

# ADDICTION: THE DISEASE TECHNOLOGY CREATED

CAPTASA 2019

January 25-26, 2019

Embassy Suites, Lexington, Kentucky

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# DISCLOSURES

**I am employed at the University of Louisville as the Counseling Coordinator for the students at the Health Science Center Campus. I receive no funding for this project from that association, nor from any other agency or source. I am grateful that the U of L allows me latitude to speak on these matters of concern, but the freedom they afford should not be interpreted as endorsement of the content.**

# “In Time, Which Made a Monkey of Us All.”

- Grace Paley. *The Collected Stories*. New York: The Noonday Press, Farrar, Straus  
and Giroux. 1994. Print.

## Meet Your Old Family:

(I.T. Assistants: This slide has the hyperlinks to the You Tube videos and can be used when there is a good internet connection. The next two slides have the videos embedded in a MicroSoft codec. The embedded option is MUCH preferred if the CODEC is installed. Chipley will also have the videos in two other codec option on his flashdrive on his person.)

**<https://www.youtube.com/watch?v=50tlF3kGbT4>**

**<https://www.youtube.com/watch?v=pSm7BcQHWXk>**

# MAMMALS (AND A FEW BIRDS) GONE WILD!



# DRUNK MONKEYS!



## On the Origins of Specious Behaviors

Alcohol is a *marker* for locating nearby sugar, a simple carbohydrate. Sugar is a highly-valued biochemical nutrient, and predictable access to nutrients -- both for individuals in a species and for the species that comprises them -- increases probabilities for reproduction and survival.

A small number of brains are designed by genetics (in interaction with the environment) to prefer alcohol OVER sugar.

Those with those alcohol-prone brains exhibit behaviors the “normals” can easily identify. The “normals” then follow the drunks because the drunks’ exaggerated behaviors signal where the fruit will be found.

These means that “normals” have brains that are designed by genes to become strongly attracted to drunks.

This is not a problem when alcohol is only available once or twice a year for just a few days when fruit ripens and rots.

# Now Meet Your New Family

Humans since the rise of complex civilization have not had the advantage of evolutionary time to get to a point of “just right” concerning alcohol effects. Some of us seem sentenced to a concocted mix of slurred denials, failed breathalyzer tests, DUIs and court-mandated treatment.

# Farmer Brown, the Dope Man

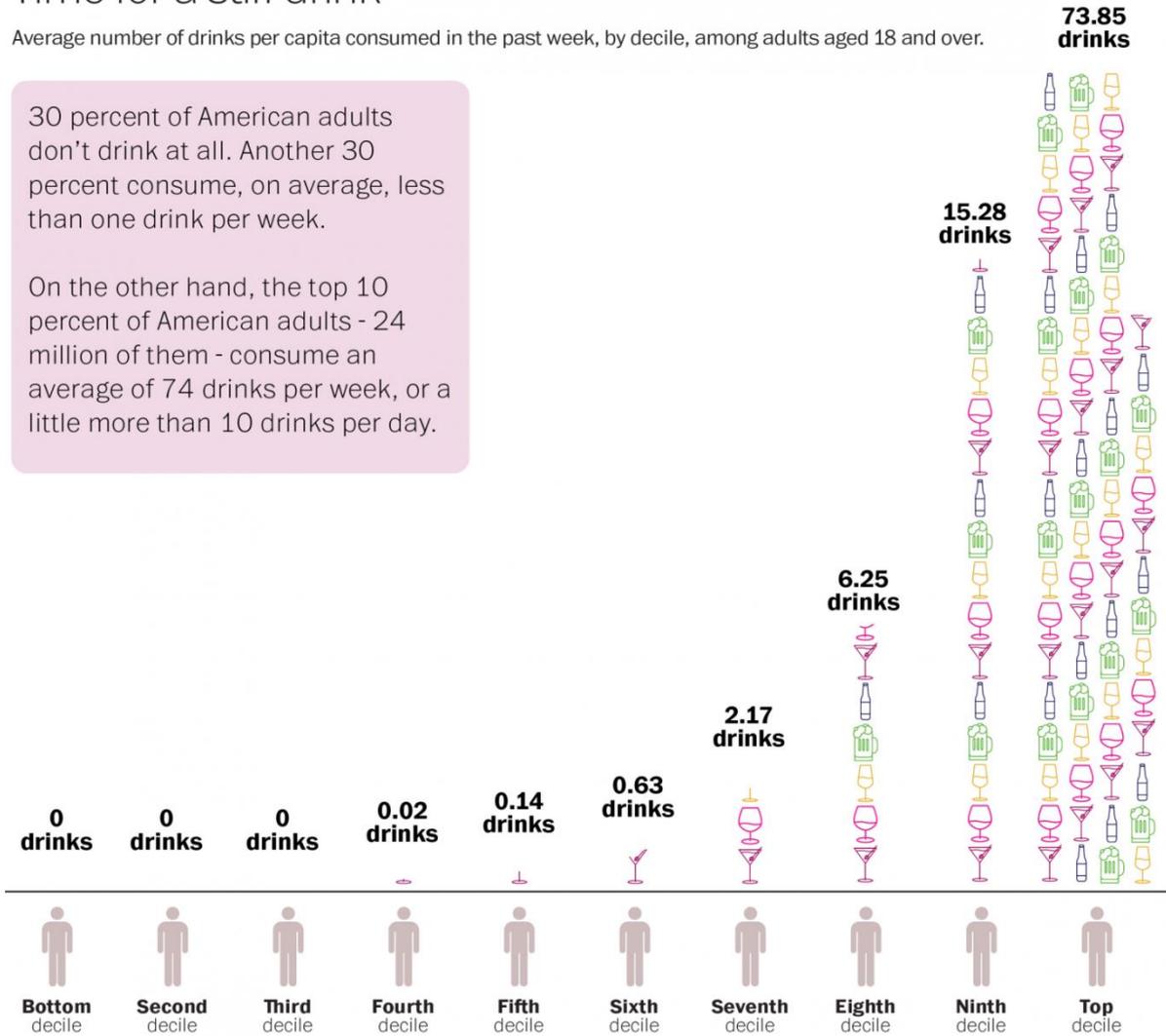
If we imagine the long-game of evolution as a twenty-four hour day, the equivalent behaviors of holding “tail-gate parties on game-day” have only emerged in the last few seconds before midnight. From the perspective of evolution, **agricultural civilization instantaneously** changed the contingencies for humans’ relationship to alcohol. Before the time this spectacular display of human inventiveness, ingenuity, and creativity in **agriculture** changed the rules, a modicum of detoxifying enzymes did well-enough to handle the constant, trace amounts of ethanol found in fruit and wet grains, and the body was even somewhat forgiving of the short periods when its easily-saturated enzyme system was subjected to the small bursts of excess ingestion allowed by seasonal fermentation.

