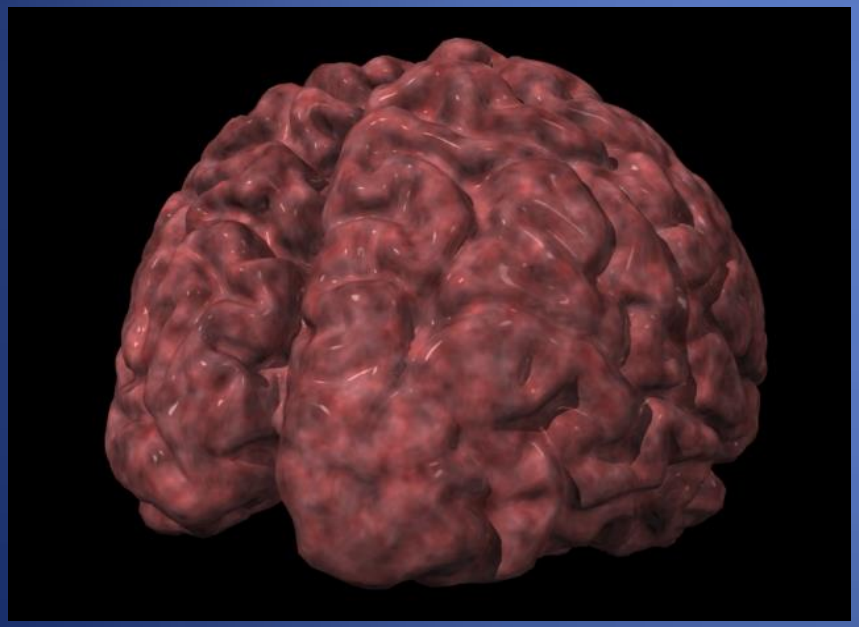
Substance Use Disorder
“Addiction”

A Chronic Brain Disease



What you will Learn

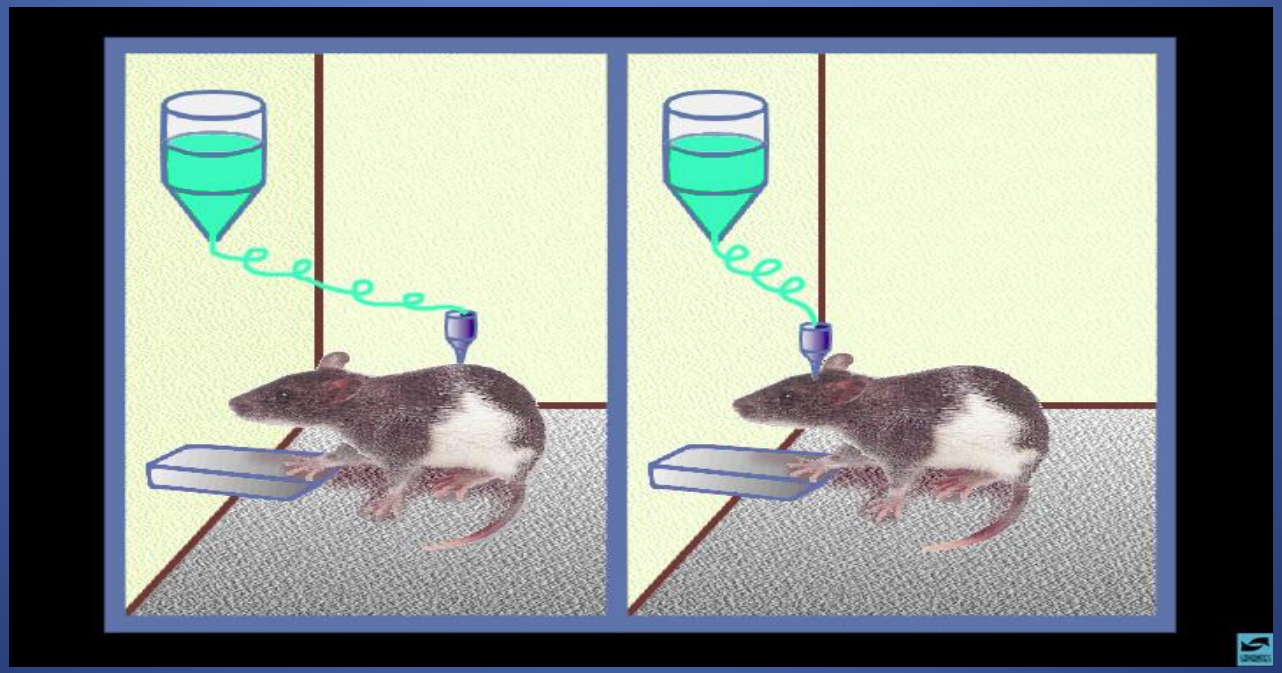
- Addiction is a Brain Disease
  - Understand the Structure and Pathways Associated with changes in the brain.
- Addiction is a Chronic Condition
  - Recognize the similarities of addiction and other Chronic Conditions
- Addiction is Treatable & Preventable
  - Identify current recommendations for management of addiction as a chronic disease.
  - Prevent future health consequences by making healthy lifestyle choices.

Myths & Misconceptions

- A person addicted to drugs / alcohol is
  - Bad, crazy, simply stupid
  - Lacking willpower
  - Hopeless
  - Must be punished as a means to force them to change
  - Must reach bottom before they can get help

