Addiction to Psychoactive Drugs

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With help from:

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- None

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Objectives

- Describe addiction as a brain disorder
- Describe differences between physical dependence and addiction
- List addictive substances and consequences
- Describe treatments for addictions

Psychoactive Drugs

- Drugs that affect mood, thinking, & behavior
- Drugs people are most likely to *misuse*
  - Often in ways that lead to *addiction*
- Can be legal or illegal
  - Alcohol and tobacco most commonly abused substances and they are *legal!*

Prevalence

- Estimated that 30 million Americans suffer from addiction to psychoactive drugs
- 30% report drinking to be a cause of family trouble
- 20% report problem with drug abuse
- Alcohol is drug most used by 12-17 year olds
  - Alcohol related car crashes #1 killer of teens

Prevalence

- More deaths & injuries caused by misuse of prescription drugs than use of all illegal drugs combined
- Annual healthcare costs exceed $124 billion
- Alcohol/drug abuse costs industry over $100 billion annually, mostly due to lost productivity
- At least 50% of all adults arrested for major crimes test (+) for drugs

Monitoring the Future Survey (2010 US data)

Drug use reported by 8th graders

- Alcohol=35%

- Any illicit drug use=21%
- Tobacco=20%
- Inhalants=14%
- Marijuana=17.3%
- Cocaine/Hallucinogens=1 - 4%
- MDMA=3.3%
- Prescription drugs=3%

Monitoring the Future Survey (2010 US data)

Drug use reported by 12th graders

- Alcohol=71%

- Any illicit drug use=48%
- Tobacco=42%
- Marijuana=43%
- Inhalants=9%
- Cocaine/Hallucinogens=2-8%
- MDMA=7.3%
- Prescription drugs=5-8%

March 2010 Update: Teen Drug Abuse in NC on the Rise

- Teens in grades 9-12 who used alcohol in the past month is up to nearly 40%
- Past-year ecstasy use increased by 67%
- Marijuana use increased by roughly 20%
- 75% of teens agree that their “friends usually get high at parties.”
- 56% of all teens believe prescription drugs are easier to get than illegal drugs
- For the full findings of the 2009 Parents Attitude Tracking Study, visit drugfreenc.org

History of Use

- Religious rituals
- Altering states of consciousness
- Recreation
- Relief from pain or distress

History of Use cont'd

- Alcohol- beer/hackleberry wine- 6400 BC
- Opium- "joy plant" in Asia Minor- 5000 BC
- Cannabis- tea for gout & absentmindedness in China- 2700 BC
- Cocaine- prepare Stone Agers for battle

History of Use in America

- 1492: Native Americans introduce Columbus & other explorers/settlers to variety of psychoactive plants such as tobacco & peyote
- 1600's: Europe introduces distilled spirits to colonies
- 1800's: Epidemic begins with use of drugs such as opium, morphine (soldier's disease), marijuana, heroin, & cocaine; all easy to obtain

History of Use (cont'd)

- Early 1900's: Amphetamines, inhalants, & tranquilizers introduced to society

- 1960's: Timothy Leary expounds on the mind-altering experience of LSD as a "feel good forever" answer to the realities of life– if it feels good, DO IT (Me-ism). With the introduction of hallucinogens, America had arrived!

History of Use (cont'd)

- Reasons people use alcohol & drugs have not changed much from the beginning of time as most users are still seeking:
  - An altered state of consciousness
  - A different perception of the world than is provided by normal day-to-day living
  - To ease emotional, physical, & societal discomfort

Who Is At Risk

- 1956- AMA formally recognizes the disease of addiction, declaring that:
  - The illness can be described
  - Course of the illness is predictable & progressive
  - The illness is primary- that is, it is not just a symptom of some other underlying disorder
  - It is permanent
  - It is terminal- if left untreated, it inevitably results in premature death

Why do some people become addicted, while others do not?

