction by itself.
• We must repair unhealthy brains and prevent vulnerable brains from undergoing neuroplasticity into unhealthy brains
• And we should not ignore the role of communities, relationships, connectedness, values, and “where people find meaning in life”
Opioids don’t cause opioid addiction

• Addiction arises due to *interactions* among agents (e.g., opioids), *vulnerable hosts (persons with increased genetic risks or psychiatric comorbidities)*, and environments (stresses, drug availability, cultural issues).
HEROIN

• The word strikes fear into many.
• The word is exotic: something from a far-away place, something involving people from far away from here, people not like us.
• It’s a *bad thing* and it involves *bad people* (Schedule I, C-I)
• **But it’s not these things.**
• It is 1,6 diacetyl morphine. It’s an analgesic.
• And **IT’S HERE.**
HEROIN

• IT’S NOT THE GATEWAY. IT’S THE ENDPOINT.
• The initial gateway: tobacco.
• The immediate gateway: prescription drugs.
• The source: friends and family.
• The “stash”: the family medicine cabinet.
• The transition: the price.
• The results: addiction, infections, overdoses, death.
The Discussion:

• It must include PRESCRIPTION PAIN KILLERS.
• It must include SUPPLIES
  • Origin = prescribers
  • Disposition = safe storage and safe disposal
  • Origin = drug labs in China making synthetic fentanyl and analogs
  • Intervention = still a role for interdiction and supply control

• The solution:
  • It must include ALL of us.
Who are we?

• Government
  • Local, state, federal
• Individuals
  • Civic leaders
• The faith community
• The educational community
• The healthcare community
Who are we?

• Prescribers
• Patients
• Youth
• Parents
• Grandparents
• Law Enforcement – police, prosecutors, judges, jails
• The Media – information, attitudes
• Addiction Treatment professionals and agencies
The Irony...

• Addiction is **not** about DRUGS!
• Addiction is about BRAINS!
• It’s not about the quantify/frequency of use
• It’s about the
  • Quality of use
  • Pattern of use
  • Relationship the person has to ‘their drug’
• It’s about how the person with addiction is changed when using
The Physiology and Neuroanatomy of the Addicted Brain

Developmental Neuroanatomy and its Relevance to Addiction
The Physiology of the Addicted Brain

• We used to talk about the Neuroanatomy of Addiction, but when we discussed ‘The Reward Center’ we really were talking about the neuroanatomy of Reward/Intoxication/Withdrawal

• We used to talk about Pharmacotherapy in Addiction, but that was a talk about psycho-pharmacology (the medication management of psychiatric complications/co-morbidities)
The Physiology of the Addicted Brain

• Now we can truly talk about the Neuroanatomy of Addiction, and we can talk about treatment as including not just psychosocial therapies ("drug rehab"), but also the pharmacotherapy of Addiction itself.
Addiction ‘Resides’ in the Orbitofrontal Cortex (OFC) and in connections between the Nuc. Acc. et al.

• Addiction is use despite adverse consequences, returning to use after periods of abstinence even with previous life catastrophes, inability to consistently control use, cognitive preoccupation, plus conscious and unconscious craving
• It involves memory, judgment, ‘executive functions’ of planning and deciding to defer gratification
• Many of these are Frontal Lobe functions
The Physiology of Addiction

Certain substances have the ability to interact with the brain’s Reward Circuitry and are thus euphoriants; they are reinforcing, and, in lab animals, self-reinforcing. They act first by being external ligands for neuro-transmitter receptors, or by causing release of (or otherwise altering levels of) neuro-transmitters.

They hijack the reward system, and the individual compulsively pursues these rewards instead of natural rewards.
Natural Rewards

Food
Water
Sex
Nurturing
Addiction 'Resides' in the Orbitofrontal Cortex (OFC) and in connections between OFC et al.
• The site of acute action for euphoriant is the nucleus accumbens (an oversimplified)

• The site of action for the chronic, recurrent, relapsing exposure to euphoriant—as is see in addiction—is the interplay among the Nuc Acc, the hippocampus (memory; recalling past experiences), the amygdala (motivation, drive, drug hunger/craving; drug seeking/use), and the frontal lobes (judgment/evaluation, planning, delay of gratification, inhibition of urges/impulses)
Non Addicted Brain

Addicted Brain
The Physiology of Addiction

• Once the Reward Circuitry is turned on, there are changes in related brain areas or neuronal circuits, and these result in the characteristic manifestations of addiction [altered memory of past intoxication experiences, altered cue response, changes in motivation so that ‘the drug’ (can be a substance, or a pathologically rewarding activity) becomes ‘the salient reinforcer,’ replacing other healthy reward]. All this contributes to preoccupation and loss of control.
The Physiology of Addiction

- Changes in **frontal lobe function** (executive functioning; the inhibition of impulses to use) are key: the brain fails in efforts to inhibit the drive to obtain/use the drug to create ‘the high’.

