

Seminar one:

# Flash Cards.



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Combining which two medications can prolong QTc intervals and lead to an increased cardiovascular risk?

Escitalopram and ziprasidone



What can happen if a patient takes valproic acid and lamotrigine?

The combination can lead to Stevens-Johnson syndrome. The provider should consider dose reduction of lamotrigine



Nicotine use...

Tobacco induces CYP1A2, sudden changes in smoking habits can result in medication fluctuation. The provider will need to adjust medications based on nicotine use



Grapefruit juice...

CYP3A4 inhibitor, can inhibit many psychotropic medications such as antidepressants, antipsychotics, benzodiazepines, stimulants, and mood stabilizers



Saint John's Wort

Dietary supplement available without prescription for the use of depression. It is a strong inducer of CYP3A4



Common drugs metabolized by the renal system?

Gabapentin, acamprostate, and lithium



Typically, benzodiazepines are avoided in patients experiencing hepatic dysfunction because they are metabolized by the liver.

Which benzodiazepines are safe for use with a patient that has hepatic failure?

Oxazepam (Serax), temazepam (Restoril), and lorazepam (Ativan)



Taking a MAOI and tyramine together can result in...

A hypertensive crisis

- Blood pressure is 180/120 mm Hg or greater; chest pain, shortness of breath, or symptoms of stroke. Stroke symptoms include numbness or tingling, trouble speaking, or changes in vision



Intellectual Disabilities

Usually present at birth and can affect a patient's physical, intellectual, and emotional development



Which medication can cause lithium levels to increase due to reduced renal clearance?

Lisinopril, thiazides, NSAIDS, and ACE inhibitors



What is the difference between hypomania and mania?

Duration and severity of DIG FAST symptoms



Impairments with the Clock Drawing Test indicate problems in the

Right parietal lobe (right hemisphere)



Which are stronger, inhibitors or inducers?

Inhibitors are stronger than inducers. If taking both, the inhibitor will increase the inducer drug, possibly causing toxicity. So, in this case, decrease the inducing drug



Before a patient is started on a stimulant, what do you check if they have a family history of CVD?

ECG



Intellectual Developmental Disorder

Occurs during the developmental period of life, and includes both intellectual and functional deficits in reasoning, problem-solving, and academics, with communication challenges, poor social interaction, and difficulties with independent living



Global Developmental Delay

Assigned to children under the age of five; the child fails to meet developmental milestones in both intellectual and functional areas of life. Ongoing assessment is required



## Language Disorder

Difficulties in spoken, written, and other forms of language due to comprehension or function deficits; vocabulary, inability to form sentences, and impaired communication structure



## Speech Sound Disorder

Challenges with clear articulation; complications for both understanding sound and being able to coordinate movement for sound (use of jaw, tongue, lips...)



## Childhood-Onset Fluency Disorder

Disruptions in fluency and patterns of speech (repetitious use, for example: I-I-I-I do not...)



## Autism Spectrum Disorder

- Impairments in social communication and restricted/repetitive interests and activities
- Perform restricted or repetitive patterns of behavior, interests and activities, and can become fixated on certain topics
- Stereotyped or repetitive movements
- Hypersensitivity to different stimuli
- Abnormal motor signs (poor coordination and/or a strange gate)



## Attention-Deficit/Hyperactivity Disorder

### Inattention and hyperactivity

- Poor school performance and disruptive behavior at school or at home: distractibility, task avoidance, ignoring details or instructions, easily misplacing or losing things, becoming hyper-focused, poor organizational skills, and/or failing to finish or accomplish a given task
- Unintentional and disruptive behavior, hyperactive/energetic actions, constantly interrupting, speaking or behaving in loud or unruly ways, putting off responsibilities (delaying), and being unable to sit still



## Tourette's Disorder

Both multiple motor and at least one vocal tic. The tics may come and go in frequency, but must have persisted for more than a year, and have occurred before the age of 18



## Persistent (Chronic) Motor or Vocal Tic Disorder

A single or multiple motor or vocal tics, but the two variations must not be present at the same time



## Provisional Tic Disorder

Single or multiple motor with or without a vocal tick that has been present for less than one year and has occurred before the age of 18



