

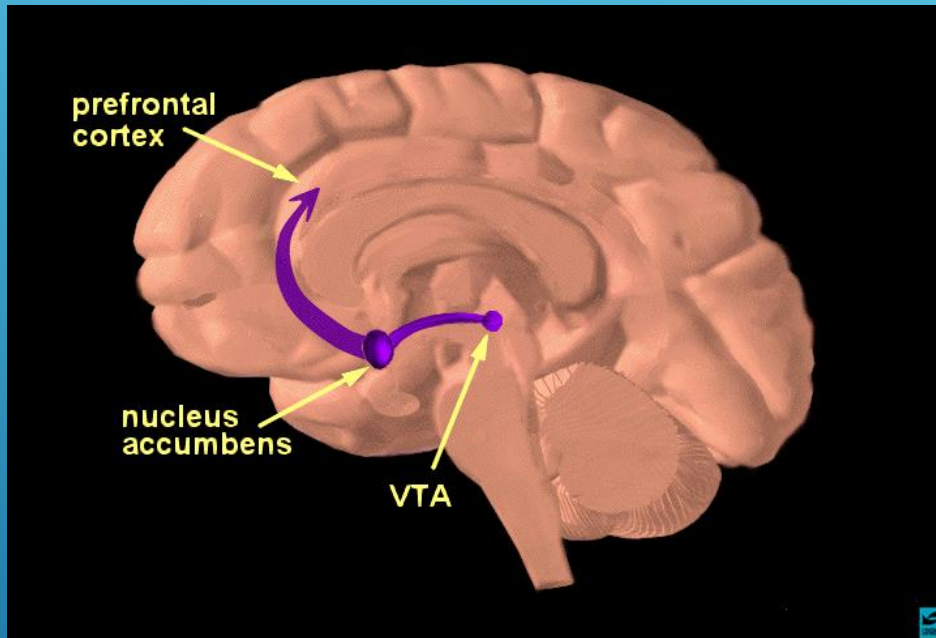
# DISEASE CONCEPT OF ALCOHOLISM AND DRUG ADDICTION

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Addiction Medicine

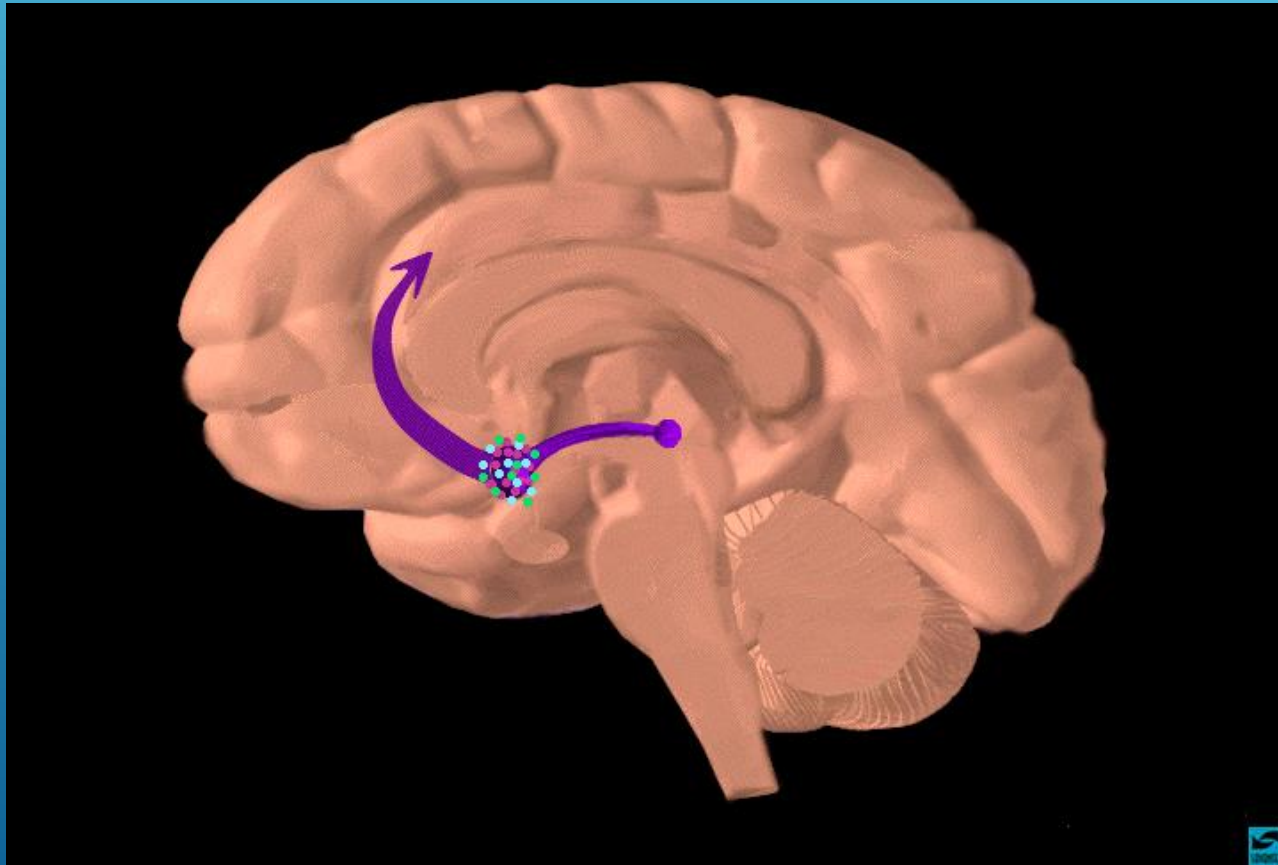
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# NEURAL CIRCUITRY OF REWARD