Bio/Psycho/Social/Spiritual Concept

- Biological Vulnerability (Genetic Factors)
- Psychological Liability (Emotional Distress)
- Social Access (Cultural Influences)
- Spiritual Emptiness (Why Was I Born)
- Addiction will only express itself when a person's biological vulnerabilities conspire with their psychological liabilities, social pressures (drug availability), & their individual sense of spiritual emptiness

Signs of Substance Abuse

- Changes in attendance at school or work
- Changes in mood, attitude
- Negative changes in appearance, personal hygiene
- Withdrawal from family & friends
- Outbreaks of temper, agitation
- Lying, stealing
- Unexplained weight loss or weight gain
- Financial problems
- Secretive and/or inconsistent behavior
- Sudden change in energy level (falling asleep in class or unable to sit still or stay seated)

Physical signs of Substance Abuse

- Bloodshot eyes (alcohol, marijuana)
- Watery eyes (heroin, opiates)
- Shakes, tremors, swaying, staggering
- Odors (alcohol, marijuana)
- Slow reactions, poor coordination (alcohol, marijuana)
- Runny nose/nasal sores (cocaine, amphetamines, heroin)
- Unsteady gait (alcohol, narcotics, marijuana)
- Slurred speech (stimulants, depressants, opiates)
- Dilated pupils (stimulants)
- Constricted pupils (depressants)

What is addiction?

- Difficulty controlling how much of a substance is used or for how long
- Continuing to use the substance even with negative consequences

Addiction

- A progressive disease
- A brain disorder
- Neurobiologic disease with genetic, psychosocial and environmental factors

Medical definition of addiction

- Based on criteria from the American Psychiatric Association (DSM-IV) and the World Health Organization (ICD-10)
- Must meet three of the following seven criteria during the same 12 month period

Addiction Criteria

- Tolerance
- Withdrawal
- Difficulty controlling use
- Negative consequences
- Significant time or emotional energy spent
- Neglected activities
- Desire to cut down on use

Basic truths

- Alcohol and nicotine are drugs
- Addiction is a brain disorder
- Addiction affects all ages, all races, and all socioeconomic groups
- Addiction can start at any age
- Addiction can happen with legal as well as illicit drugs
- Addiction is not a weakness

Dual Diagnoses

- Many people with substance abuse also have a diagnosed, or undiagnosed, mental illness
  - Bipolar
  - Depression
  - Schizophrenia
  - ADHD
  - Personality disorders

Genetics

- Addiction is due to about half genes and half to poor coping skills
- Children of addicts are 8 times more likely to develop an addiction
  - Heredity and environment
  - Genetics loads the gun, environment pulls the trigger
- Cross addictions are common

Addiction myths

- Must use every day
- Must have cravings
- Must have withdrawal
- Must have hit bottom
- Must have fancy definition

Addiction

- If you think you have an addiction, you probably do

Substance abuse

- Some people are not addicted to drugs but do abuse them

- Use – sporadic use without consequences
- Abuse – user experiences consequences, frequency varies
  - The binge drinker
  - The weekend cocaine user

Substance Abuse : DSM-IV

- Must meet one of these criteria:

- Continued use despite social or interpersonal problems
- Repeated use resulting in failure to complete obligations at work, school, or home

Substance abuse

- Continued criteria from DSM-IV:

- Repeated use which results in dangerous situations
- Use results in legal problems

Physical Dependence

- When the body adapts to a drug and experiences withdrawal upon abrupt cessation or rapid dose reduction or administration of an antagonist