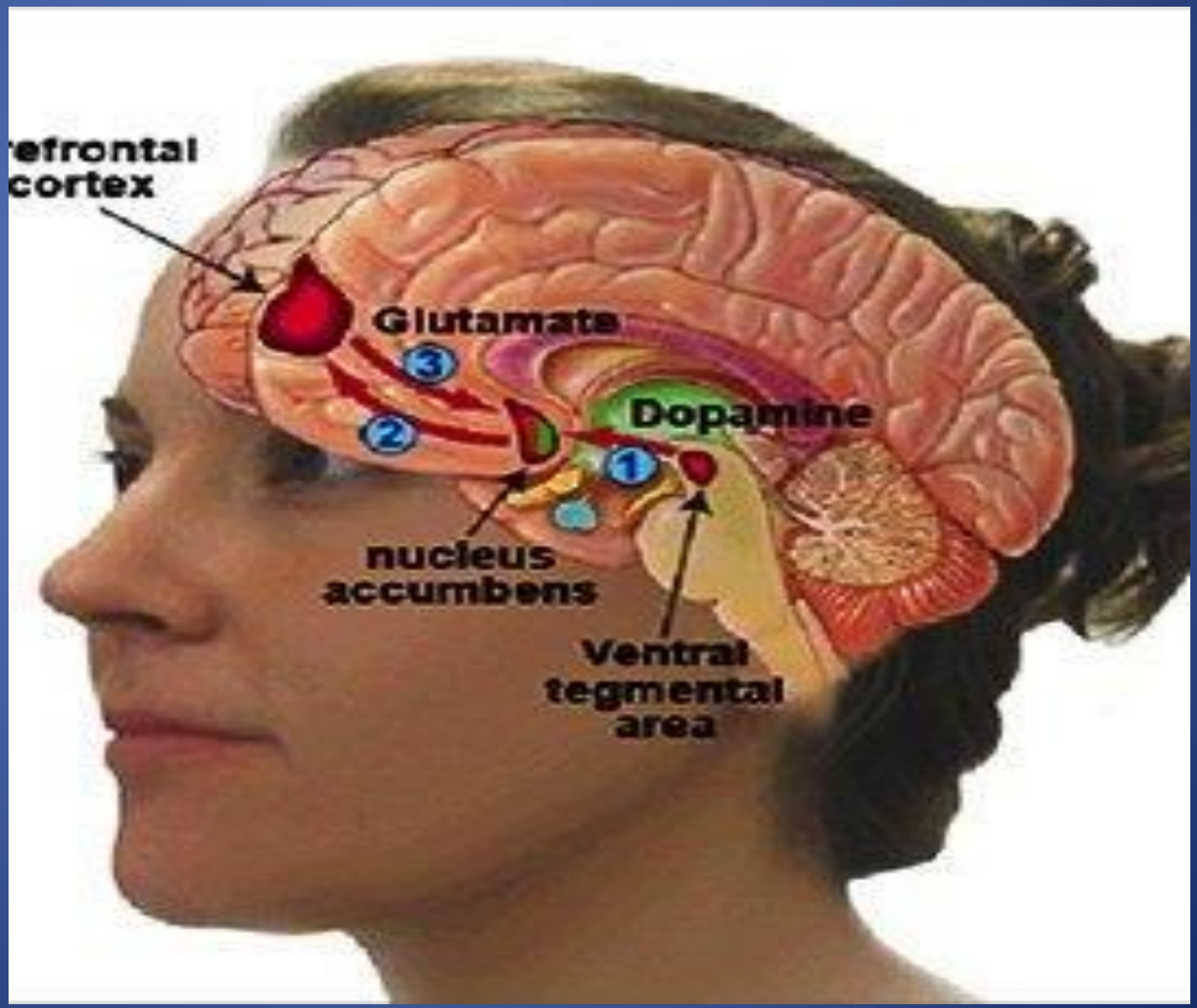
Understanding Drug Abuse and Addiction

What Science Says



A Complex Illness

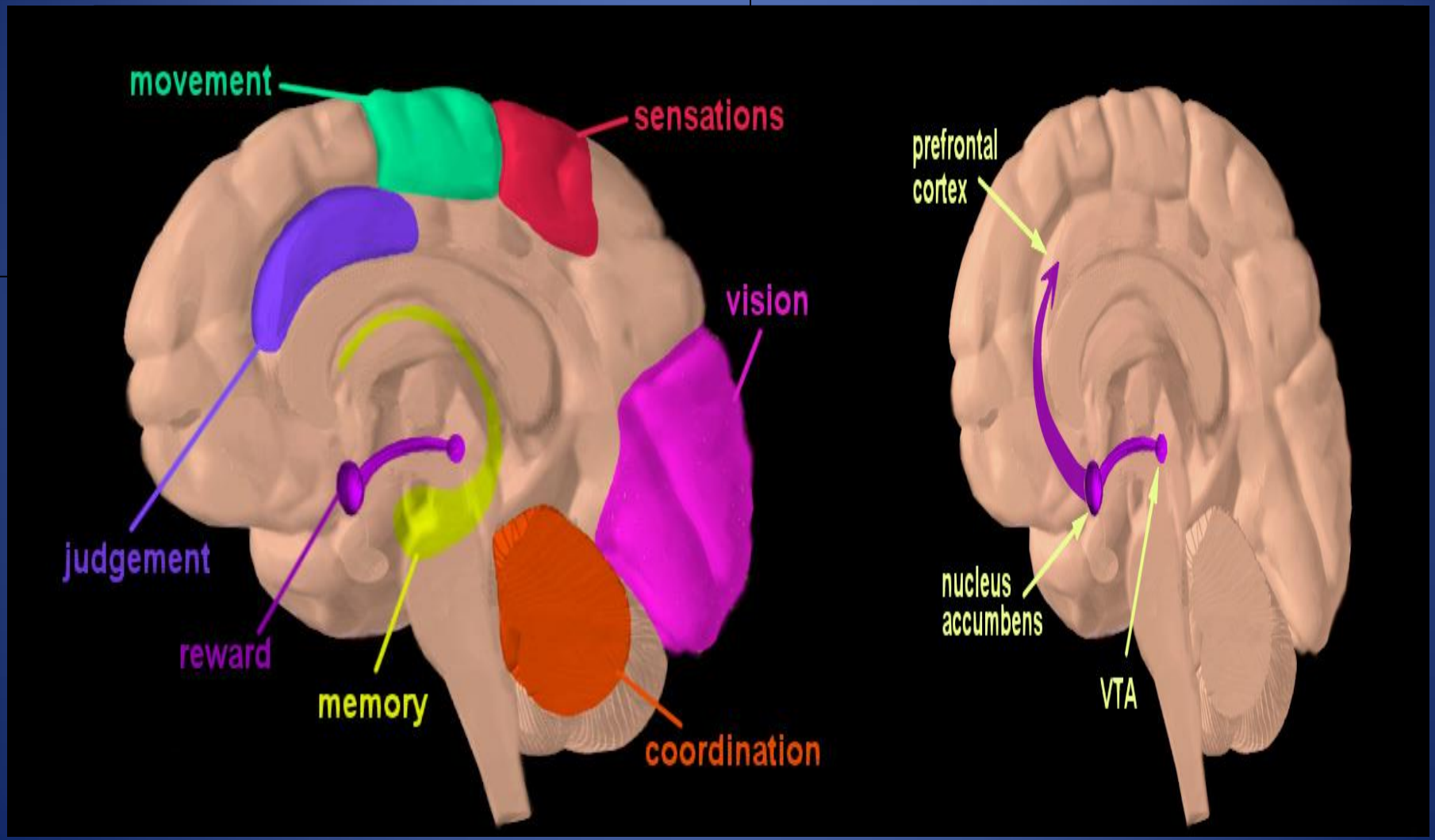
- Reward Pathways
- Emotional Centers
- Memory Centers
- Perceptions & Judgments