## Delusional Disorder

One or more delusions (a false belief), lasting one month or longer without marked impairment in bizarre or odd behavior. If the patient is experiencing hallucinations, they must not be prominent



## Brief Psychotic Disorder

One or more delusions, hallucinations, disorganized and/or incoherent communication patterns, and disorganized or catatonic (disrupted awareness) behavior that has lasted at least one day, but less than a month. After the ascending symptoms of sides, the patient returns to normal functioning



## Schizophreniform Disorder

Two or more delusions, hallucinations, disruptive communication patterns, disorganized or catatonic behaviors, and the presence of negative-type (emotional withdrawal, avolition) symptoms for a persistent amount of time during a one-month timeframe



## Schizophrenia

Unable to distinguish reality from falsehood. Positive symptoms include delusions, hallucinations, disorganized, speech, and catatonic behavior. Negative symptoms involve diminished emotional expression



## Schizoaffective Disorder

Symptoms associated with schizophrenia and accompanying symptoms related to a mood disorder



## Bipolar Disorder

- Involves both manic highs and depressive lows and extreme mood swings between the two. Mania = elevation of mood or energy, and symptoms include irritability, distractibility, impulsivity, grandiosity, flight of ideas
- Increased activity levels, an overall decrease in the need to sleep, and excessive talkativeness, with increased goal-directed activity
- 1 "fun" week and 2 "blue" weeks



## Cyclothymic Disorder

At least a two-year history of hypomanic symptoms, which do not meet the threshold for the hypomanic episode, with periods of depressive symptoms that are also not categorized as a major depressive episode



## Disruptive Mood Dysregulation Disorder

Age six and older with onset before the age of 10; marked by persistent irritability, anger, and extreme temper outbursts (either verbal or behavioral) that are disproportional to the situation that preceded the action(s)/mood



## Major Depressive Disorder

- Marked change in depressed mood (anhedonia) with symptoms of sleep disturbances; feelings of guilt or hopelessness; decreased interest in previously enjoyed activities; decreased energy, concentration, and appetite; retardation of speech and physical movement; and suicidal ideation
- 2 "blue weeks" with 5+ symptoms



## Persistent Depressive Disorder

Lasts for at least two years. The patient has at least two of the depressive symptoms listed above during the two-year period with symptoms lasting more than two months at a time



## Generalized Anxiety Disorder

- Persistent worry; manifest in both physical and physiological symptoms with changes in vital signs and mental stability
- Sweating, uneasiness, tachycardia, nausea, shortness of breath, loss of control, chest pain, muscle tension, irritability, decreased sleep, decreased energy, restlessness, and decreased attention span
- Occurs more days than not for at least six months with the patient finding it difficult to control the worry



## Separation Anxiety Disorder

- Excessive fear or anxiety when separated from an attached individual
- Results in distress, worry, seclusion, sleep disturbance, nightmares about the separation, and physical manifestations



## Selective Mutism

- Failure to speak in social situations that normally require communication
- Not related to another underlying condition



## Social Anxiety Disorder

- Increased fear or worry when placed in social situations
- The anxiety is disproportional to the actual threat that is posed within the social or sociocultural environment, and the avoidant behavior lasts for six months or more



## Panic Attack

- Brief period of marked intense mental and physical discomfort which is activated by the fear response
- Sweating, shaking, dizziness, disassociation, tachycardia, nausea, shortness of breath, fear of dying or going crazy, chest pain, and/or chills



## Panic Disorder

Recurrent panic attacks with persistent concern or worry about having additional panic attacks for at least a month



## Agoraphobia

Fear or panic when a patient is placed in a public or crowded place for which they believe cannot be escaped



## Obsessive-Compulsive Disorder

- Persistent and reoccurring thoughts, urges, or ideas that are unwanted, distressing, and mind-based. Obsessive thoughts are resistant, despite efforts to ignore, or suppress the obsession
- Obsessional thoughts are extremely distressing and can be seen by the patient as extremely inappropriate, disheartening, or even immoral. Patients are able to recognize the issues
- Compulsions are considered a counterbalance used to reduce the distress that is caused by obsessive and intrusive thoughts