Psychological Dependence

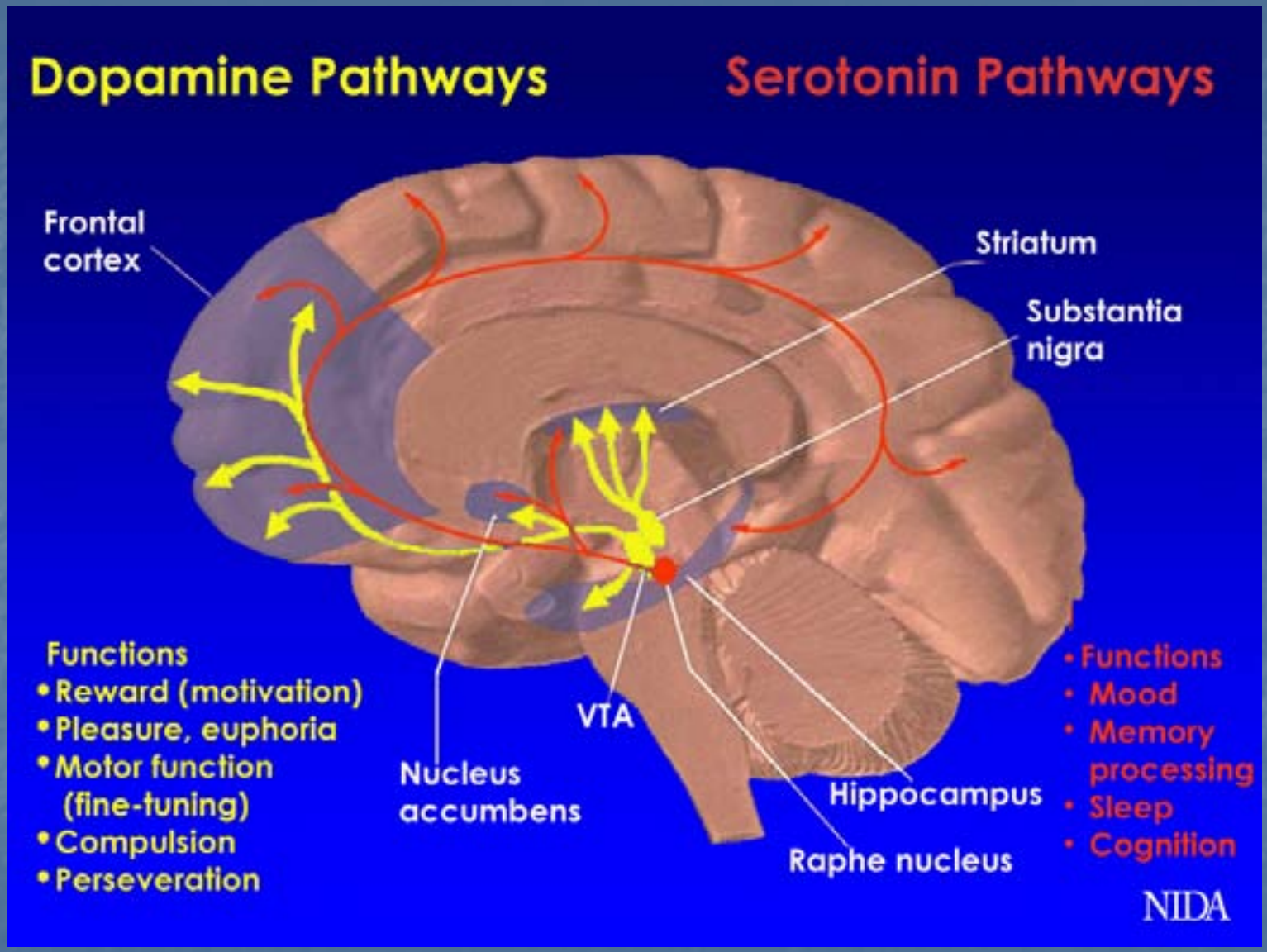
- A subjective need for a specific psychoactive substance either for its positive effects or to prevent negative effects when abstinent

The Brain

- The brain cells communicate through chemical messengers (neurotransmitters) released as a result of electrical impulses
- Chemical messengers include:
  - Dopamine
  - Serotonin
  - Norepinephrine and Epinephrine
  - GABA and Glutamate

The Brain and Addiction

- All drugs of abuse affect the limbic system in the brain – the “reward pathway”
- Response to pleasure is to release the neurotransmitter dopamine
- Dopamine is the “feel good” chemical messenger
- The brain desires more of it


Dopamine Pathways
Serotonin Pathways
Frontal cortex
Striatum
Substantia nigra
Functions
• Reward (motivation)
• Pleasure, euphoria
• Motor function (fine-tuning)
• Compulsion
• Perseveration
VTA
Nucleus accumbens
Hippocampus
Raphe nucleus
• Functions
• Mood
• Memory processing
• Sleep
• Cognition
NIDA