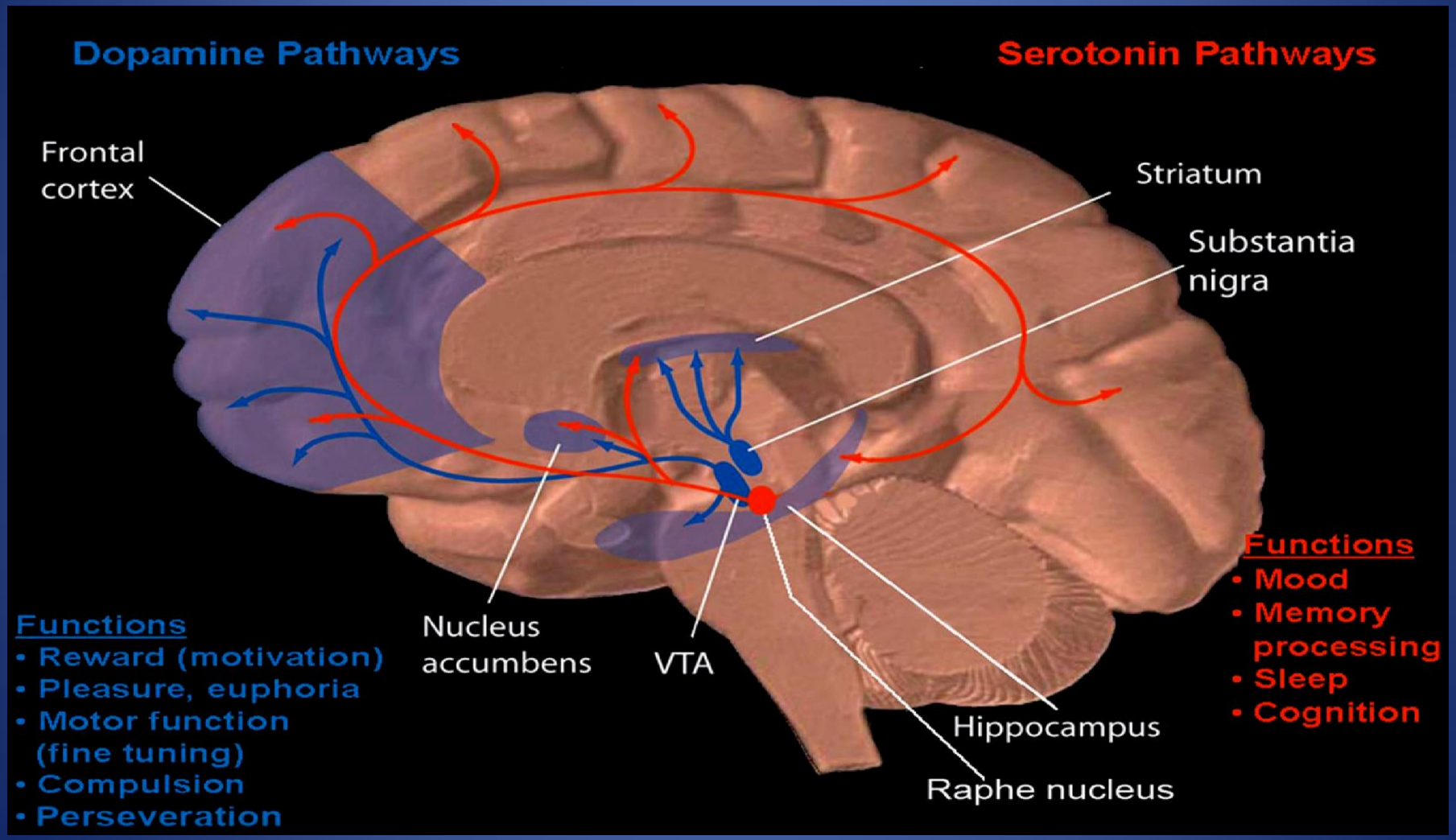
Changes in the Brain

- Over Time Addiction causes changes in the brain.
  - Brain Structure
    - Prefrontal Cortex, limbic system
  - Brain Pathways (neural connections)
    - Dopamine pathway, seratonin pathway
  - Brain Chemicals
    - Dopamine, seratonin,,endorphin, glutamate