# Time for a stiff drink

Average number of drinks per capita consumed in the past week, by decile, among adults aged 18 and over.

30 percent of American adults don't drink at all. Another 30 percent consume, on average, less than one drink per week.

On the other hand, the top 10 percent of American adults - 24 million of them - consume an average of 74 drinks per week, or a little more than 10 drinks per day.



# ALL BRAINS ARE NOT THE SAME

All brains are not the same. Besides possible dysphoria, ethanol also spawns a mix of euphoric and sedating effects, and that mix is a not universal experience, despite the Porter's speech in *Macbeth*. For the majority of people who drink some alcohol **(not to be confused with the minority of people who drink most all of the alcohol)**, the sedating effect of ethanol is felt strongly and quickly. Those drinkers will decide to stop drinking early in an episode, or drink very slowly in the episode, or pass out quickly in the episode. These drinkers who sedate well are, frankly, the most "normal" when norms are measured by math. They are the much-more frequently encountered subjects, and they earn the reputation of being "light weights" who are described as "can't hold their liquor." The heavy drinkers who keep on walking and talking despite heavy intake are really the abnormal drinkers.

# Of Dope and Dopamine

Studies in the neurophysiology and neuroanatomy of vervets and humans reveal another striking similarity between the two species. Subjects who show extremely pronounced attraction to alcohol share **abnormalities in dopamine**, a neurotransmitter crucial to **motivation pathways** that link midbrain regions to the frontal cortex<sup>1</sup>. The chemical dice in this brain-game of probability are differentially loaded within monkeys **and** humans (Mash et al. 1996; Goldstein and Volkow, 2011). This group difference within *Homo sapiens* goes far in explaining why learning the “habits” of addiction (whether for alcohol or other substances) is intrinsically easy for certain subjects and why “unlearning” those habits for those same subjects seems nearly impossible by recourse only to clinical application of psychology’s principles. Alcoholic vervets would, presumably, also show similar recalcitrance if some aspect of their lives tried to nudge them into sobriety, but there is no indication that concerned, normal vervets are motivated to arrange “interventions” on their drunken peers.

<sup>1</sup>Littrell, Jill (2010) 'Perspectives Emerging From Neuroscience on How People Become Addicted and What to Do About It', *Journal of Social Work Practice in the Addictions*, 10: 3, 229 — 256

# Hereditry: From Adaptation to Adoption

Donald Goodwin, M.D., examined a naturally occurring human “laboratory” for clues about alcoholism found in Denmark’s superbly kept health records. From these he constructed a retrospective study known as the Danish adoption study and he published the results in four major articles in *The Archives of General Psychiatry* from 1973 through 1977. His research, in tandem with that of others, appears in his book *Is Alcoholism Hereditary?* (1976) (234). His answer is “yes,” and the answer is compelling. Although he does not discount the claim that “nurture” can modulate the major effect created by “nature,” the evidence clearly indicates heritability of the trait.