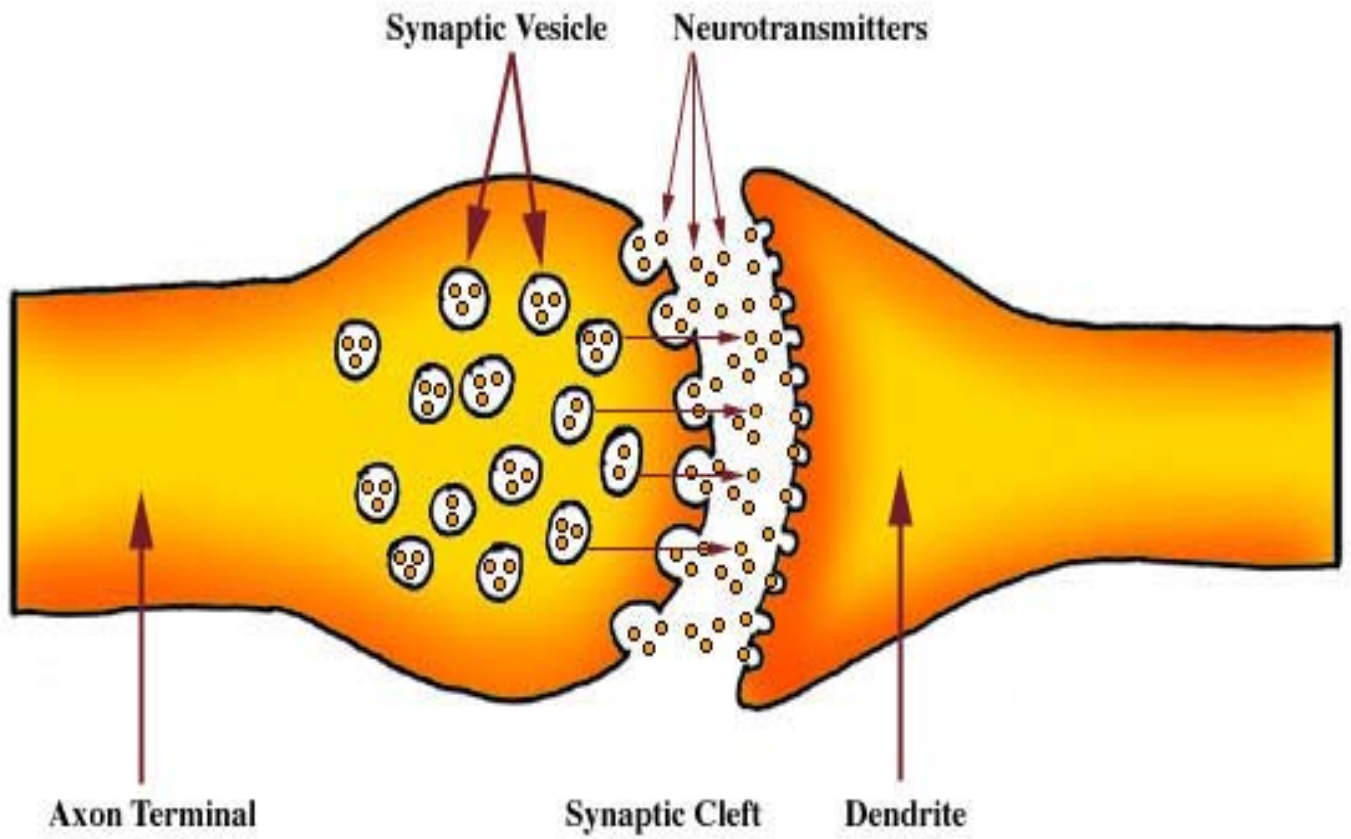
Drugs in the Brain

Drugs have the same size and shape and mimic the actions of the chemical messengers, but not perfectly

Drugs replace neurotransmitters in the nerve synapse, they take up the space

- The brain stops making neurotransmitters because it appears to be enough

THE SYNAPSE


Synaptic Vesicle
Neurotransmitters
Axon Terminal
Synaptic Cleft
Dendrite
WALTER CRANE

Drugs and the Brain

- The brain is wired to remember pleasurable feelings and strives to repeat those feelings – cravings
- After continued use, the brain needs more drug to get the same feeling - tolerance
- The concept of “normal” changes, the brain is rewired

Drugs and the Brain: Progression

Once the brain heals when the patient is clean for some time, it is not protected against drug use and addiction. If the person begins using again, the brain remembers and picks up where it left off after the last use.

Addiction is a chronic disease

Addictive Drugs

- Sedative-hypnotics
  - Alcohol, benzodiazepines, barbiturates
- Opioids
  - Heroin, prescription pain relievers
- Stimulants
  - Cocaine, methamphetamine, nicotine
- Other
  - Marijuana, hallucinogens, psychedelics
  - Designer drugs

Drug appeal

- Pharmacokinetics – duration of the high
- Pharmacodynamics – quality of the high
- Pharmaceutics – solubility and ability to crush or cut
- Market availability
- Route of administration convenience

Alcohol

- Very common
- Two-thirds of American adults drink
- About 10% of Americans abuse alcohol
- The third leading preventable cause of death
- Forty percent of traffic fatalities

Alcohol in Children/Teens

- Alcohol kills 6 ½ times more teenagers than all other illicit drugs combined
- 40% of those who started drinking age 13 or younger developed alcohol dependence later in life
- Teens that drink are 50 times more likely to use cocaine than teens who never consume alcohol

Alcohol

- Works on GABA and Glutamate
- Increases GABA, the calming neurotransmitter
- The increased GABA leads to a compensatory increase of glutamate, the excitatory neurotransmitter