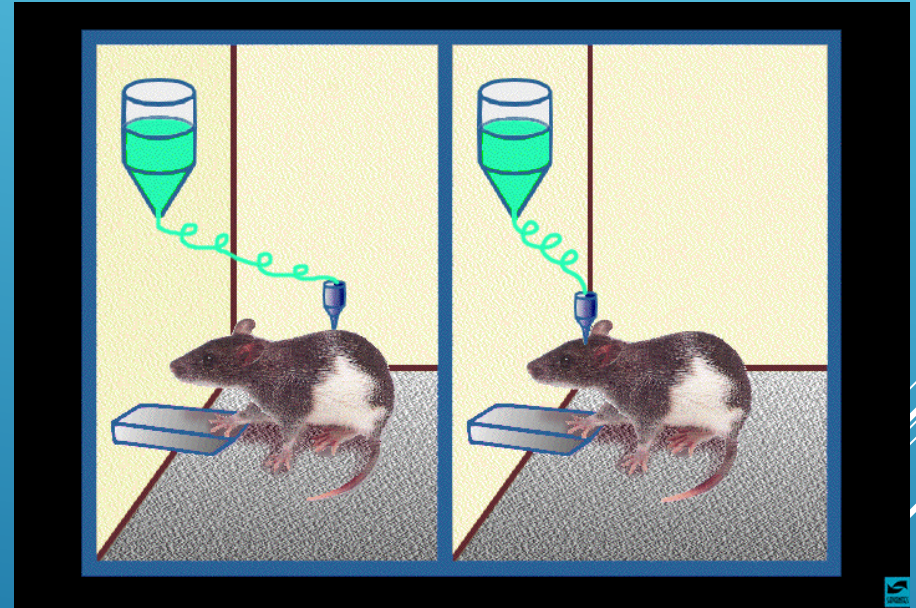
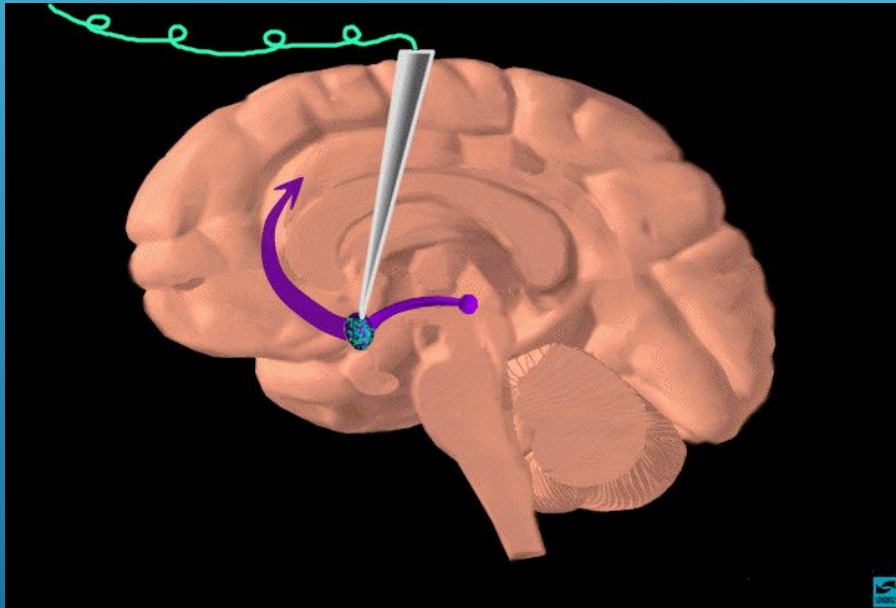