## Body Dysmorphic Disorder

- Preoccupation with one's defects or physical flaws (even though others around them do not see the same issues)
- Results in repetitive behaviors; constantly checking on oneself in the mirror, excessively combing hair, picking at the skin, and comparing oneself to others regarding appearance



## Hoarding Disorder

Difficulty discarding or trashing personal possessions, because of a desire to save them and has nothing to do with concern over the monetary value



## Reactive Attachment Disorder

Child is unable to form healthy emotional bonds with caretakers, often because of emotional neglect or abuse at an early age and the child becomes emotionally withdrawn and rarely seeks comfort or attention (think foster care child)



## Post-traumatic Stress Disorder

- Trauma related to a violent or life-threatening event, that results in intense feelings and emotions such as fear, helplessness, and terror
- Must have been life threatening or a physical and/or sexually violent act
- Experience flashbacks of the event and can have moments of disassociation, nightmares, hyperarousal, hypervigilant
- Will often avoid people, places, and situations that may be associated with traumatic memory; may have delayed onset



## Acute Stress Disorder

- Exposed to a traumatic event, either witnessing or experiencing the event in person or watching it occur to someone else (close friend or family member)
- Followed by intrusive thoughts of the situation; nightmares or distressing dreams; flashbacks; depression; disassociation and/or dissociative amnesia; avoidance of thoughts, memories, or feelings pertaining to the event; sleep disturbances; and or irritability
- Lasts between three days to one month after the traumatic event with symptoms beginning immediately after the trauma



## Adjustment Disorders

Sadness, hopelessness, worry, and anxiety that develop within three months in response to a known and identifiable stressor



## Dissociative Identity Disorder

- Consistent patterns of derealization, depersonalization, and memory lapse culminating into a complete and separate identity state with identity fragmentation
- Completely different person from one situation to the next (two or more distinct personality states)



## Dissociative Amnesia

Episodic, retrograde amnesia of autobiographical content (personal information) that occurs in conjunction with or around the same time as a traumatic event



## Somatic Symptom Disorder

Distress, worry, anxiety, or alterations in normal functioning as a result of significant focus on physical conditions or symptoms (such as pain)



## Conversion Disorder

- Physical symptoms (motor or sensory), such as numbness, blindness, deafness, seizures, or other manifestation, yet has no underlying neurologic or medical diagnosis
- (Man goes blind after wife dies...)



## Factitious Disorder

- **Imposed on Self** – a false medical or psychiatric condition, where the patient deceives or misrepresents an illness or injury, in order to deceive (gain something in return)
- **Imposed on Another** – falsifying the physical or psychological symptoms, disease, or injury of another person, in order to deceive or mislead. The other person is considered a "victim" and in an abusive situation in which the perpetrator intentionally harms the other



## Pica

Eating disorder in which a person eats things not normally considered food



## Rumination Disorder

Repetitive regurgitation of food



## Avoidant/Restrictive Food Intake Disorder

- Failure to consume the required daily amount of nutritional food, due to a lack of interest or aversion to eating
- Significant weight loss and nutritional deficiency
- Self-sustain by consuming supplements



## Anorexia Nervosa

- Caloric restriction, low body weight (BMI), poor physical health, and developmental delays
- Extreme fear of being fat or gaining excessive weight with disregard the severity of the situation and can become obsessed with persistent behaviors designed to lose as much weight as possible
- Extremely underweight, nervous or fearful about gaining weight, has distorted perceptions about weight, and participates in extreme exercising or even purging patterns to lose weight



## Bulimia Nervosa

- Distorted eating that results in impulsive overeating, followed by compulsive purging (vomiting)
- Tied to self-esteem. Worries that being overweight will result in rejection by others
- Prevention can also occur through use of laxatives, diuretics, and fasting



## Enuresis

- Repeated urination in bed or when wearing clothes
- At least 5 years old



## Encopresis

Involuntary or intentional act of defecating in inappropriate places. At least 4 years old



## Insomnia Disorder

- Difficulties falling asleep, staying asleep, or waking up too early
- Erratic sleep patterns and loss of sleep result in significant stress and dysfunction
- Result in irritability, fatigue, and inattention