Alcohol Abuse

- Medical consequences include:
  - Hypertension
  - Liver damage
  - Red blood cell damage
  - Depression

NIAA Drinking Criteria

- Moderate - low risk
  - Men, < 3 drinks per day
  - Women and age > 65, < 2 drinks per day
- Heavy drinking – at risk
  - Men, > 14 per week, or 4 per occasion
  - Women, > 7 per week, or 3 per occasion
- Binge drinking
  - Men > 5 and Women > 4 drinks in a row

Drink Sizes – 14 grams alcohol

- US Dept of Health and Human Services
  - 1 can of beer – 12 ounces
  - 1 glass of wine – 4 ounces
  - 1 shot of liquor – 1.5 ounces

Blood Alcohol Levels

- 0.02 to 0.03 percent
  - Mild sedation, normal behavior
- 0.03 to 0.05 percent
  - Euphoria, decreased inhibitions
- 0.06 to 0.1 percent
  - Excitation, memory impairment, motor impairment, increased reaction time

Blood Alcohol Levels

- 0.2 to 0.3 percent
  - Disorientation, ataxia, emotional outbursts
- 0.4 to 0.5 percent
  - Stupor, incontinence, inability to stand
- > 0.5 percent
  - Death, usually

Alcohol Withdrawal

- Minor withdrawal – 6 to 36 hours
  - Tremulousness, mild anxiety, headache, diaphoresis, palpitations, anorexia, GI upset
  - Normal mental status
- Seizures – 6 to 48 hours
  - Single or brief generalized tonic-clonic
  - Short post-ictal period

Alcohol Withdrawal

- Alcoholic hallucinosis – 12 to 48 hours
  - Visual, auditory, and/or tactile hallucinations with intact orientation and normal vital signs
- Delirium tremens – 48 to 96 hours
  - Delirium, agitation, tachycardia, hypertension, fever, diaphoresis, psychosis

Alcohol Withdrawal

- Acute withdrawal is treated with benzodiazepines (GABA)
  - Lorazepam (Ativan)
  - Clonazepam (Klonapin)
- Encephalopathy treated with lactulose to bind nitrogen
- Psychosis is treated with antipsychotics

Wernicke-Korsakoff

- Wernicke's encephalopathy
  - Thiamine deficiency leads to lack of glucose uptake in the brain, sometimes leading to lesions
- Korsakoff psychosis
  - Short term memory loss, psychosis, confabulation
  - Usually permanent if not treated

Alcohol Withdrawal

- Anxiety, insomnia, and autonomic dysfunction may persist for up to three months
- Alcoholism is a chronic disease
- Alcoholics are usually not successful as moderate drinkers

Abstinence Treatment

- Naltrexone
  - Opioid antagonist reduces the reinforcing effects of the first drink
  - ReVia 50 mg PO Q day
  - Vivitrol 380 mg IM Q 4 weeks
  - Contraindicated in opioid dependent patients
  - Side effects – GI, anxiety, HA, liver toxicity

Abstinence Treatment

- Disulfiram (Antabuse)
  - Antagonizes acetaldehyde dehydrogenase resulting in acetaldehyde toxicity leading to hypertension, nausea and vomiting, tachycardia if patient drinks
  - 500mg Q Day X 2 weeks, then 250 mg Q Day
  - Takes up to 14 days to clear

Abstinence Treatment

- Acamprosate (Campral)
  - Interacts with GABA and glutamate systems decreasing cravings and decreasing number of drinking occasions and amount of alcohol
  - 666 mg TID
  - Side effects – diarrhea, nausea, depression, anxiety

Abstinence Treatment

- Pharmacotherapy works best along with intensive outpatient programs such as AA
- Requires long term treatment

Benzodiazepines and Sedatives

- Diazepam (Valium)
- Chlordiazepoxide (Librium)
- Lorazepam (Ativan)
- Alprazolam (Xanax)
- Clonazepam (Klonapin)
- Barbiturates (phenobarbital, Fioricet)

BZDs and Sedatives

- Often legitimate prescriptions
- Used to treat anxiety disorders
- Sometimes used to treat sleep disorders
- May be used in pain disorders
- Those who abuse BZDs often abuse other drugs, but these drugs are not rated high on the scale of “liking”

Benzodiazepines

- High potential for abuse
- Short term use only
- Withdrawal/tolerance occurs after 1 month
- Can cause next day sedation
- Cognitive impairment, anterograde amnesia, respiratory depression
- Disinhibition, especially in elderly