# Neurobiology of Addiction

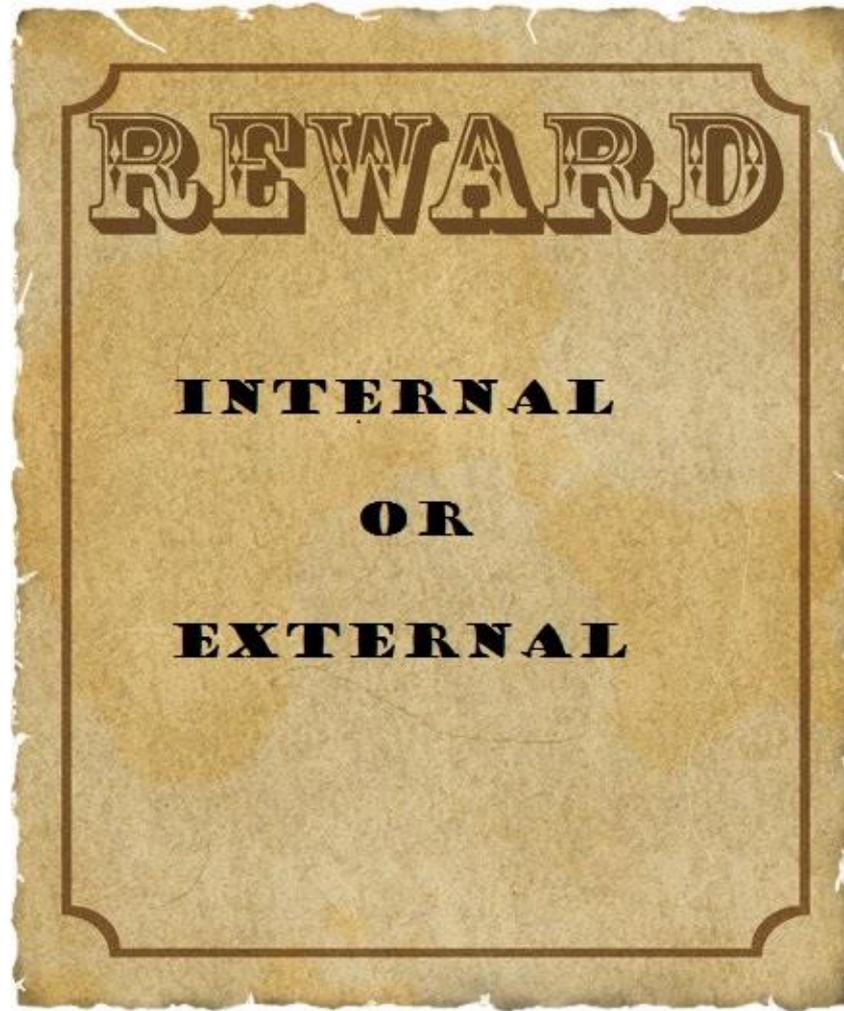
## *How they are wired up*

**“These allergic types can never safely use alcohol in any form at all. [...] Men and women drink essentially because they like the effect produced by alcohol. The sensation is so elusive that, while they admit it is injurious, they cannot after a time differentiate the true from the false. To them, their alcoholic life seems the only normal one. They are restless, irritable and discontented, unless they can again experience the sense of ease and comfort which comes at once by taking a few drinks—drinks which they see others taking with Impunity.”**

**-William D. Silkworth, M.D., “The Doctor’s Opinion,” Alcoholics Anonymous, 4<sup>th</sup> Edition. 1939.**

# Objectives for our talk

- Learn the brain chemistry of Alcoholism and Addiction
- Learn how to tell who might have this disease



**REWARD**

**INTERNAL**

**OR**

**EXTERNAL**

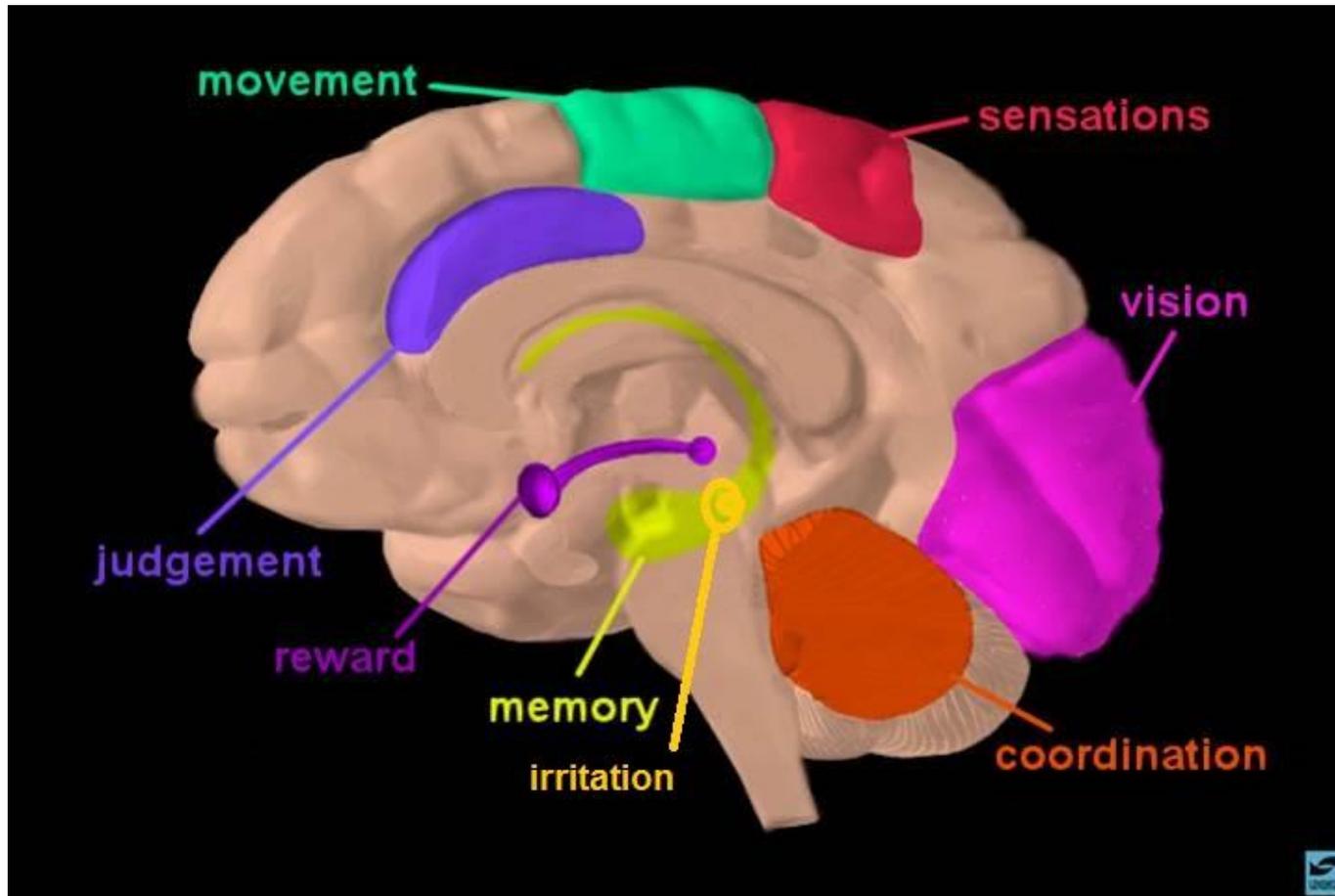
# The Pleasure Principle and the Reduction of Suffering