## Narcolepsy

- Neurological disorder; excessive daytime sleepiness, suddenly falling asleep without warning or desire
- Muscle paralysis while awake (cataplexy), vivid hallucinations during transitions from sleep to wakefulness or vice versa, suddenly falling asleep, and sleep paralysis



## Gender Dysphoria

- Mismatch between a patient's biological sex assigned at birth and their own personal gender identity
- Strong desire to be another gender and like to participate in events such as cross dressing or showing preferences for activities that are commonly gender-categorized. Desire to outwardly manifest primary and/or secondary gender specific characteristics to which they identify



## Oppositional Defiant Disorder

- Starting before age 8, but no later than age 12
- Patterns of angry and irritable mood with argumentative, defiant behavior and include erratic temper, being easily annoyed, argumentative with authority figures/other children/adults. Will refuse to follow rules or listen to anyone in authority
- Tries to annoy others seek to blame others for their own mistakes and behavior



## Intermittent Explosive Disorder

- Behavioral outbursts defined by inability to control aggression and resulting in temper tantrums and physical fighting/aggression toward others, animals or property
- Are impulsive and not planned occurrences and result in significant problems both at home and in school and can occur in children of at least 6 years in age



## Conduct Disorder

- Known bully who threatens and intimidates; behaviors that violate the basic rights of others
- Intimidation, participating in physical fighting, use of a weapon with the intent to harm, animal cruelty, extortion, armed robbery, destruction of property, and deliberately disobeying rules.
- Children under the age of 18



## Antisocial Personality Disorder

- Over the age of 18 with persistent patterns of behavior that intrude or infringe on the basic rights of others to include deception, aggression, violence, theft, and cruelty
- Criminals with impulsive disregard for safety; liars with extreme aggression and a propensity for irresponsible behavior with extreme remorselessness



## Pyromania

- Start a fire on more than one occasion
- Can become aroused and excited just prior to setting the fire; fascinated with intense curiosity and attraction towards situations involving fire; sense of relief and satisfaction



## Kleptomania

- Need to steal based on impulse/emotion and not for financial gain; sense of tension and excitement during and immediately after the act
- Great pleasure and satisfaction in stealing and is not in response to anger or psychosis



## Substance Use Disorder

- Use of substances or medications that impair control, result in physical dependence, complicate social and interpersonal relationships, and are often associated with risky behavior and impulsivity
- Unable to decrease use or stop



## Alcohol Use Disorder

- Persistent pattern of alcohol use
- History of unsuccessfully stopping or cutting down and spending a great deal of time and money
- Done to cope with challenges at home and work; can result in tolerance



## Delirium

- Disturbance in attention with reduction in ability to focus and remain aware
- Occurs within hours to a few days and is a marked change from baseline
- Memory deficit, disorientation, changes in language, or perception



## Alzheimer's Disease

- Most common type of dementia
- Loss of memory and cognitive decline with a decrease in neural activity in the parietal cortex, hippocampus, and basal forebrain
- Must have a clear decline in memory and learning with a steady progressive decline in cognition



## Frontotemporal Neurocognitive Disorder

- Frontotemporal dementia, damaged neurons in the frontal and temporal lobes of the brain
- Slow and steady progression with marked behavioral changes, apathetic behavior, compulsive or ritualistic type behavior, language degradation, and memory/perceptual motor functioning complications



## Lewy Body Dementia

- Abnormal deposits of a protein resulting in chemical alterations in the brain which can lead to a slow and gradual progression of changes in cognition, attention, and alertness
- Recurrent visual hallucinations and parkinsonian-like movements



## Vascular Neurocognitive Disorder

- Progressive cognitive deficits; changes in executive functioning (confusion; attention and concentration difficulties; disorganization; inability to analyze, develop, or communicate thoughts and plans to others)
- Decreased cerebral blood flow to the brain
- Sudden and stepwise decline



## Traumatic Brain Injury (TBI)

- Caused by sports injury, car accident, penetrating object, or damage by a blunt object
- Dizziness, loss of consciousness, coma, subdural or subarachnoid hemorrhaging and/or cerebral edema; decreased or lost autonomic nervous system function



