

Psychotropic Drugs – Critical Thinking

Background: The blood-brain barrier is a network of tightly packed cells in the walls of capillaries that prevents many harmful substances, including some poisons, from entering the brain and spinal cord. In order to produce changes in thought, mood, perception, or behavior a drug must be capable of crossing this barrier. Drugs capable of penetrating the blood-brain barrier are called psychotropic or psychoactive drugs.

Part I

Directions: Complete the following by filling in the missing term. In some cases, a word choice has been provide (*Information for this exercise was obtained from the website of the National Institute on Drug Abuse*).

1. THC, the active ingredient in the drug marijuana mimics the natural neurotransmitter anandamide making this an _____ (agonist or antagonist) drug. The brain uses the neurotransmitter anandamide remove unnecessary short-term memories. The drug THC acts like anandamide and accelerates this process. Which brain area is impacted by the THC in marijuana? _____

2. Ecstasy or MDMA can be placed into either of two drug categories. Ecstasy increases heart rate and can cause muscle spasms, which is why it can be classified as a _____ drug but the fact that it causes distorted perceptions makes this also a _____ drug.

3. Ecstasy or MDMA mimics the natural neurotransmitters serotonin and dopamine making this an _____ (agonist or antagonist) drug. Ecstasy impacts serotonin pathways related to mood, sleep, aggression, appetite, anxiety, memory, perception, and appetite.

Both ecstasy and methamphetamine interfere with the body's ability to regulate internal temperature. On unpredictable occasions, this can lead to a sharp increase in body temperature (hyperthermia), which can result in liver, kidney, or cardiovascular system failure or even death. Which area of the brain is being disrupted when hyperthermia occurs as a result of ecstasy or methamphetamine use? _____

Ecstasy can result in influence strong emotions related to fear and anxiety and alter memory. Which group of brain structures is being disrupted when MDMA alters emotions and memory? _____.

4. Marijuana and alcohol both impair fine motor coordination and balance. As a result driving ability is impaired because these drugs have depressed brain area responsible for this function. Which area of the brain has been impaired if an individual has a loss of balance and fine motor coordination? _____

5. When individuals are under the influence of alcohol they are less inhibited because the areas of the brain responsible for decision-making, reason, planning, and risk evaluation are depressed. Which area of the brain is being slowed down as a result of alcohol causing these cognitive and behavioral changes? _____
6. Individuals who are under the influence of cocaine experience elevated heart and respiratory rates that can become life threatening. Which area of the brain is causing these physiological changes? _____ In which drug category should cocaine be classified? _____
7. Individuals who abuse steroids, methamphetamine or prescription stimulants may experience high levels of anxiety and hostility by affecting many different parts of the brain, including the _____, which is a subcortical structure that controls strong emotions.
8. Although the various drugs classified as CNS depressants work differently, they all have a calming or drowsiness-inducing effect because they increase the transmission of the major inhibitory neurotransmitter _____, which is why some are used for sleep disturbances and anxiety. CNS depressants increase the transmission of a particular neurotransmitter making them _____ (agonist or antagonist) drugs.
9. Drugs (such as opioids) with addictive properties work on the reward pathway in the brain by increasing transmission of the pleasure producing neurotransmitter _____ and the body's natural pain relieving neurotransmitter _____.
10. Individuals under the influence of cocaine may experience surges of adrenaline due to the overstimulation of the part of the brain responsible for regulating the fight or flight response. The result can be hyper-alertness, paranoia, and aggression. What area of the brain controls the fight or flight reaction? _____
11. Individuals sometimes find that the day after drinking alcohol that they cannot recall some or all of the events that occurred when they were drinking. Which brain structure that is responsible for encoding new memories was likely not functioning due to the depressant alcohol? _____
12. Which area of the hindbrain is impaired when heroin or alcohol depresses the area of the brain responsible for heart rate and breathing? _____

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Part II

Directions: Listed below are several brain parts. For each brain part listed, indicate how an individual's behavior might be changed if a psychotropic drug crossed the blood brain barrier and impacted that brain part. You may use the same drug more than one time.

Use at least one drug from each of the following categories:

- Depressant
- Stimulant
- Opioid

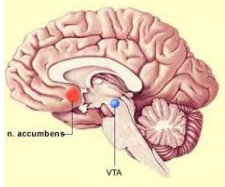
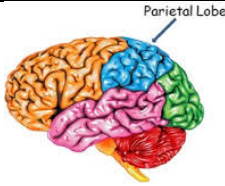
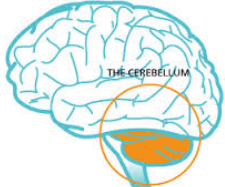
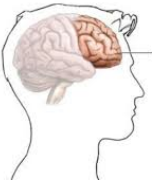
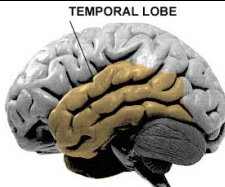
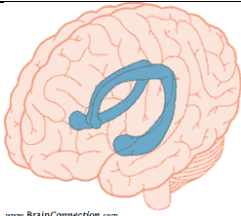
Example: Reticular Formation


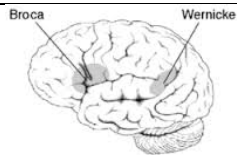
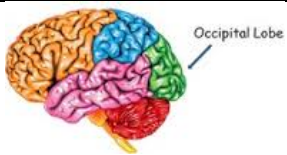
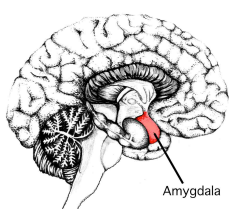
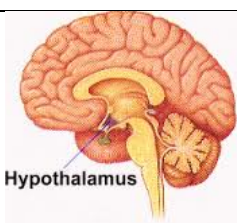
Specific Drug: Heroin

Drug Category: Depressant (Opioid)

Responsibility of Brain area: Plays a role in alertness and arousal

Impact on behavior: When heroin crosses the blood-brain barrier to impact the reticular formation the result can be an individual losing consciousness because the reticular formation is responsible for arousal.

Brain Area	Specific Drug	Drug Category	Responsibility of Brain Area	Impact on Behavior	Location in Brain
Nucleus Accumbens					
Parietal Lobe					
Cerebellum					
Prefrontal Cortex					
Temporal Lobe					
Hippocampus					

Brain Area	Specific Drug	Drug Category	Responsibility of Brain Area	Impact on Behavior	Location in Brain
Medulla					 A sagittal cross-section of the human brain. The medulla oblongata is highlighted in orange and labeled. Below it, the text 'Hindbrain' is written in orange.
Broca's Area					 A sagittal cross-section of the human brain. Broca's area is labeled on the left side of the image, and Wernicke's area is labeled on the right side.
Occipital Lobe					 A sagittal cross-section of the human brain. The occipital lobe is highlighted in green and labeled with a line pointing to it.
Amygdala					 A sagittal cross-section of the human brain. The amygdala is highlighted in red and labeled with a line pointing to it.
Hypothalamus					 A sagittal cross-section of the human brain. The hypothalamus is highlighted in yellow and labeled with a line pointing to it.