Brain Structure

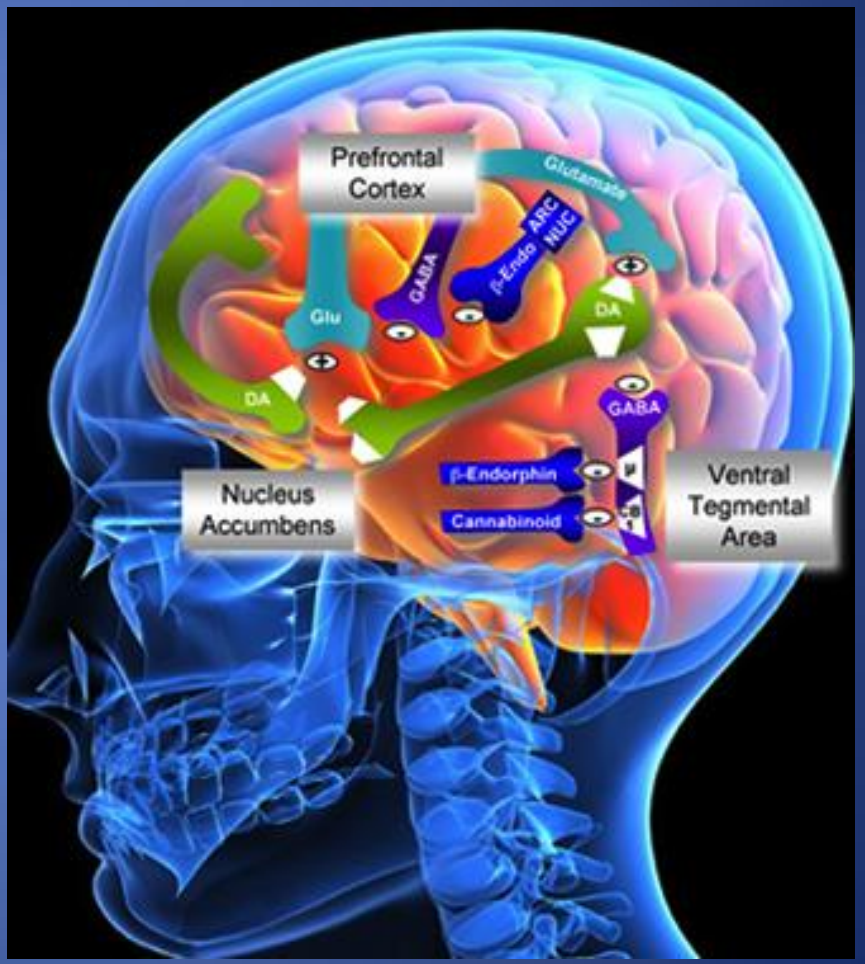


Brain Pathways



Brain Chemicals

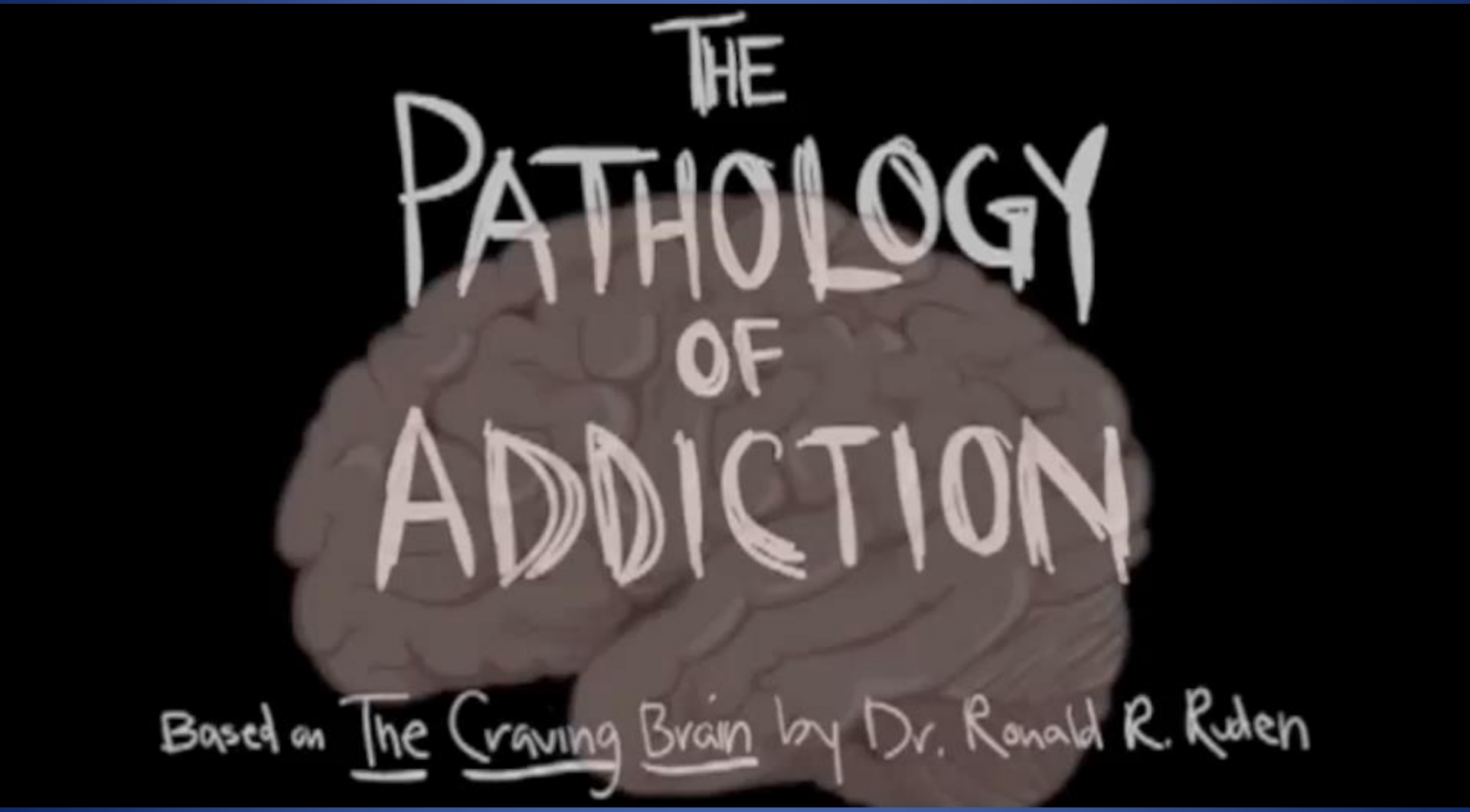
- Dopamine – a feel good chemical.
- Seratonin – the happy, anti-worry, flexibility chemical.
- GaBA – an inhibitory neurotransmitter that helps calm or relax the brain
- Endorphins – the brains own natural pleasure and pain killing chemical
- Glutamate – locks the pleasureable experience into memory



The Addict's Dilemma

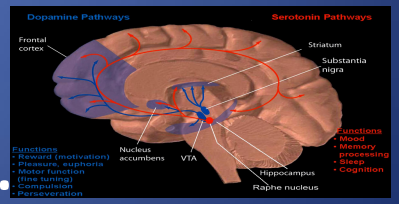
- The brain is hard wired to seek rewards … food, water, sex (for survival)
- Addictive drugs activate this same reward pathway creating Powerful desires that mimic survival needs.
- Psyche – automatically seeks refuge from STRESS / PAIN -
- Prefrontal Cortex (judgment & decision making) – tells the addict to stop … bad things are happening …
- Limbic System (pleasure / reward/survival) system override those commands with uncontrollable cravings and a compulsive drive to seek rewards and refuge from stress/pain.

The Pathology of Addiction



The Addiction Cycle & the 4 C's

- Craving (dopamine; brain is hard wired to crave rewards)
- Compulsion (low seratonin levels)
- Loss of Control (damage to the prefrontal cortex; right & wrong)
- Continued Use Despite Consequences – further damage to prefrontal cortex (interferes with judgement).



Predisposition & Progression

Substance Use ……

Substance Misuse / Substance Abuse

Substance Dependence / Addiction

Genetics / Environment

The Disease Model

- Only about 100 years old
- Emerged from Germ Theory
- Organ >>>> Defect >>>> Symptoms
  - Femur > Fracture > Pain/Deformity
  - Pancreas > Insulin Secretion > Symptoms of Diabetes
- Doctors go after the Defect to cure the disease.

Is addiction a Disease?

- Disease is a departure from health.
- Disease –" a disordered or incorrectly functioning organ, part, structure or system of the body.

  - Defect (malady)
  - Signs & Symptoms
  - Predictable Natural Course
  - Specific Outcome if left untreated
  - Risk Factors
  - Early Warning Signs
  - Diagnostic Criteria

Signs & Symptoms

- Cravings
- Compulsion
- Loss of Control
- Continued use Despite Consequences

- Tolerance
  - A State in which an organism no longer responds to a drug
  - A higher dose is required to achieve the same effect.
- Withdrawal
  - Manifested as a physical disturbance when the drug is removed (withdrawal)