## Human immunodeficiency virus (HIV)

- Neurocognitive; earliest stages include impairment in concentration, memory, and executive functioning with progressive psychomotor retardation, depression, irritability
- Motor degradation overtime



## Prion Disease

- Normal prion proteins become abnormally folded causing memory impairment, personality changes, and difficulties with movement
- (Bovine Spongiform Encephalopathy)



## Parkinson's Disease

- Deterioration of dopamine-releasing neurons in the substantia nigra
- Tremors, unsteady movements, loss of balance, pill-rolling movement in their hand, bradykinesia, stiffness, and facial masking



## Huntington's Disease

- Hereditary and progressive; mutation in the HTT gene
- Chorea, involuntary jerking, and hand-flapping movements. Progressive cognitive decline and is fatal within 10-20 years following a diagnosis



## Paranoid Personality Disorder

- Distrust and suspicion of others; doubt loyalty and trustworthiness and are reluctant to confide in others
- Unforgiving and quick to anger and/or attack, and can be suspicious of loved ones



## Schizoid Personality Disorder

- Detachment from social relationships with restricted expression and emotions within personal settings
- **Avoid** close relationships; primarily loners with little to no interest in sexual relationships and can be cold



## Schizotypal Personality Disorder

- Marked social and interpersonal deficits
- Inability to form close relationships; cognitive or perceptual distortions to include delusions, magical thinking, superstitious beliefs, and can be paranoid



## Antisocial Personality Disorder

Behavior that violates the rights of others and includes purposeful deception, aggression, and violence



## Borderline Personality Disorder

- Instability with mood, affect, behavior, relationships, and identity
- Dysphoric and emotionally unstable, can have suicidal and homicidal tendencies, may experience psychosis-like and dissociative symptoms, and are quick to anger and be negative
- Relationships are often short lived and unstable; sensitive to interpersonal rejection, yet attempt to avoid abandonment



## Histrionic Personality Disorder

- Pattern of exaggerated emotionality and attention-seeking behaviors
- Uncomfortable in situations where not the center of attention and interaction with others can result in inappropriate sexual or provocative behavior
- Expressions of emotion are rapidly changing and insincere; believe relationships to be more romantic and intimate than they are in reality



## Narcissistic Personality Disorder

- Need for admiration and extremely self-centered
- Exaggerate talents and achievements, and become preoccupied with power, success, beauty, and an idealistic way of life; seek attention and admiration. A total sense of entitlement



## Avoidant Personality Disorder

- Avoid others; however, unlike schizoid, they **do** desire personal interaction and relationships
- Chronic self-doubters and are extremely sensitive to the idea of rejection



## Dependent Personality Disorder

- Heavily rely upon others in multiple areas of life; to make decisions and to give them a sense of purpose
- Pathologically agreeable and avoid conflict at all costs to avoid losing a relationship; extremely maladaptive and gullible



## Obsessive-Compulsive Personality Disorder

- Emotional and behavioral rigidity with a need to have total control and order; avoid new experiences and are inflexible to change.
- Believe that their way is the “right way.”



## Cerebrum

- Largest part of the brain
- Responsible for all higher order functions (learning, memory, communication, sensation, and movement)
- Divided into a left and right hemisphere by the longitudinal fissure



Corpus callosum

Connects the two left and right hemispheres and allows for communication (essential for normal functioning)



Left hemisphere

Dominant for most people and controls right-side functions



Right hemisphere

Controls most of the left-sided functions of the body



Cerebral cortex

- Outer most layer of the cerebrum and is made up of neuron cell bodies
- Responsible for many of the human "higher functions"
- Divided into four lobes - FPOT: the frontal lobe, the parietal lobe, the occipital lobe, and the temporal lobe



## Cerebellum

- Located behind the cerebrum
- Responsible for coordination of complex movements, balance, and posture
- Dysfunctional cerebellum will cause a patient to have erratic and uncoordinated movements



## Brainstem

- Midbrain, pons, and medulla oblongata
- Responsible for the most basic and vital human functions such as breathing, maintaining a heartbeat, sleeping, and other primitive functions



## Midbrain

Relay system; plays an important role in vision and hearing as well as motor control, sleep/wake cycles, alertness, and temperature regulation