**All Learning requires a balance in the brain between the addition of pleasure and the reduction of irritation. This is achieved by endogenous (internal) and by exogenous (external) agents.**

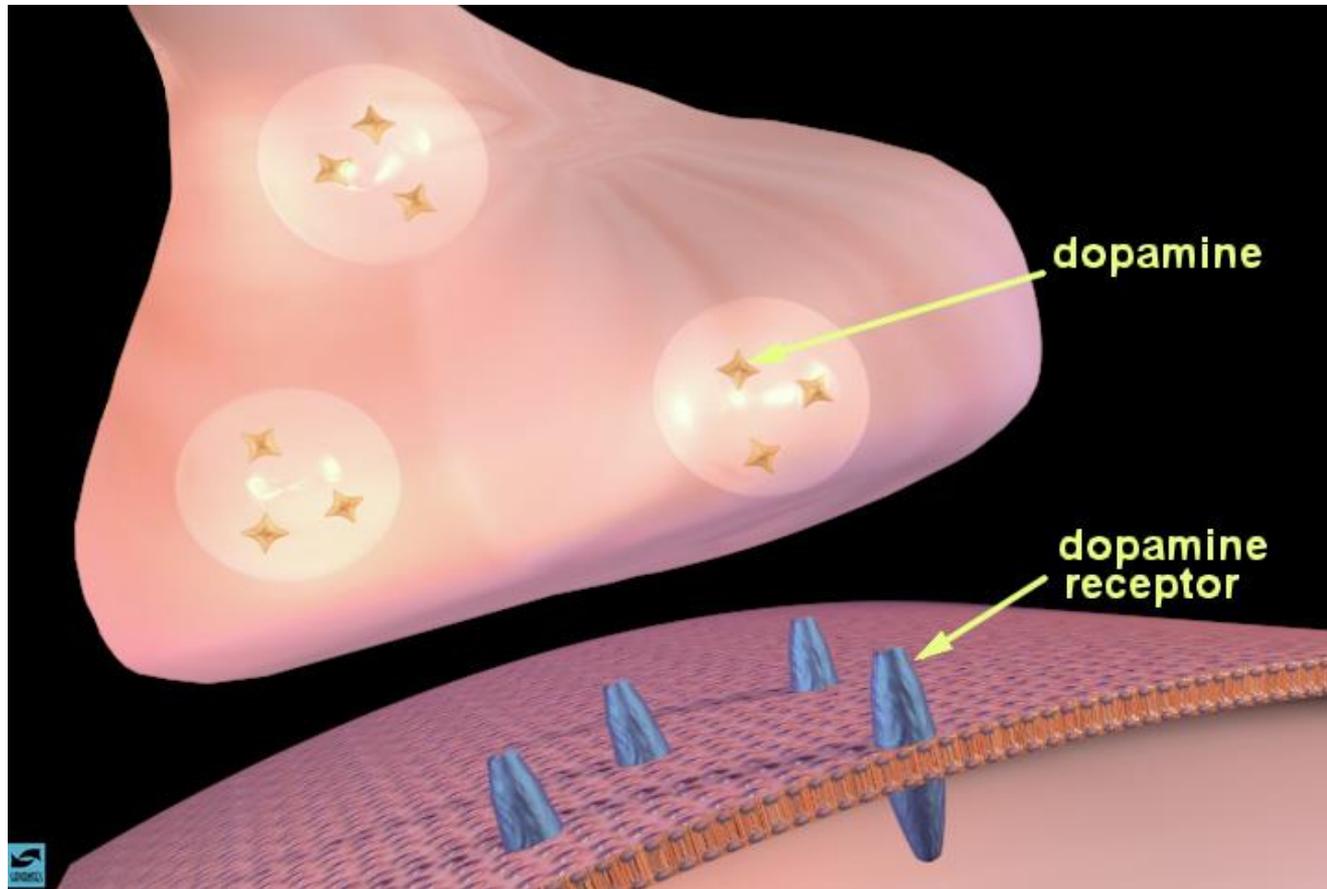
**This is true for non-addicts and for addicts.**