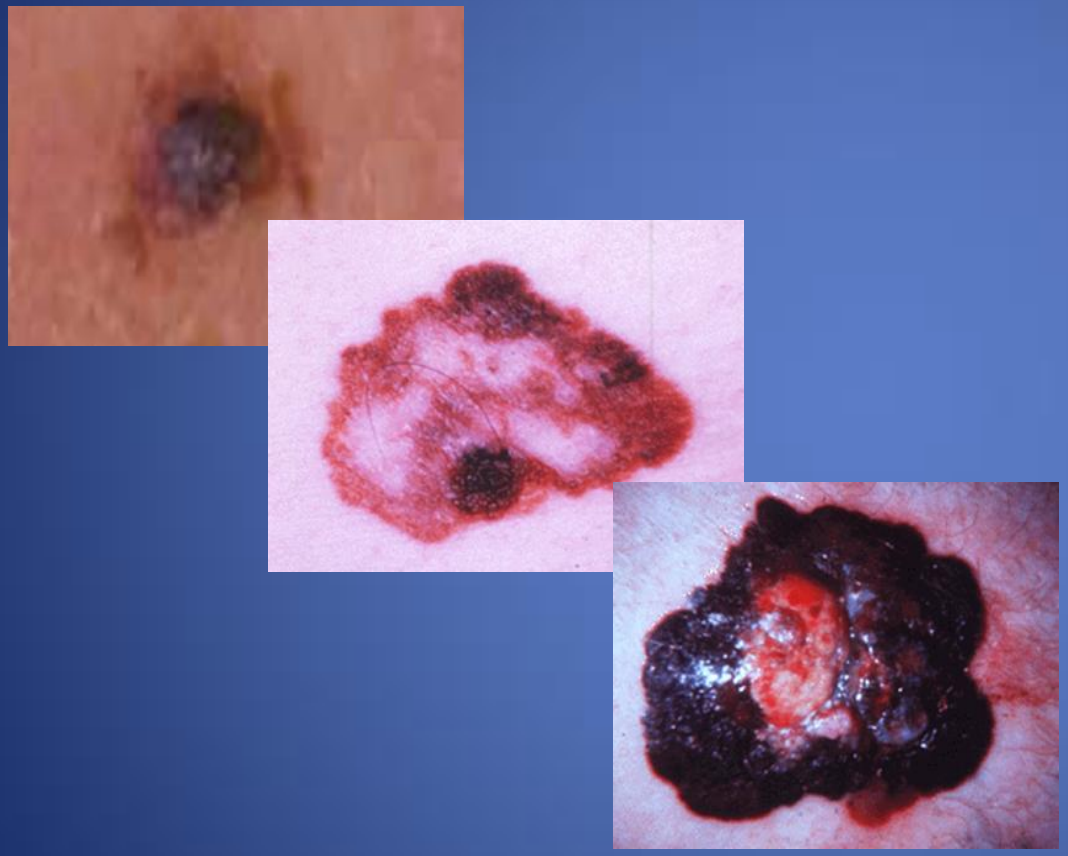
Addiction Progresses in Stages

- Substance use
- Substance Abuse (Risky Use)
- Substance Dependence / Addiction

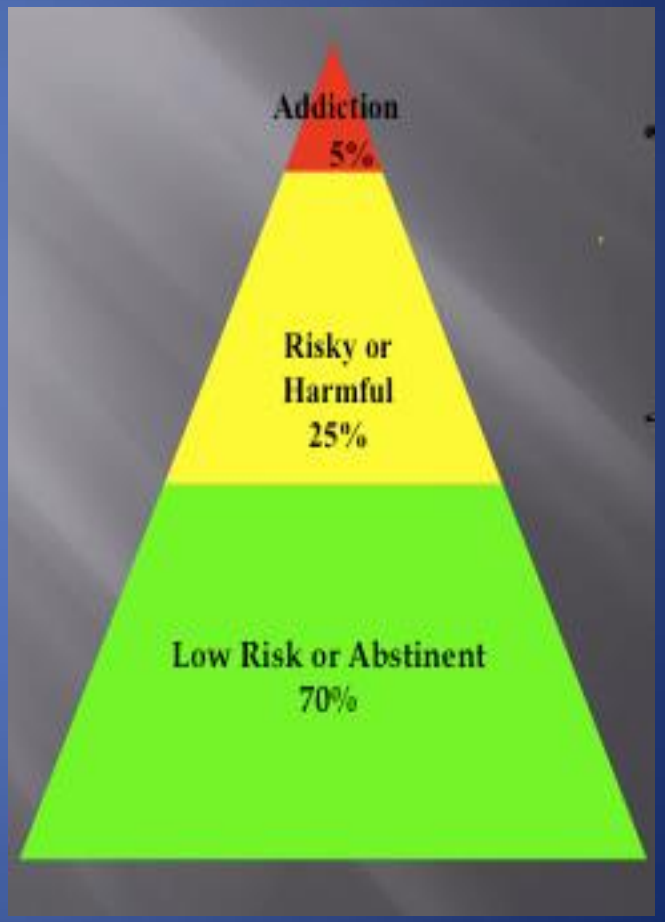
- DSM IV makes a clear distinction between substance abuse / addiction; the pattern of compulsive use is the distinguishing factor.