- ▶ Present in all animals
- ▶ Produces pleasure for behaviors needed for survival:
- ▶ Eating
- ▶ Drinking
- ▶ Sex
- ▶ Nurturing


# ALL DRUGS OF ABUSE BIND TO THE NEURAL CIRCUITRY OF REWARD




# SELF-STIMULATION STUDIES




# AMERICAN SOCIETY OF ADDICTION MEDICINE (ASAM) DEFINITION

- ▶ **Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry**
- 


# ADDICTION

- ▶ **An overwhelmingly powerful compulsion to use a substance, with progressively diminished capacity to resist it, despite escalating personal harm**
  - ▶ **The use is at the expense of natural rewards**
  - ▶ **The development of a negative emotional state**
- 

# RISK FACTORS

- ▶ **40 - 50 % genetic vulnerability (epigenetics)**
  - ▶ **Trauma, neglect, abuse**
  - ▶ **Parenting**
  - ▶ **Peer group**
- 

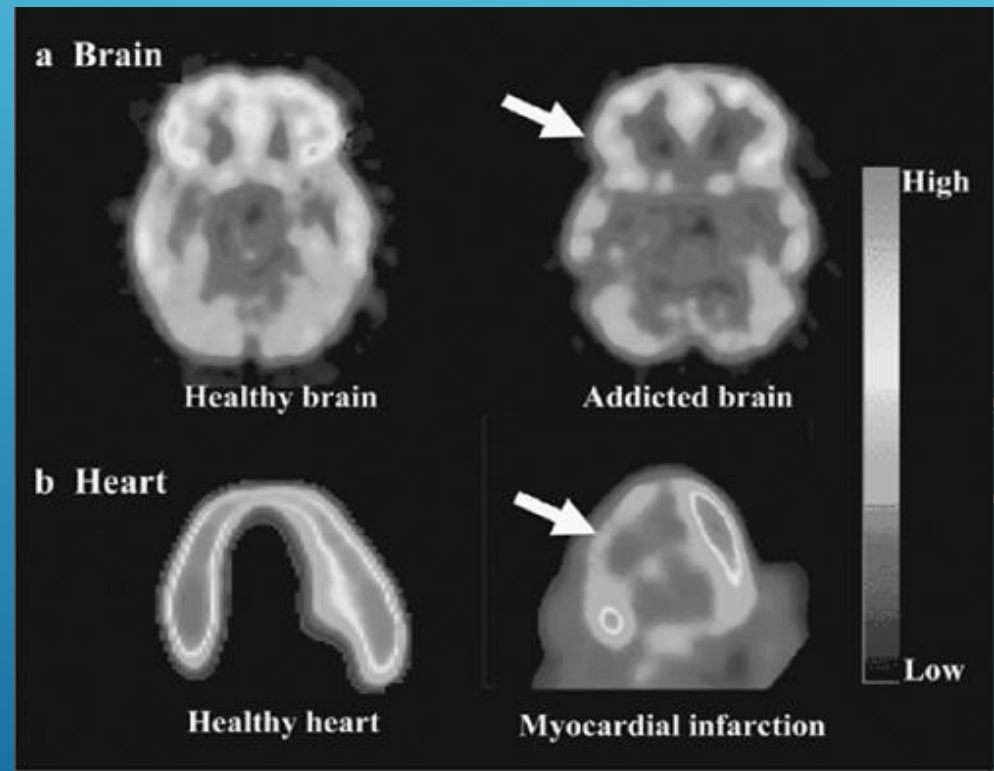
# RISK FACTORS

- ▶ Drug availability
  - ▶ Stress
  - ▶ Social isolation (especially in adolescence)
  - ▶ Traumatic brain injury
  - ▶ Mental illness:
    - ▶ Bipolar, ADHD, PTSD, Schizophrenia, Anxiety disorders
- 