- **Impairment in control** and **preoccupation** are the key behavioral/cognitive characteristics of addiction, and have an anatomical/physiological substrate in the brain.
The ASAM Definition of Addiction:
The Pathological Pursuit of Reward or Relief

West Coast Symposium on Addictive Disorders (WCSAD)
June 1, 2012
Addiction is not...

• Just a social problem
• Just a criminal problem
• Just a moral problem

• Frequent intoxication, heavy use, having fun
• High frequency / high quantity use

• Physical Dependence
Addiction is...

• A BRAIN DISEASE

• A primary, relapsing and remitting CHRONIC DISEASE....

• A PEDIATRIC DISEASE....
What is Addiction?

American Society of Addiction Medicine • April 2011

Definition of Addiction:
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“Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.”
Upward Progression of Illness: Downward Spiral

Addiction & Trauma (constriction)

Recovery & Healing (expansion)
Atrophy

• Of social network
  • People...

• Of activities / interests
  • Places, Things

• Of emotions
  • Flatness, less expressive, dysthymic / alexithymic

• Of rewards
  • Salience
Upward Narrowing / Atrophy of Interests Activities / Rewards

Addiction & Trauma (constriction)

Recovery & Healing (expansion)
How to come out of the depths? How to RECOVER?

• Re-people-ization
  • AA
  • Sponsor
  • Church
  • Social clubs
  • Activities with others
  • Family

• Professional Treatment (group therapy, meet others)

• Re-Connectedness
ASAM Public Policy Statement: Definition of Addiction (Long Version)

Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Addiction affects neurotransmission and interactions within reward structures of the brain, including the nucleus accumbens, anterior cingulate cortex, basal forebrain and amygdala, such that motivational hierarchies are altered and addictive behaviors, which may or may not include alcohol and other drug use, supplant healthy, self-care related behaviors.
ASAM Public Policy Statement: Definition of Addiction (Long Version)

Addiction also affects *neurotransmission and interactions between cortical and hippocampal circuits and brain reward structures*, such that the memory of previous exposures to rewards (such as food, sex, alcohol and other drugs) leads to a biological and behavioral response to external cues, in turn triggering craving and/or engagement in addictive behaviors.
The neurobiology of addiction encompasses more than the neurochemistry of reward.¹

The frontal cortex of the brain and underlying white matter connections between the frontal cortex and circuits of reward, motivation and memory are fundamental in the manifestations of altered impulse control, [and] altered judgment....
...and the dysfunctional pursuit of rewards (which is often experienced by the affected person as a desire to “be normal”) seen in addiction--despite cumulative adverse consequences experienced from engagement in substance use and other addictive behaviors.
The frontal lobes are important in inhibiting impulsivity and in assisting individuals to appropriately delay gratification. When persons with addiction manifest problems in deferring gratification, there is a neurological locus of these problems in the frontal cortex.
Frontal lobe morphology, connectivity and functioning are still in the process of maturation during adolescence and young adulthood, and early exposure to substance use is another significant factor in the development of addiction. Many neuroscientists believe that developmental morphology is the basis that makes early-life exposure to substances such an important factor.
New Understandings about Addiction

• Addiction is a disease of the brain

• Dopamine in the VTA and the Nucleus Accumbens is important in Drug Reward (the ‘Reward Pathway’ of the MFB etc.)

• BUT we now understand that the Nuc Acc is where REWARD HAPPENS, whereas ADDICTION resides in the OFC and in connections among the Nuc Acc, the OFC, the hippocampus and the amygdala
The Physiology of Addiction

Certain substances have the ability to interact with the brain’s Reward Circuitry and are thus euphoriants; they are reinforcing, and, in lab animals, self-reinforcing. They act first by being external ligands for neuro-transmitter receptors, or by causing release of (or otherwise altering levels of) neuro-transmitters.