Predictable Natural Course

Addiction Progresses in Stages



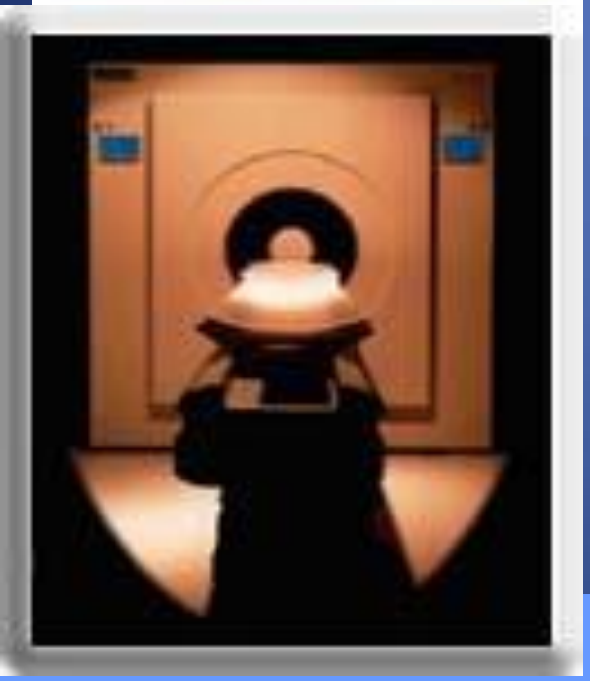
Cancer Progresses in Stages



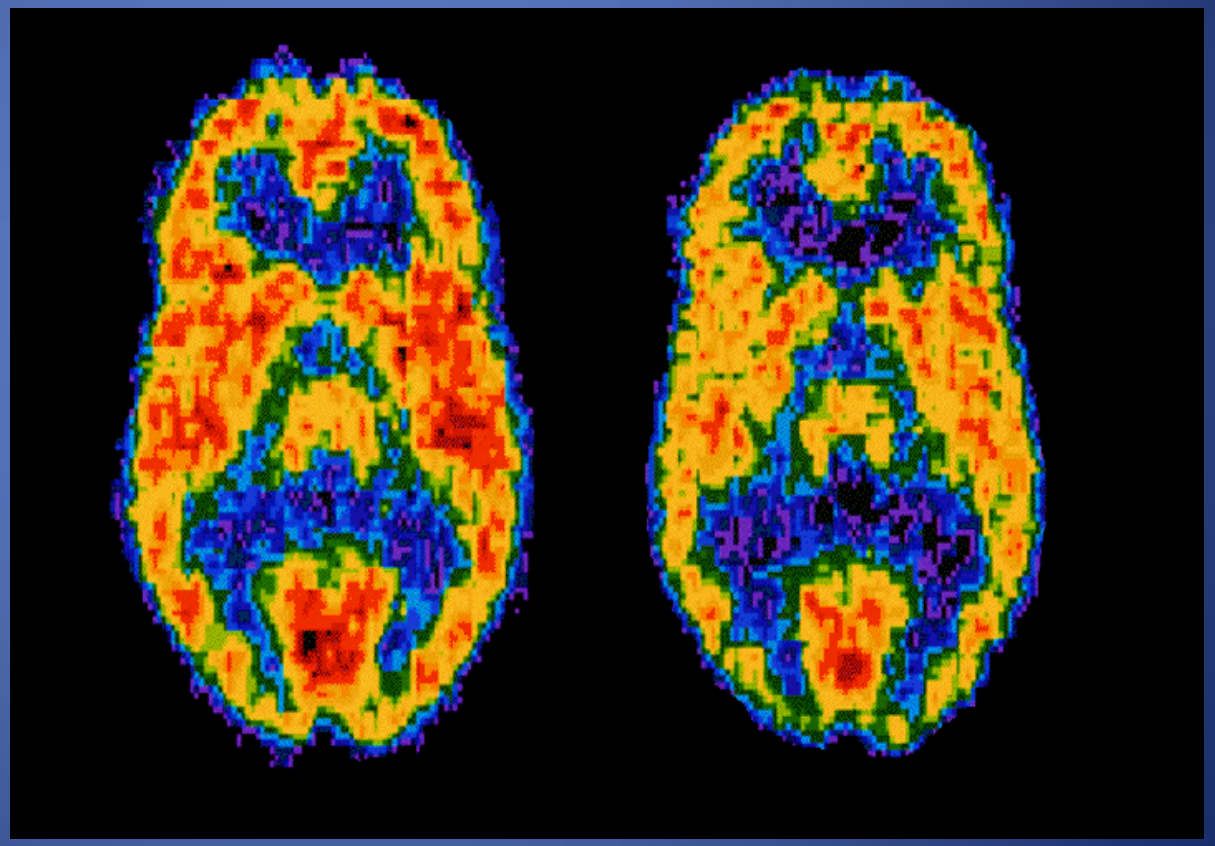
Substance Dependence as a Brain Disease

- Substance dependence: fundamentally, a brain disease
- Prolonged drug use changes the brain in fundamental and long-lasting ways
  - Both structural and functional
- Drugs change brain circuits and motivational priorities
  - More than simple pursuit of pleasure

Positron Emission Tomography (PET)



control on cocaine

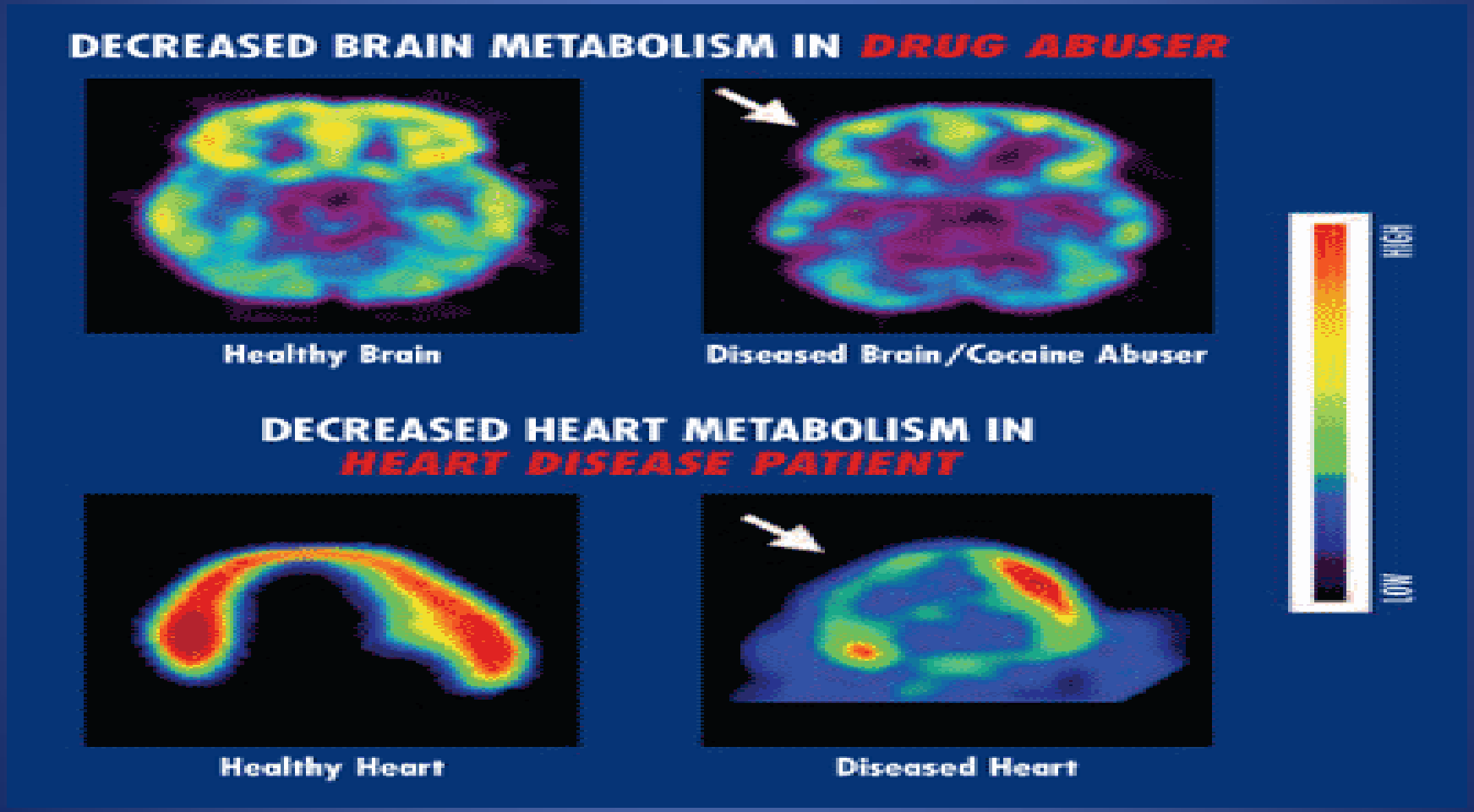


Addiction
A chronic Progressive disease

- Hypertension
- Type II Diabetes
- Atherosclerosis
- Asthma
- Obesity
- COPD

- Genetic Predisposition
- Environmental factors
- Social Factors
- Progressive over time
- Signs & Symptons
- Structural / Functional malady (defect)
- Risk Factors
- Protective Factors