Benzodiazepines

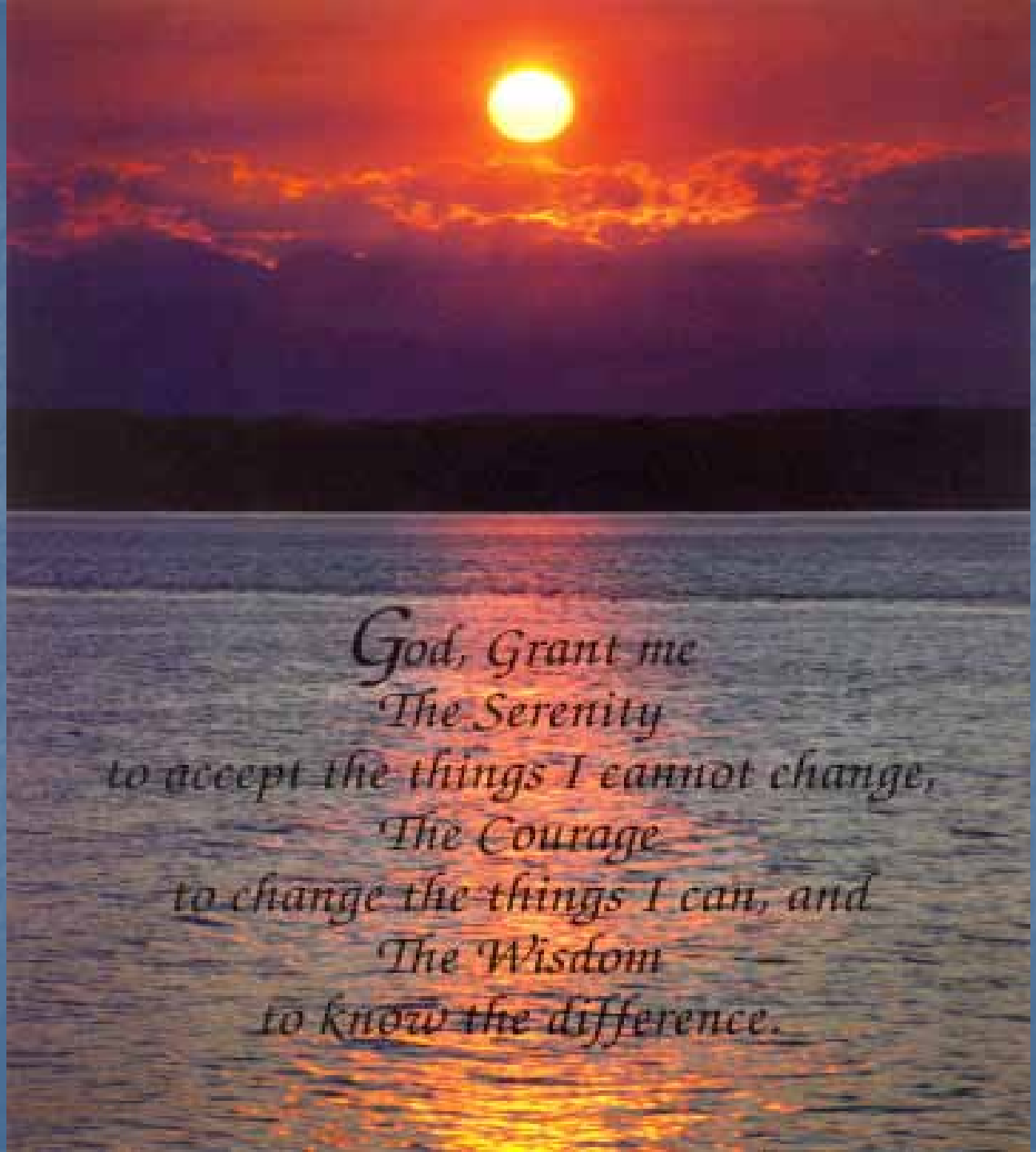
- Bind to the BZD binding sites on GABA-a
- Not the same site as GABA
- GABA enhances binding
- Affects frequency of opening of Cl channels

Benzodiazepines

- Often used with antidepressants
- Difficult to stop, must taper slowly
- BZDs with longer T ½ preferred in treatment
- T ½ increases in long acting BZD with continued administration

Benzodiazepines

- Most commonly abused
  - Diazepam (Valium) and alprazolam (Xanax)
  - Quicker onset of action


God, Grant me
The Serenity
to accept the things I cannot change,
The Courage
to change the things I can, and
The Wisdom
to know the difference.