They *hijack the reward system*, and the individual compulsively pursues these rewards instead of natural rewards.
Genetic factors account for about half of the likelihood that an individual will develop addiction.

Environmental factors interact with the person’s biology and affect the extent to which genetic factors exert their influence. Resiliencies the individual acquires (through parenting or later life experiences) can affect the extent to which genetic predispositions lead to the behavioral and other manifestations of addiction. Culture also plays a role in how addiction becomes actualized in persons with biological vulnerabilities to the development of addiction.
Environmental / Cultural Factors

• Availability
• Social Norms for/against
  – Indoor smoking bans
  – MADD
  – “Those Who Host Lose the Most”
• Perceived Harm
• Consequences (legal status; drug-free schools)

• “Peer Pressure”
• Siblings
• Parents
  – Their Use
  – Their Attitudes (perceived harm)
  – Their Rules/Consequences
    (parents are ‘the antidrug’)
Other factors that can contribute to the appearance of addiction, leading to its characteristic bio-psycho-socio-spiritual manifestations, include:

- The presence of an underlying biological deficit in the function of reward circuits, such that drugs and behaviors which enhance reward function are preferred and sought as reinforcers;
- The repeated engagement in drug use or other addictive behaviors, causing neuroadaptation in motivational circuitry leading to impaired control over further drug use or engagement in addictive behaviors;
- Cognitive and affective distortions, which impair perceptions and compromise the ability to deal with feelings, resulting in significant self-deception;
“...neuroadaptation in motivational circuitry leading to impaired control over further drug use or engagement in addictive behaviors....”

[O’Brien: “addiction = neuroplasticity”]
changes in motivation/control
changes in cue responsiveness

Other factors that can contribute to the appearance of addiction, leading to its characteristic bio-psycho-socio-spiritual manifestations, include:

• Disruption of healthy social supports and problems in interpersonal relationships which impact the development or impact of resiliencies;
• Exposure to trauma or stressors that overwhelm an individual’s coping abilities;
• Distortion in meaning, purpose and values that guide attitudes, thinking and behavior;
• Distortions in a person’s connection with self, with others and with the transcendent (referred to as God by many, the Higher Power by 12-steps groups, or higher consciousness by others); and
• The presence of co-occurring psychiatric disorders in persons who engage in substance use or other addictive behaviors.
Griffith Edwards (1976)

Edwards (Griffith), Gross (Milton)
“Alcohol dependence: provisional description of a clinical syndrome”
Griffith Edwards (1976)

“...Awareness of ‘loss of control’ is said to be crucial to understanding abnormal drinking....

“Control is probably best seen as variably and intermittently impaired rather than ‘lost’.”
Although some believe that the difference between those who have addiction, and those who do not, is the *quantity or frequency* of alcohol/drug use, engagement in addictive behaviors (such as gambling or spending)³, or exposure to other external rewards (such as food or sex)…,
Persistent risk and/or recurrence of relapse, after periods of abstinence, is another fundamental feature of addiction. This can be triggered by exposure to rewarding substances and behaviors, by exposure to environmental cues to use, and by exposure to emotional stressors that trigger heightened activity in brain stress circuits.⁴
In addiction there is a significant impairment in executive functioning, which manifests in problems with perception, learning, impulse control, compulsivity, and judgment. People with addiction often manifest a lower readiness to change their dysfunctional behaviors despite mounting concerns expressed by significant others in their lives; and display an apparent lack of appreciation of the magnitude of cumulative problems and complications.
The still developing frontal lobes of adolescents may both compound these deficits in executive functioning and predispose youngsters to engage in “high risk” behaviors, including engaging in alcohol, nicotine or other drug use. The profound drive or craving to use substances or engage in apparently rewarding behaviors, which is seen in many patients with addiction, underscores the compulsive or avolitional aspect of this disease. This is the correlation with “powerlessness” over addiction and “unmanageability” of life, as is described in Step 1 of Twelve Step programs.
The emotional aspects of addiction are quite complex.

• Some persons use alcohol or other drugs or pathologically pursue other rewards because they are seeking “positive reinforcement” or the creation of a positive emotional state (“euphoria”).

• Others pursue substance use or other rewards because they have experienced relief from negative emotional states (“dysphoria”), which constitutes “negative reinforcement.”

• Beyond the initial experiences of reward and relief, there is a dysfunctional emotional state present in most cases of addiction that is associated with the persistence of engagement with addictive behaviors.
The state of addiction is not the same as the state of intoxication.