Brain Disease / Heart disease



Risk Factors

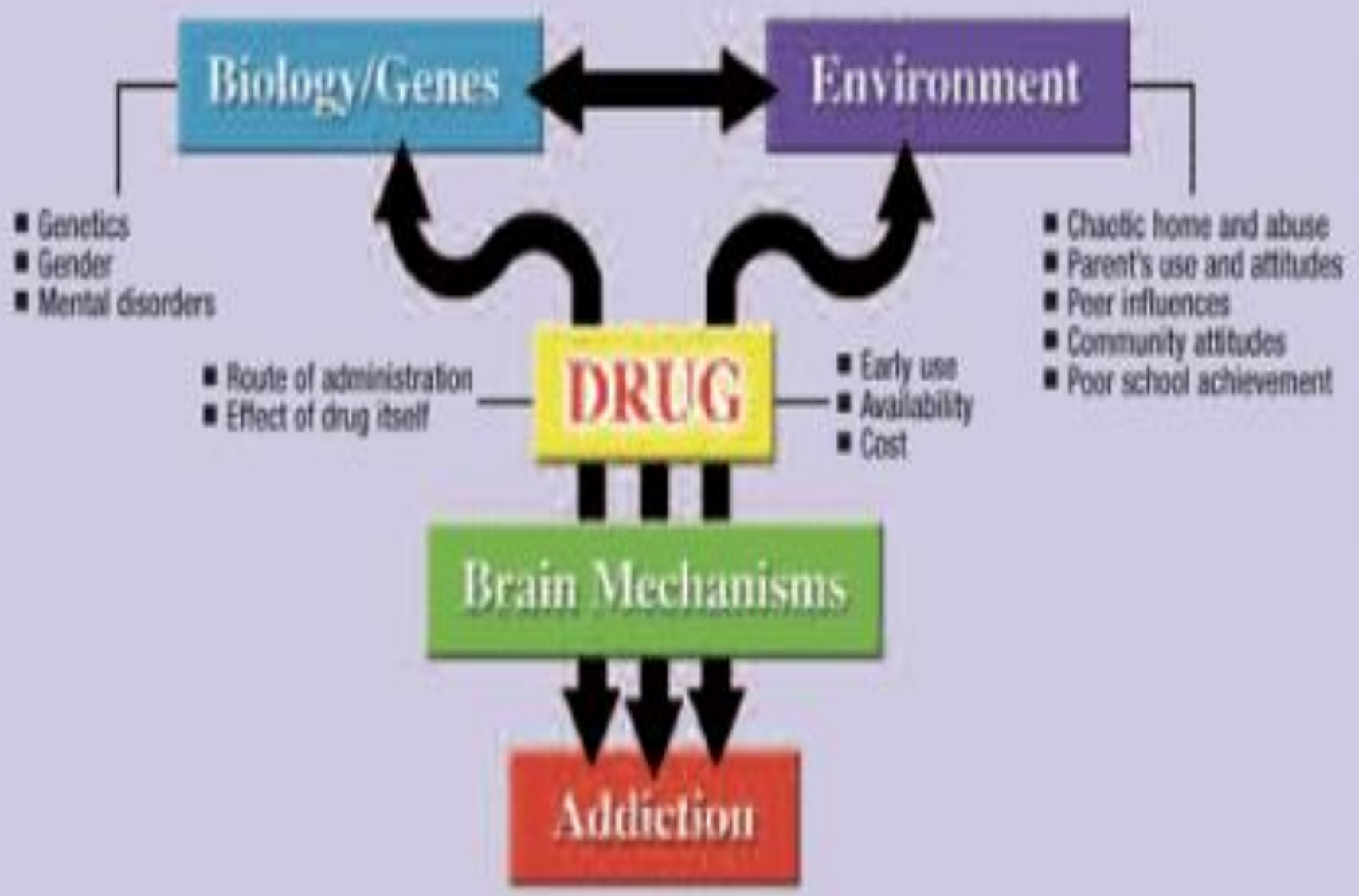
General Risk Factors

1. Psychological
2. Behavioral
3. Social
4. Demographic
5. Family
6. Genetics

Stress and Addiction are closely linked.

Increased stress creates a significant increase in risk for addiction.

RISK FACTORS



Occupational Hazard for Nurses

Workplace Risk Factors

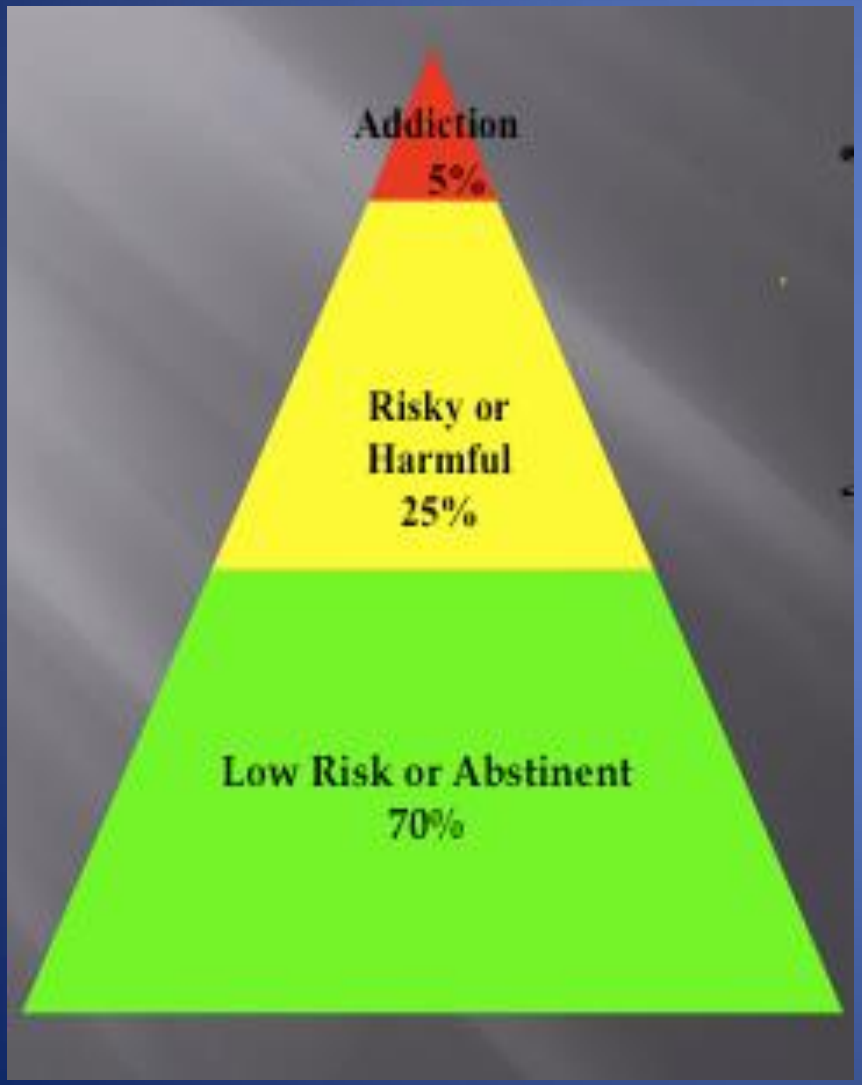
1. Stress
2. Access
3. Lack of Education
4. Attitude

- 5 Attitudes that increase risk for nurses.
  - Acceptable means of coping
  - Faith in what drugs can do to relieve stress & pain.
  - Sense of entitlement
  - Invulnerable
  - Accepting of self diagnosis and self medicating

Protective Factors

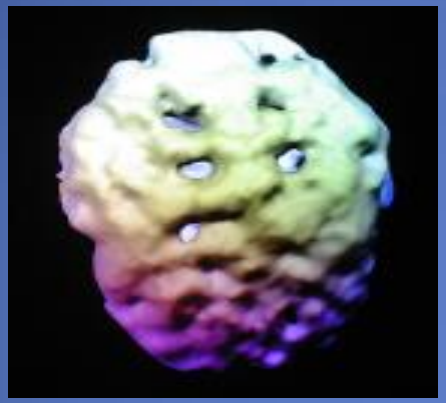
- Lifestyle Risk Reduction
  - Stress Reduction Activities
    - Exercise, Meditation, Yoga, Painting, Music
  - Healthy Lifestyle
    - Proper Nutrition, regular exercise
  - Healthy Relationships
    - Healthy emotional bonds with others
  - Healthy Work and Social Environments
    - Environments that support healthy living