## Pons

- Connects the medulla oblongata and the thalamus
- Responsible for relaying impulses from the motor cortex to the cerebellum, medulla, and thalamus



## Medulla oblongata

- Responsible for autonomic functions (heartbeat, blood pressure; reflexes – vomiting, swallowing, and sneezing)
- Regulates the respiratory system via chemoreceptors that can detect changes in blood chemistry

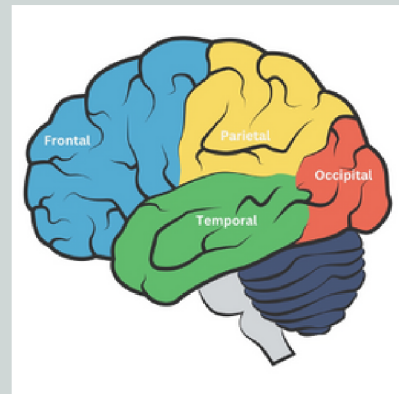


## Spinal cord

- Main connection for neurons traveling between the brain and all other organs throughout the body
- Any trauma caused by external forces or pathological reasons (disease), along this delivery system, will affect and hinder functions at and below the location



## Lobes of the brain



## Frontal lobe

- "Brainiest" part of the brain
- Executive functioning (decision making); think, plan, solve, decide, emotional behavior)



Damage to frontal cortex will cause

Damage to the frontal cortex can disrupt basic instincts and patients can be impulsive with inappropriate and have strange behavior



Primary motor cortex

Controls voluntary movements, such as giving a thumbs up, or shooting a basketball



Broca's area

Found within the frontal lobe; responsible for language production. Damage to this area can result in expressive aphasia



Temporal lobe

- Located on the lower side of the cerebrum, just above the ears
- This is the auditory cortex. Auditory sensory information from the ears is processed within the auditory cortex



## Wernicke's area

- Located in the temporal lobe
- Responsible for receptive speech or language comprehension. Damage to this area can result in receptive aphasia



Memory formation and emotion also occur in the...

- Temporal lobe
- Complications within the temporal lobe can result in hallucinations, aphasia, and amnesia



## Occipital lobe

- Primary visual cortex - back of the brain
- Sensory information coming from the eyes will travel to the occipital cortex and will be processed into what is seen
- Problems in the occipital lobe can lead to visual field deficits, blindness, and visual hallucinations

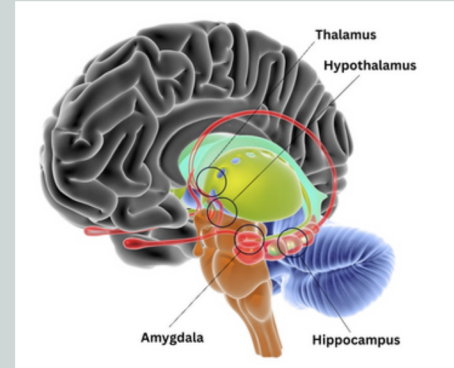


## Parietal lobe

- Located just behind the frontal lobe and separated by the central sulcus
- Processes sensory information within the somatosensory cortex - taste, reading, and writing
- Complications within the parietal lobe could cause sensory-perceptual disturbances in perceptions resulting in increased, decreased, or distorted hearing; vision; touch sensation; smell or kinesthetic responses to stimuli



## The Limbic System



## The Limbic System

Essential for the regulation of emotion, memory, motivation, and behavior



## Hypothalamus

Appetite, hunger, thirst, water balance, circadian rhythms, body temperature regulation, libido, and hormone regulation



## Thalamus

Smell and flow of sensory information; regulates emotions, memory, and related affective behaviors



## Hippocampus

Converts short-term memory into long-term memory. Regulates motivation, stress, emotion, and learning



## Amygdala

Mediates mood, emotional memories, fear, anxiety, anger, stress, emotion, and aggression



Increased levels of corticotropin releasing hormones in the amygdala, hippocampus and locus coeruleus can cause?