**The difference between the two groups is the tipping point of the balance**

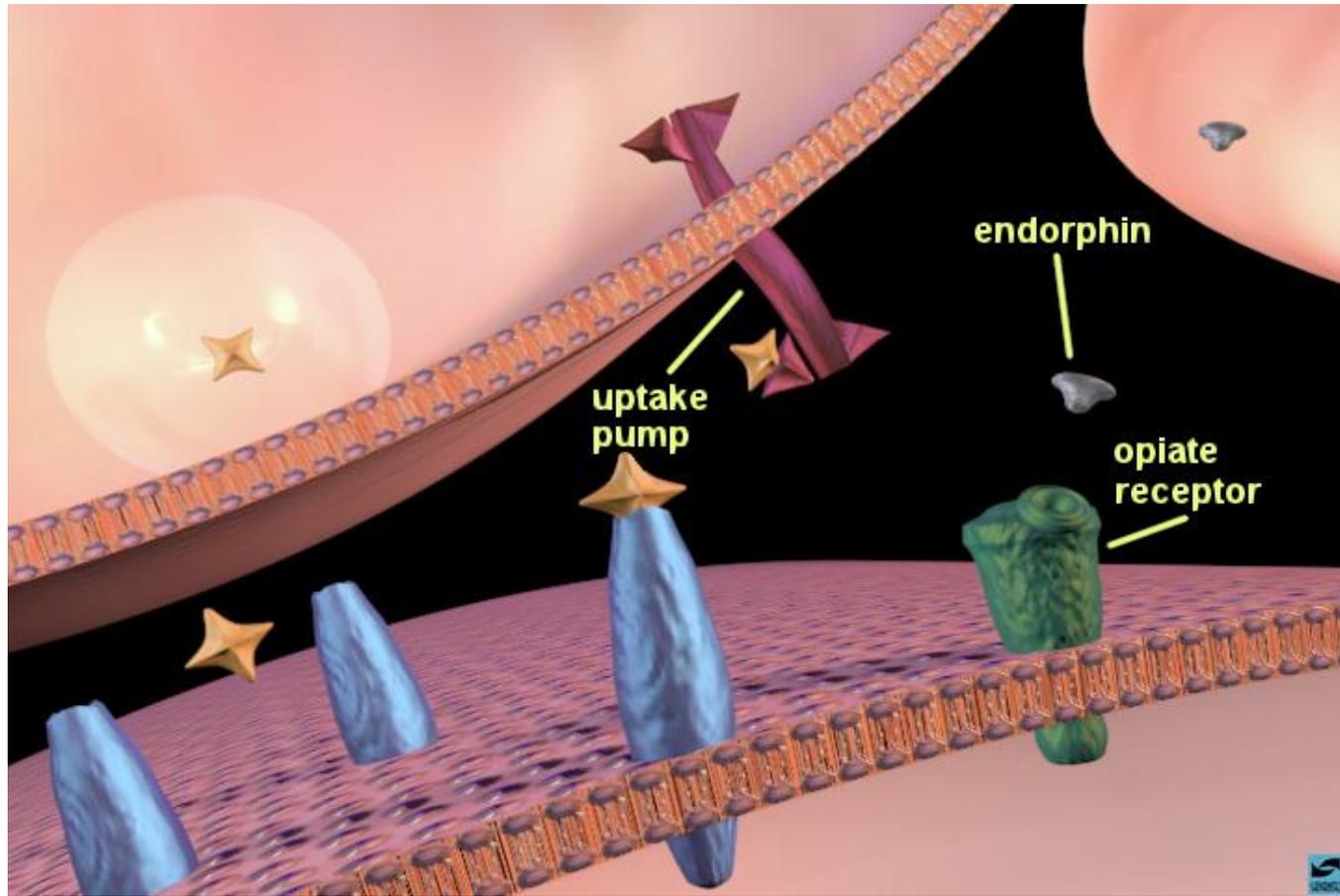
# BASIC NEUROANATOMY



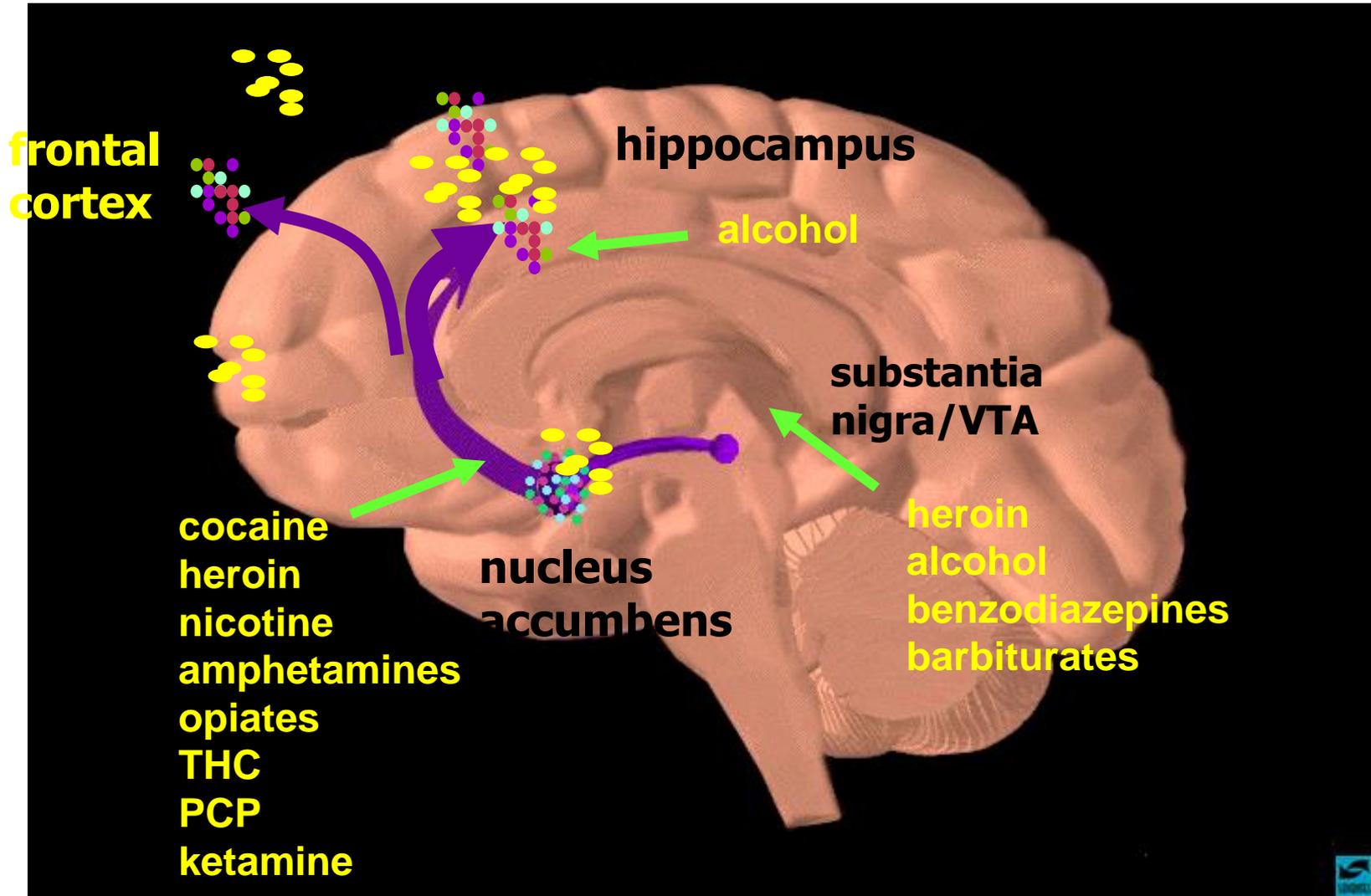
# WHERE MOLECULES HOOK UP



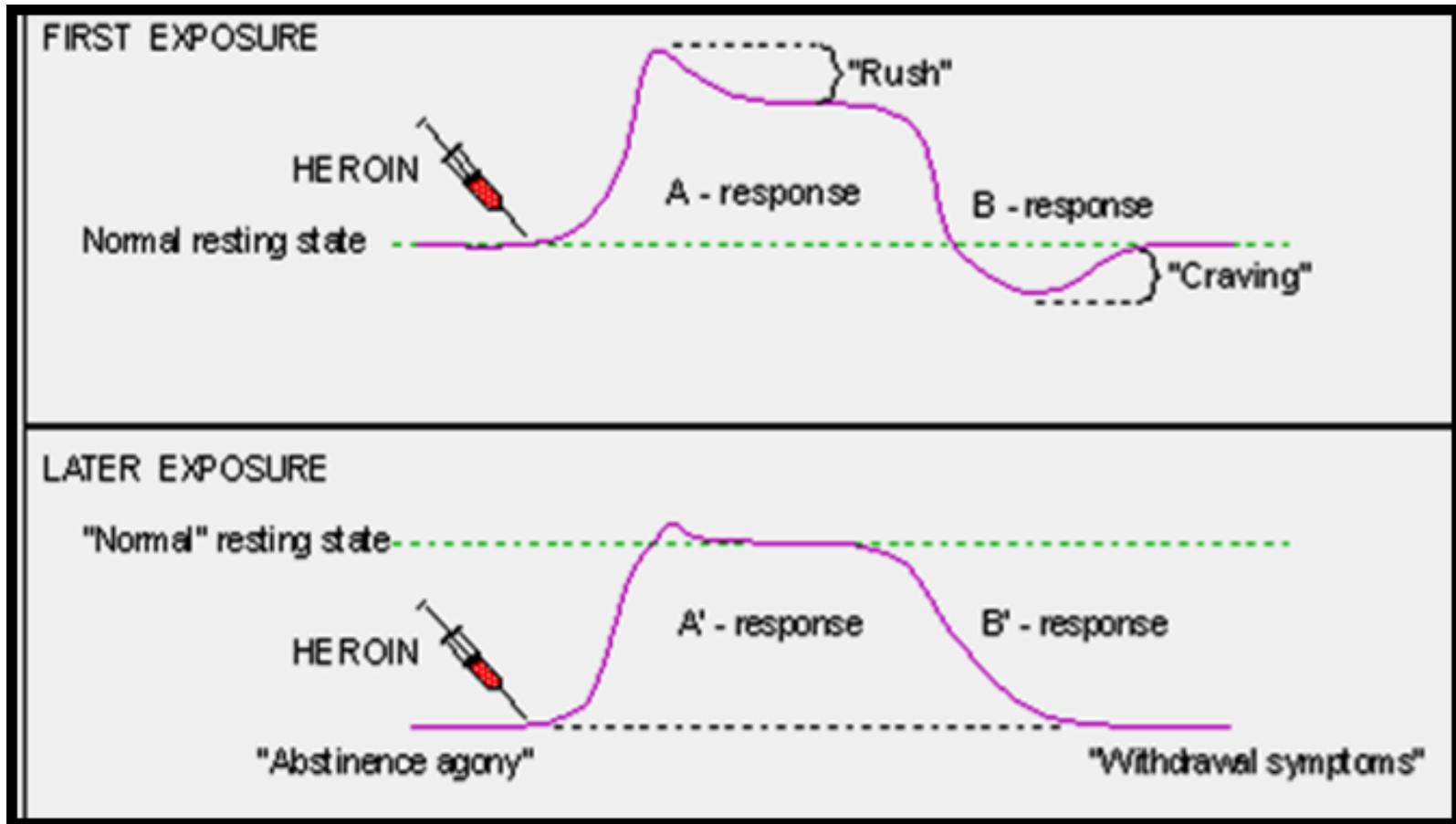
# WHERE BRAINS GET HOOKED



# Dopamine Pathways – Pleasure pathways



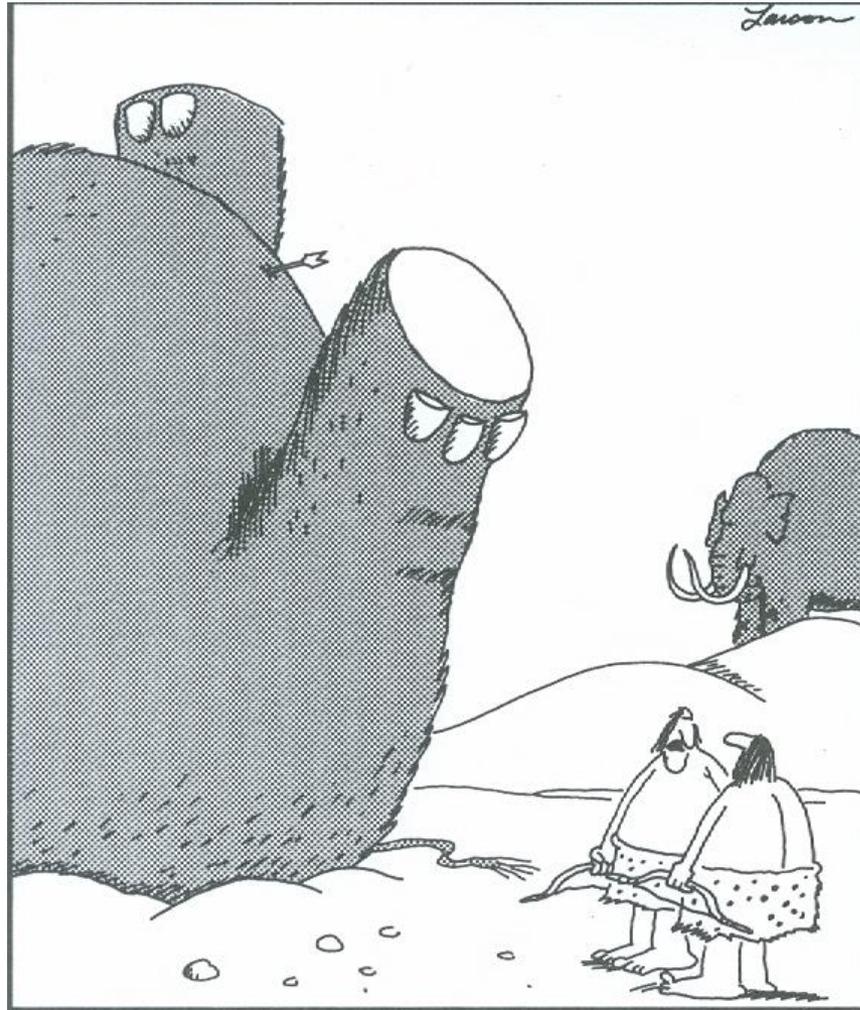
# CHASING THE FEELING



# Alcoholism / Drug Addiction

- This Is a Brain Disease or Difference