Prevention / Treatment



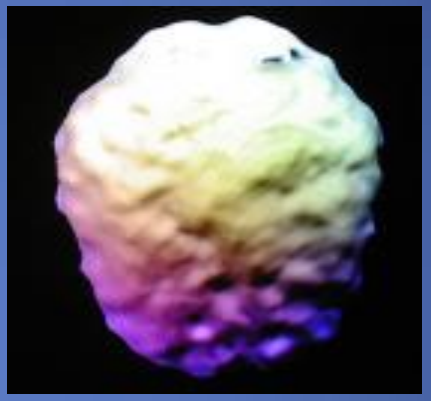
- Lifestyle Changes
- Behavior modification
- Outpatient Therapy
- Inpatient Treatment
- Pharmacotherapy
  - Medication coupled with adjunctive lifestyle modifications can be of great therapeutic benefit in treating addiction

Medical science requires assessing the target organ in conjunction with the behavior. For addiction, the target organ is the brain



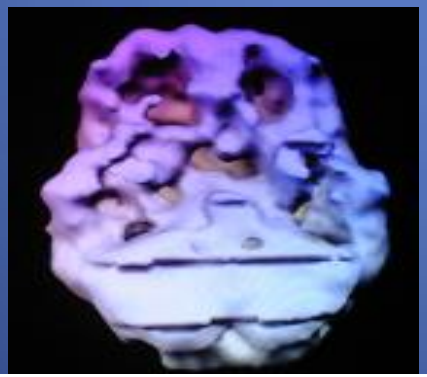
top down surface view

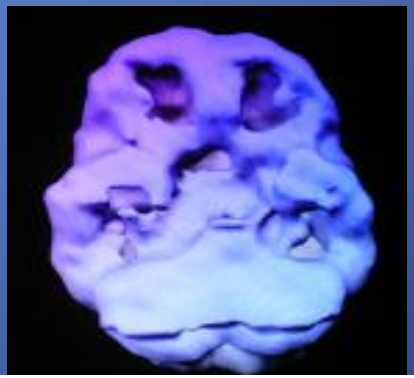
during substance abuse



top down surface view

after a year drug and alcohol free

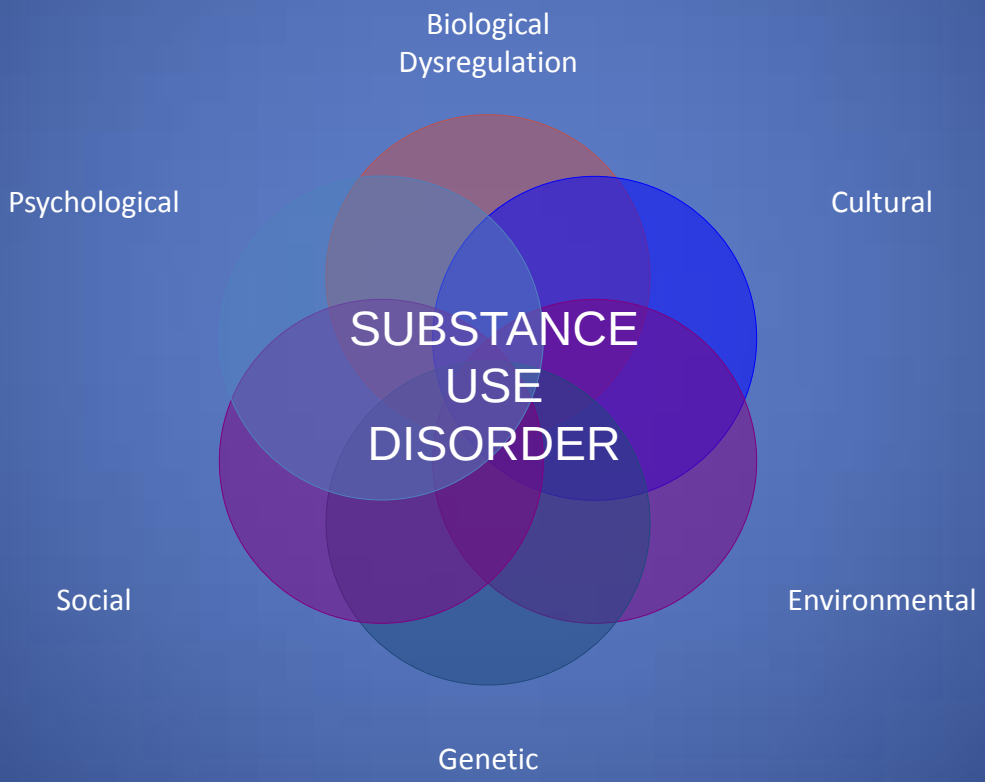




underside surface view

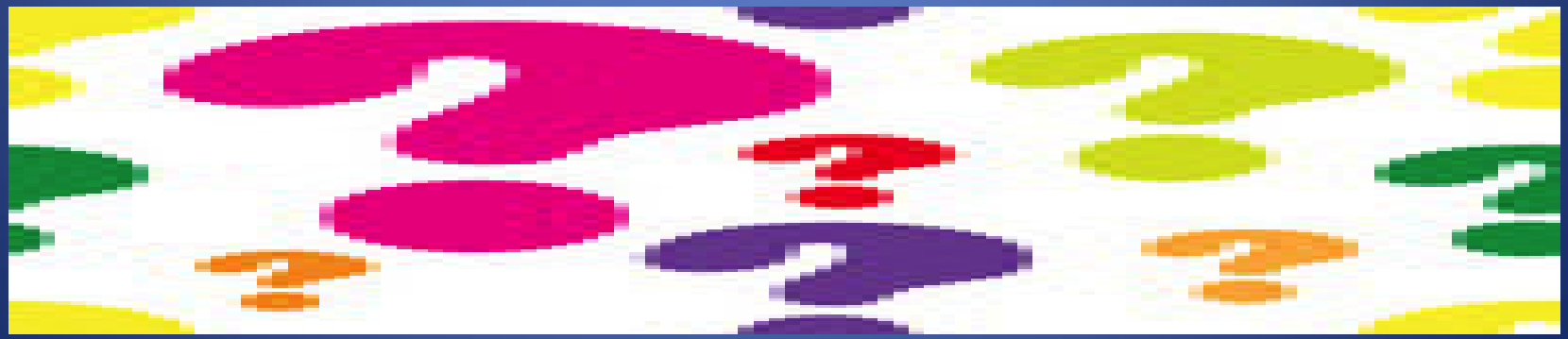
SPECT Images courtesy of D.G. Amen, MD

Etiology of Substance Dependence: A Multifactorial Neurologic Disorder



Thank You

Questions

Comments

Discussion