THE DISEASE OF ADDICTION
Mortality and morbidity attributable to use of addictive substances in the United States. 
The Association of American Physicians from 1999
60 million tobacco smokers in the U.S.

14 million dependent on alcohol

14 million users of illicit drugs

590,000 deaths can be attributed to an addictive substance in some way
NewsTimes.com

“Prescription drug use in Connecticut now kills more people under the age of 34 than car crashes”

[Therapist] has sent 30 of her patients under age 22 to in-patient treatment for opiate abuse.

“An increasing number of teens are dying from the scourge of prescription drugs, particularly opiates that mimic heroin.”
A disorder of brain reward mechanisms crucial for survival

Substance & behavioral addictions are a single disorder

pathological gambling, shopping, internet, bingeing, exercise, sex addiction
Different brain areas work together (Duh)

Reward (Nucleus Accumbens/Amygdala)

Habit (VTA)

Cognitive control (Frontal Lobe/Anterior Cingulate)
Reward centers grip attention, dominate motivation and compel behavior directed toward survival goals (Think evolution...If it feels good, it must be safe, so do it some more)

By dysregulating endogenous reward centers, addictive drugs hijack brain circuits involved in rational goal-directed behavior

Result: progressive loss of control over drug intake despite medical, interpersonal, occupational and legal hazards (Dackis, Nature Neurosci 2005)
SIDE TRACK- Here’s the thing about theories…

People say ridiculous things…. 

Rush Limbaugh 

"Obamacare is . . . the largest tax increase in the history of the world."

Facebook post

"More than 43 percent of all food stamps are given to illegals."

What’s your source!?!?!?
Study using brain scans in addicted individuals
Dopamine is the driver

(a) Cocaine inhibits monoamine reuptake

(b) Amphetamines cause monoamine release
Different effects are produced throughout the body, but Dopamine release is the constant

**Opiates:**
1. Inhibit GABA interneurons → disinhibition → DA release. Also, direct stimulation of accumbens opiate receptors

**Nicotine:**
- Binds cholinergic receptors in ventral tegmentum → DA release

**Alcohol:**
- Binds GABA$_A$ interneurons in ventral tegmentum → DA release
(Nestler, Nat Neurosci, 2005)
Ever get that feeling...

The “before” can be even better or just as good as the “during”
Dopamine activity is proportional to expectation and magnitude of future reward (“sets the gain on incentive salience attribution” and facilitates consolidation of memory traces connected to rewarding stimulus).

Study: Dopaminergic neuron activity in the addicted brain on the way to use
Dopamine activity in ventral tegmentum (VTA) plunges below baseline during craving (This is also seen if the anticipated reward is not received)

In fact: Addiction is a dopamine deficiency state

This is not the same as “craving”
Down regulation of dopamine receptors in dorsal striatum results in decreased sensitivity to natural rewards

... So, for the addict, drug use does not produce pleasure, but relieves dysphoria, anhedonia and irritability

The anterior cingulate and frontal cortex no longer exert willed control over motivation and behavior
...and here is what it looks like

http://youtu.be/r_ylVvhAZBk?t=13m35s
“The cycle of addiction becomes etched in midbrain and frontal structures that reinforce the pursuit of survival-related behaviors by dominating attention and decision-making” (Dackis, *Nature Neurosci* 2005)
Can someone have an addictive personality?

Activation of Nucleus Accumbens and Anterior Cingulate correlates with severity of craving and risk of relapse

Are there genetic influences on addiction: evidence from family, adoption and twin studies. *Addiction*

“…in favor of heritable influences on alcohol, nicotine, cannabis and other illicit drug dependence.”

“Alcoholism is familial and that having an alcoholic parent is associated with a fivefold increase in the risk of alcoholism.”
Anosognosia (denial)

Preference for immediate over delayed reward (impaired salience attribution; “temporal discounting”)

Inability to modify behavior on basis of consequences (“myopia for the future”)

Repetition of behavior in face of punishment (perseveration)

Impaired response inhibition, working memory, and set shifting (*serotonin)
Studies have shown the following to be true in adolescents

1. Higher brain DA in Nucleus Accumbens

2. Incomplete myelination of prefrontal lobes and anterior cingulate involved in self-regulation and cognitive control
What if I said, smoking cigarettes makes you dumber?

**Association between Tobacco Smoking and Cognitive Functioning in Young Adults.** *American Journal on Addiction*

“In comparison to nonsmokers, nicotine users showed **significant cognitive impairments** on sustained attention, spatial working memory, executive planning, and did not appropriately adjust behavior as a function of risk.”

“These data, using objective translational paradigms, support an association between tobacco smoking and cognitive problems in young people, with implications for such individuals and for society.”

**Cognitive Performance Profiles by Latent Classes of Drug Use.** *American Journal on Addiction*

“There was evidence to suggest that **substance use in itself was associated with worse cognition.** Cognitive performance on nearly all tests was substantially worse than published normative values.”
How would you diagnose addiction?

http://www.hulu.com/watch/140067#i0,p0,d0
Write down some characteristics of an addicted person.
What would you see them doing?
How would they treat their friends and family?
How would they be spending their time?
How would you know they are using/not using?
Are they reliable?
Dependence

Developed tolerance

Withdrawal

Inability to stop

Significant time spent getting/using

Using more than intended
Abuse

Interferes with your life

Legal problems

Dangerous use

Causes interpersonal problems
ever felt you should Cut down

Do you get Annoyed by someone criticizing your use

Ever felt Guilty about your use

Ever had an Eye opener
Resources for addicted individuals and their families

Local resources: Newtown Parent Connection, Four Winds Hospital, Midwestern CT Council on Alcoholism, High Watch Recovery Center, local chapters of the AA...

Looking for help?

Newtown Parent Connection, Inc. offers help and guidance to those struggling with issues of substance use and abuse.

For information or referrals, please call (203) 270-1600. Calls are strictly confidential. You will be directed to other agencies and services available, as appropriate.

More information on our support groups >

“Immediate help is available at 860-927-3772”
Danbury hospital has special services for adolescents
CCATS (The Center for Child and Adolescent Services)

Crisis Intervention Hotline: 1(888)447-3339
Appointment Number: 203-830-6082