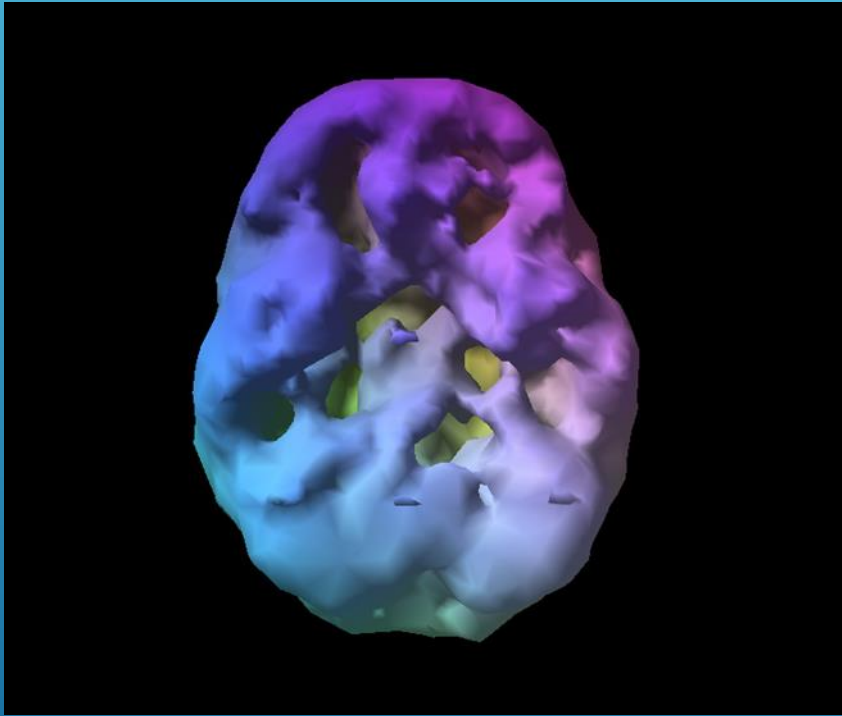


# ADDICTION AS A DISEASE OF THE BRAIN

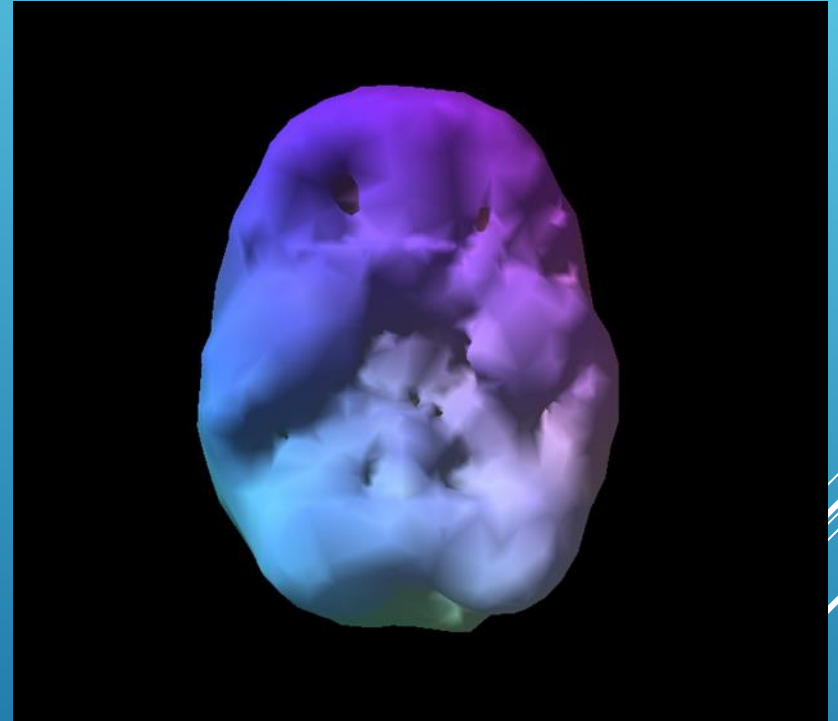
- ▶ **Imaging studies consistently show specific abnormalities in the brain function of addicted individuals**