- Biologically, they have a final common pathway
- They have *essentially* the same Treatment

**“We should write that spot down”**



**“Don’t Worry. We did.”**



**“So did we.”**



**“ DOCTOR GORDON... THERE'S A DRUG DEALER HERE TO SEE YOU... ”**

**“Doctor Gordon... There's a drug dealer here to see you...”**

# So Did They



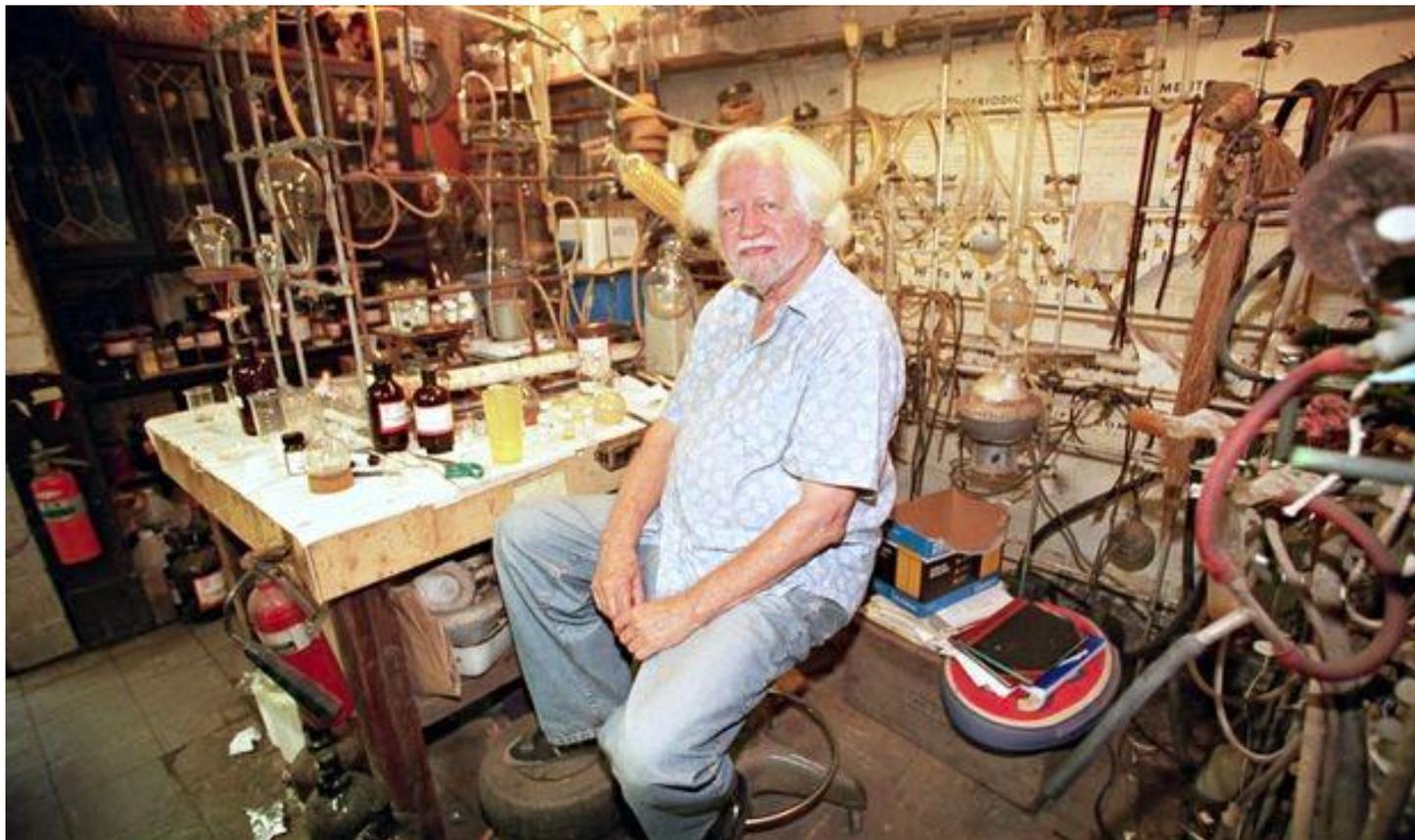
**Purdue Pharma Headquarters**

# So Did They



**U.S. Drug Cartel Leaders Model Appropriate Business Attire**

# And So Did He



**Alexander Theodore "Sasha" Shulgin (June 17, 1925 – June 2, 2014)**

# Alcoholism / Drug Addiction

- Not bad people, just people with a bad disease
- A Chronic, Progressive and very unpleasant, on the way to being, Fatal illness
- An illness that is somewhat preventable and treatable for most who have it