Increased anxiety



## Broca's aphasia (expressive aphasia)

- Can occur due to a stroke, brain tumor, or brain trauma
- A patient may have difficulty producing speech. They can understand and know what they want to say, but are not able to form words used in verbal communication



## Wernicke's aphasia

- Can happen as a result of hemorrhagic or ischemic stroke
- A patient may speak clearly and produce speech, but their speech has no meaning and may have difficulty understanding language



## Cranial Nerve I (CN 1)

Olfactory: Sense of smell and patency of the nasal passages



## CN II (CN 2)

Optic: Vision



## CN III (CN 3)

Oculomotor: Motor – adjust and coordinate eye position during movement. Move and blink eyes; pupils: reactions to light and accommodation; corneal reflex



## CN IV (CN 4)

Trochlear: Motor – innervates superior oblique muscle to lift the eyes to look down. The nerve also enables the eyes movement toward the nose or away from it



## CN V (CN 5)

Trigeminal: Sensations in face and cheeks, taste and jaw movements; biting, chewing and swallowing, and facial and scalp sensations



## CN VI (CN 6)

Abducens: Motor – innervates the ipsilateral lateral rectus muscle with partially innervation of the contralateral medial rectus muscle to produce lateral eyeball movement



## CN VII (CN 7)

Facial: Facial expressions and sense of taste



CN VIII (CN 8)

Vestibulocochlear: Sense of hearing and balance



CN IX (CN 9)

Glossopharyngeal: Ability to taste and swallow



CN X (CN 10)

Vagus: Elevation of uvula and gag reflex



CN XI (CN 11)

Accessory: Shoulder and neck muscle movement



CN XII (12)

Hypoglossal: Ability to move the tongue



Norepinephrine

Produced in the locus coeruleus and medullary reticular formation



Serotonin

Produced in the raphe nuclei of the brainstem



Dopamine

Produced in the substantia nigra, nucleus accumbens, and ventral tegmental area (VTA)



Acetylcholine

Synthesized by the nucleus  
basalis of Meynert



$\gamma$ -Aminobutyric acid (GABA)

- The most abundant inhibitory neurotransmitter
- This is the calming neurotransmitter
- A decrease in GABA will increase anxiety



Which drug class binds with GABA to "calm"  
a patient?

Benzodiazepines



Glutamate

The most abundant excitatory  
neurotransmitter. Too much  
glutamate will cause anxiety



## Pharmacokinetics

How the body interacts with administered medications – what the **BODY** does to the drug



## Pharmacodynamics

How a drug (via molecular, biochemical, and physiologic effects or actions) affects the body – what the **DRUG** does to the body



## Agonist effect

When a drug binds to a receptor and **ACTIVATES** or opens the ion channel



## Inverse agonist effect

When a drug causes the **OPPOSITE EFFECT** of an agonist: binding and closing an ion channel



Partial agonist effect

When a drug DOES NOT FULLY ACTIVATE the ion channel (less effective than an agonist)



Antagonist effect

When a drug binds to a receptor and it DOES NOT ACTIVATE a biological response



It takes how many *half-lives* to eliminate a medication form the body?

5



A drug-drug interaction can cause...

- Delayed, decreased, or enhanced absorption of either drug
- Decrease or increase the action of either or both drugs
- Adverse effects



If a patient is taking sertraline (Zoloft) and begins taking the mood stabilizer carbamazepine (Tegretol), what will occur?

Carbamazepine (Tegretol) is a known inducer. The inducer speeds up the metabolism of the other drug. So, sertraline metabolism **INCREASES**, resulting in an overall **DECREASE** in drug effectiveness



If a patient is taking sertraline (Zoloft) and begins taking ritonavir (Norvir; a HIV retroviral), what will occur?

Ritonavir (Norvir; a HIV retroviral) is a strong inhibitor, resulting in **DECREASED** metabolism of Zoloft and an overall **INCREASE** in the amount of sertraline (Zoloft) in the system



How does liver disease impact enzyme activity and first pass metabolism?

- Reduces drug clearance
- Reduces the synthesis of plasma proteins and causing changes in liver blood flow and medication distribution
- Results in **TOXIC** (high) drug levels (this can vary based on the chemical characteristics of the medication and severity of liver disease)



How does reduced kidney clearance effect medications?

Reduction in kidney clearance can **INCREASE** drug serum concentrations resulting in symptoms such as confusion, tremors, slurred speech, and vomiting