# ALCOHOL SPECT SCAN

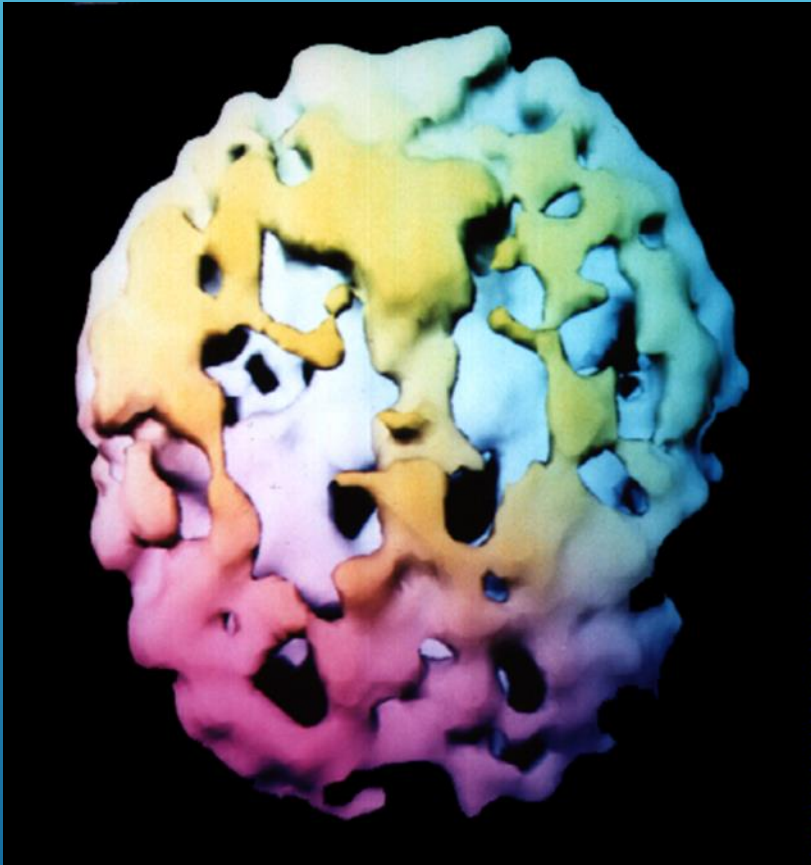


Alcoholic brain

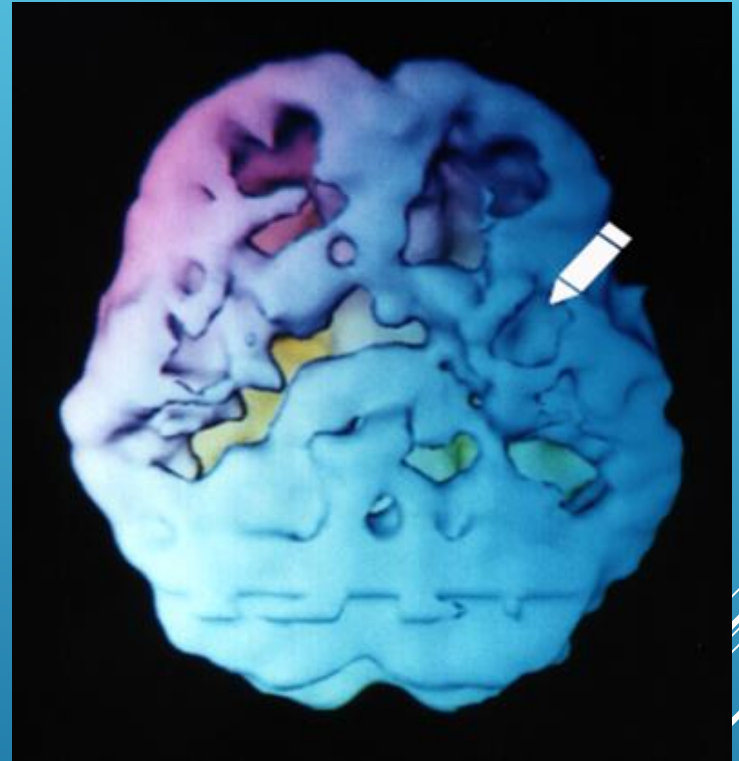


Normal brain

# HEROIN AND CANNABIS SPECT SCANS



Heroin




Cannabis


# COCAINE PET SCAN



# DISEASE OF MALADAPTIVE\*LEARNING

- ▶ **Addiction is the hijacking of the brain mechanisms for learning and memory.**
  - ▶ **These mechanisms (brain circuits and chemicals) are there to shape behaviors with that, through rewards and cues, promote survival**
    - ▶ **\*wrong response to a situation**
- 