# Primary Drugs of Addiction

- **Alcohol**
- **Opiates**
- **Sedatives (freeze dried alcohol)**
- **Cannabis**
- **Cocaine**
- **Amphetamines**

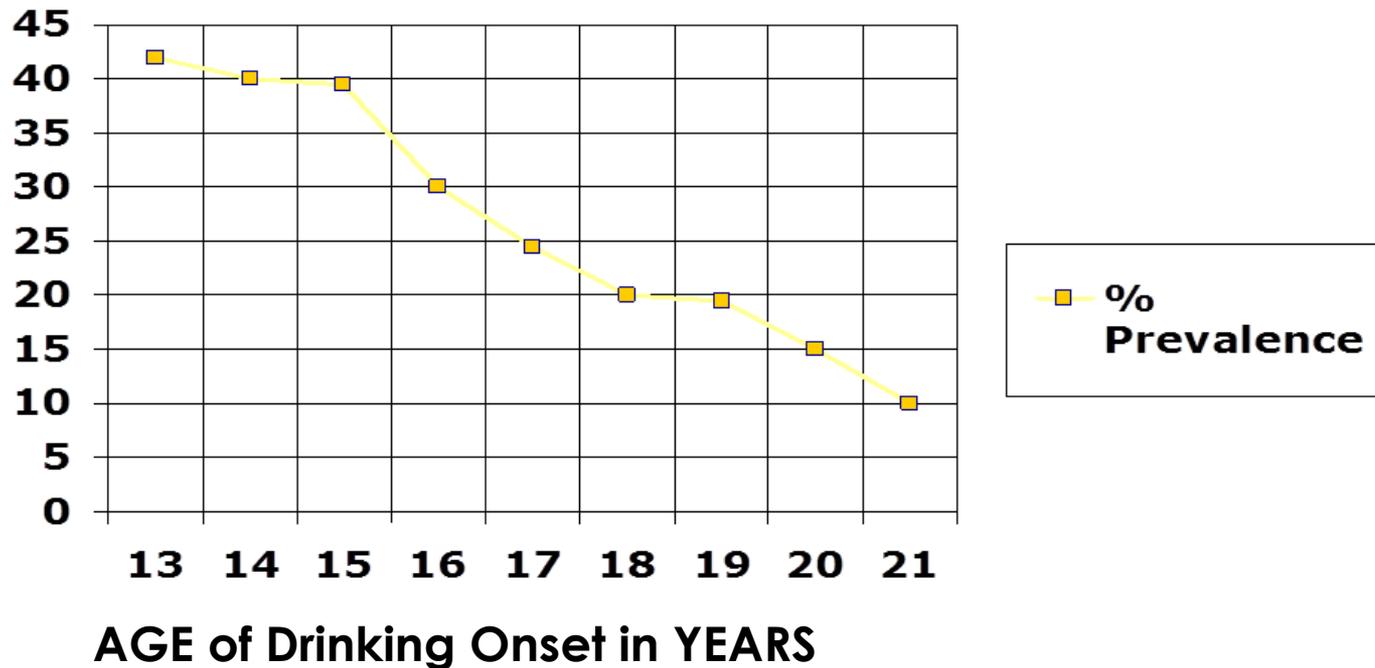
## Who's at risk?

- Anyone with a first degree relative is 4 x more likely to develop an Addiction
- Anyone who uses an addictive substance before age 15 is 5 x more likely
- Some develop Addiction without either, however
- Approximately 15% of population

Pediatric Adolescent  
Medicine 152:952,1998

**Teens who begin  
drinking before age  
15 years are 4X more  
likely to develop  
alcoholism**

# Lifetime Alcohol Dependence by Age of Onset of Drinking



<http://www.niaaa.nih.gov/about/budweb1.htm>

Grant & Dawson,  
1997

# “At Risk Drinking”

- “At Risk Drinking” is a level of alcohol consumption that is directly harmful, or is correlated with a greater risk of health problems.
- Men: > 14 drinks per week  
5 or more drinks per occasion
- Women: > 7 drinks per week  
4 or more drinks per occasion

## Increased access to Opiates

- 40 million Rx's 1991 up to 180 million in 2007 to 259 million in 2012
- US receives 99% of world's supply of Hydrocodone
- US receives 71% of world's Oxycodone

# How to tell who has this disease

- Tolerance
- Withdrawal
- Using more than intended or more often
- Persistent desire to cut back
- Lots of time using or recovering
- Decreased function:  
social/occupational/recreational
- Continued use despite  
physical/psychological problems

# The C-A-G-E Questionnaire

**C:** “Have you **C**ut back on use?”

**A:** “Have you become **A**ngry when confronted about your use?  
(For ages 16- 24, It may be better to ask “Have you driven an **A**uto while intoxicated?”)

**G:** “Have you felt **G**uilty about your use?”

**E:** “Have you ever used an **E**ye-opener amount to get going the next day?”

$\frac{1}{4}$  = probably not;  $\frac{2}{4}$  = high suspicion that needs a thorough evaluation;  $\frac{3}{4}$  = Almost certain;  $\frac{4}{4}$  = Certain and need for detox

# About Detox (which is not treatment)

The person with addiction deserves the humane condition of an appropriate acute detoxification as far as resources allow. Certain addictions (alcohol, benzodiazepines and barbiturates) have potential for fatality in acute detoxification if not attended to carefully and if not with nearby access to medical treatment to address those problems. Notions that “letting” the addicted person “suffer sufficiently” with detox symptoms will deter further abuse are FALSE.