When anyone experiences mild intoxication through the use of alcohol or other drugs, or when one engages non-pathologically in potentially addictive behaviors such as gambling or eating, one may experience a “high”, felt as a “positive” emotional state associated with increased dopamine and opioid peptide activity in reward circuits. After such an experience, there is a neurochemical rebound, in which the reward function does not simply revert to baseline, but often drops below the original levels. This is usually not consciously perceptible by the individual and is not necessarily associated with functional impairments.
Over time, repeated experiences with substance use or addictive behaviors are not associated with ever increasing reward circuit activity and are not as subjectively rewarding. Once a person experiences withdrawal from drug use or comparable behaviors, there is an anxious, agitated, dysphoric and labile emotional experience, related to suboptimal reward and the recruitment of brain and hormonal stress systems, which is associated with withdrawal from virtually all pharmacological classes of addictive drugs.
While tolerance develops to the “high,” tolerance does not develop to the emotional “low” associated with the cycle of intoxication and withdrawal. Thus, in addiction, persons repeatedly attempt to create a “high”--but what they mostly experience is a deeper and deeper “low.” While anyone may “want” to get “high”, those with addiction feel a “need” to use the addictive substance or engage in the addictive behavior in order to try to resolve their dysphoric emotional state or their physiological symptoms of withdrawal.
Persons with addiction compulsively use even though it may not make them feel good, in some cases long after the pursuit of “rewards” is not actually pleasurable. Although people from any culture may choose to “get high” from one or another activity, it is important to appreciate that addiction is not solely a function of choice. Simply put, addiction is not a desired condition.
The Absinthe Drinker, Edward Degas
“Without withdrawing sympathy from the non-dependent drinker who is experiencing harm, society should be asked to realize that the person who has become dependent on alcohol is certainly ill; and the possibility of contracting this illness awaits anyone who drinks very heavily.”
An Overview of Neuroplasticity and Progression of Addiction

• Addiction begins as persons seek positive reinforcement (reward, euphoria) via exposure to intense rewards (alcohol, drugs, gambling).

• Those with a genetic predisposition experience changes in the connections from the reward circuitry to other areas (hippocampus, amygdala, frontal lobes, brain stress circuitry).

• Addiction shifts from being an episodic, sometimes impulsive pursuit of reward to a compulsive pursuit of relief. Positive reinforcement is supplanted by negative reinforcement.

• In advanced addiction, people pursue intense rewards to not feel miserable: they have become enslaved.
The qualitative ways in which the brain and behavior respond to drug exposure and engagement in addictive behaviors are different at later stages of addiction than in earlier stages, indicating progression, which may not be overtly apparent.
As addiction is a chronic disease, periods of relapse, which may interrupt spans of remission, are a common feature of addiction. It is also important to recognize that return to drug use or pathological pursuit of rewards is not inevitable.
Clinical interventions can be quite effective in altering the course of addiction. Close monitoring of the behaviors of the individual and contingency management, sometimes including behavioral consequences for relapse behaviors, can contribute to positive clinical outcomes. Engagement in health promotion activities which promote personal responsibility and accountability, connection with others, and personal growth also contribute to recovery. It is important to recognize that addiction can cause disability or premature death, especially when left untreated or treated inadequately.
As is the case with other chronic diseases, the condition must be monitored and managed over time to:

• Decrease the frequency and intensity of relapses;
• Sustain periods of remission; and
• Optimize the person’s level of functioning during periods of remission.
• In some cases of addiction, medication management can improve treatment outcomes.

• In most cases of addiction, the integration of psychosocial rehabilitation and ongoing care with evidence-based pharmacological therapy provides the best results.

• Chronic disease management is important for minimization of episodes of relapse and their impact.