# ADDICTION AND COGNITION (THINKING)

- ▶ **Addiction as the cause**
  - ▶ **Pre-existing causes predisposing to addiction**
    - ▶ **ADHD**
    - ▶ **Fetal alcohol syndrome**
    - ▶ **Traumatic brain injury**
- 

# ADDICTION AND COGNITION


- ▶ **Cognitive deficits impair ability to benefit from counseling: more sessions, more reinforcement needed, role of Alcoholics Anonymous**

# VOLKOW: DOPAMINE AND SALIENCE\*


- ▶ **Increases in dopamine are not directly related to reward per se, as was previously believed, but rather to the prediction of reward and for salience**
  - ▶ **\*Salience: motivationally important**
- 



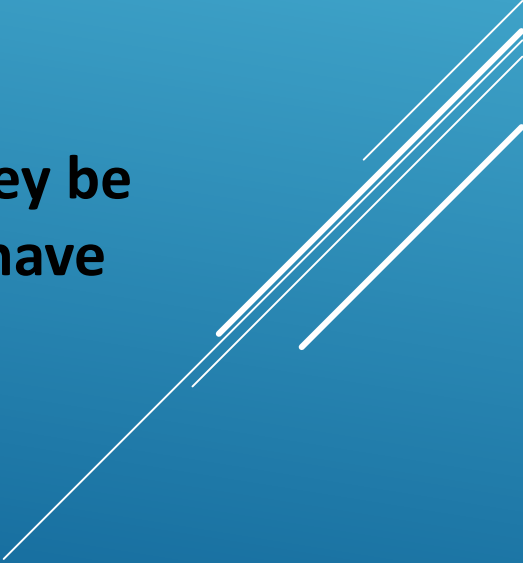
# GEORGE KOOB

- ▶ **“Addiction is a cycle of spiraling dysregulation of brain reward systems that progressively increases, resulting in compulsive drug use and a loss of control over drug taking”**
  - ▶ **Counteradaptive\* hedonic\*\* dysregulation**
    - ▶ **\*Opposite of a proper, effective change**
    - ▶ **\*\*Pleasure**
- 


# NEUROADAPTATION

- ▶ **Drugs change the brain's pleasure and reward balance**
  - ▶ **The brain has powerful mechanisms to oppose this change,**
  - ▶ **The counteradaptive action overshoots**
  - ▶ **Repeated cycles of use lead to long-lasting neuroplastic changes**
- 

# ALLOSTASIS

- ▶ **Change to a new, vulnerable state**
  - ▶ **Activation of stress circuitry**
  - ▶ **Deficit state: inhibition of brain reward system**
  - ▶ **Increased reward threshold**
  - ▶ **Altered hedonic tone**
  - ▶ **Drugs create the stress that require that they be used to create the very problem that they have created**
- 
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# CRAVING

- ▶ **Craving and relapse can be triggered by salient cues and stress**
  - ▶ **Kindling**
  - ▶ **Stress: foot shock, foot shock**
  - ▶ **Searching**
- 

# STRESS REINSTATEMENT PARADIGM

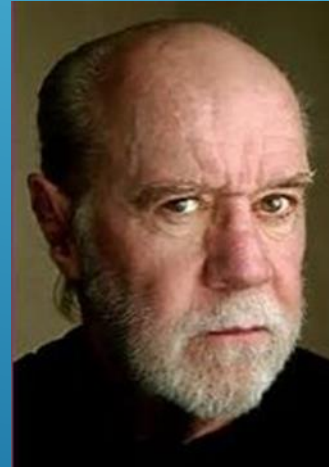
- ▶ **Our patient's lives:**
- ▶ **Foot shock, foot shock, foot shock**



- ▶ **Addiction is a chronic, progressive brain disease**
  - ▶ **In the course of repeated drug use long-lasting changes occur in the circuitry involved in memory, learning, motivation and reward as well as inhibitory control**
  - ▶ **Craving and relapse can be triggered by salient cues and stress**
- 

- ▶ **“Just because you got the monkey off your back doesn’t mean that the circus left town.”**

GEORGE CARLIN



- ▶ **Facebook: @medadditiontreatment**
  - ▶ **Facebook for the Northern New England Society of Addiction Medicine: @ASAM.NorthernNE**
  - ▶ **Website: [www.markpublicker.com](http://www.markpublicker.com)**
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