• Treatment of addiction saves lives †
Targeted Therapeutic Changes in Addiction Treatment

**BEHAVIORAL CHANGES**

- Eliminate alcohol and other drug use behaviors
- Eliminate other problematic behaviors
- Expand repertoire of healthy behaviors
- Develop alternative behaviors

**BIOLOGICAL CHANGES**

- Resolve acute alcohol and other drug withdrawal symptoms
- Physically stabilize the organism
- Develop sense of personal responsibility for wellness
- Initiate health promotion activities (e.g., diet, exercise, safe sex, sober sex)
Targeted Therapeutic Changes in Addiction Treatment

<table>
<thead>
<tr>
<th>COGNITIVE CHANGES</th>
<th>AFFECTIVE CHANGES</th>
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<tbody>
<tr>
<td>• Increase awareness of illness</td>
<td>• Increase emotional awareness of negative consequences of use</td>
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<tr>
<td>• Increase awareness of negative consequences of use</td>
<td>• Increase ability to tolerate feelings without defenses</td>
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<tr>
<td>• Increase awareness of addictive disease <em>in self</em></td>
<td>• Manage anxiety and depression</td>
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<tr>
<td>• Decrease denial</td>
<td>• Manage shame and guilt</td>
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Targeted Therapeutic Changes in Addiction Treatment

SOCIAL CHANGES
• Increase personal responsibility in all areas of life
• Increase reliability and trustworthiness
• Become resocialized: reestablished sober social network
• Increase social coping skills: with spouse/partner, with colleagues, with neighbors, with strangers

SPIRITUAL CHANGES
• Increase self-love/esteem; decrease self-loathing
• Reestablish personal values
• Enhance connectedness
• Increase appreciation of transcendence

Miller, Michael M. Principles of Addiction Medicine, 1994; published by American Society of Addiction Medicine, Chevy Chase, MD
Addiction professionals and persons in recovery know the hope that is found in recovery. Recovery is available even to persons who may not at first be able to perceive this hope, especially when the focus is on linking the health consequences to the disease of addiction.
As in other health conditions, self-management, with mutual support, is very important in recovery from addiction.

Peer support such as that found in various “self-help” activities is beneficial in optimizing health status and functional outcomes in recovery. ‡
Recovery from addiction is best achieved through a combination of self-management, mutual support, and professional care provided by trained and certified professionals.
Griffith Edwards (1976)

“Doctors should be aware that not every patient who drinks too much (for whatever reason) is necessarily dependent on alcohol, and different patients need different help and treatment.”

1. **Addiction is a complex but treatable disease that affects brain function and behavior.** Drugs of abuse alter the brain’s structure and function, resulting in changes that persist long after drug use has ceased.

2. **No single treatment is appropriate for everyone.**
So, to pull it all together....
The Physiology of Addiction

Certain substances have the ability to interact with the brain’s Reward Circuitry and are thus euphoriants; they are reinforcing, and, in lab animals, self-reinforcing. They act first by being external ligands for neuro-transmitter receptors, or by causing release of (or otherwise altering levels of) neuro-transmitters.

They hijack the reward system, and the individual compulsively pursues these rewards instead of natural rewards.
The Physiology of Intoxication

This is actually quite complex. The motor components of alcohol/sedative intoxication are manifestations of actions on the cerebellum and other motor control systems. The reward components of drug-induced euphoria vary somewhat from drug to drug: the nucleus accumbens is the major locus for cocaine, the central nucleus of the amygdala more so for alcohol.
The Physiology of Withdrawal

The physiological components of withdrawal are often autonomic: changes in pulse, blood pressure, temperature, and motor components including tremor.

The rebound from the experience of emotional reward involves decreases in activity of reward systems in the nucleus accumbens and central nucleus of the amygdala, but also the recruitment of brain stress systems in the central nucleus of the amygdala and bed nucleus of the stria terminalis.
The Physiology of Addiction

- Once the Reward Circuitry is turned on, there are changes in related brain areas or neuronal circuits, and these result in the characteristic manifestations of addiction [altered memory of past intoxication experiences, altered cue response, changes in motivation so that ‘the drug’ (can be a substance, or a pathologically rewarding activity) becomes ‘the salient reinforcer,’ replacing other healthy reward]. All this contributes to preoccupation and loss of control.
Addiction is characterized by:

- Inability to consistently Abstain;
- Impairment in Behavioral control;
- Craving; or increased “hunger” for drugs or rewarding experiences;
- Diminished recognition of significant problems with one’s behaviors and interpersonal relationships; and
- A dysfunctional Emotional response.
The Physiology of Addiction

• Changes in **frontal lobe function** (executive functioning; the inhibition of impulses to use) are key: the brain fails in efforts to inhibit the drive to obtain/use the drug to create ‘the high’.

• **Impairment in control** and **preoccupation** are the key behavioral/cognitive characteristics of addiction, and have an anatomical/physiological substrate in the brain.
Thank you!

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