MOOD DISORDERS
WORKSHEET 1

This assignment is our introduction to mood disorders.
There are **five questions**.

Different Views of Mood Disorders Throughout History

Q1) Peter has recently been feeling overwhelmed and emotional. Peter has been less interested in his school work, questioning the meaning of it all. He went to different philosophers for advice. What might these different philosophers say?

Match the philosopher to the idea! Note: Jean-Paul Sartre was a famous existentialist.

IDEAS

A) There is no authority to look for the answer to your quarrels. Humans are born into a universe lacking any inherent meaning and are "condemned to be free." The best you can do is accept this freedom and make your life meaningful.

B) You need to balance your biological humors – reason, intelligence, and impulse. There is an issue with your emotions, centered in your heart.

C) Your poor mental health is a reflection of your lack of contentment and non-optimal soul. While many before me saw one's soul as existing alone, I believe the soul belongs to a living human. Your heart is ill, causing these poor thoughts and emotions.

D) You have an imbalance of too much phlegm, black bile, and yellow bile; and too little blood. These components are in all of us and work together to establish a human personality.

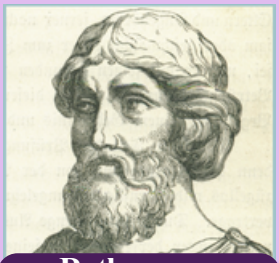
E) Your poor mental health is a reflection of your lack of contentment and non-optimal soul. You must take personal responsibility for your poor mental health and work on seeking higher, true wisdom.

F) Your mind is ill, the controller of your body. These actions are mere reflexes, but you must work on the root cause, the actions of the mind, which are conscious and voluntary.

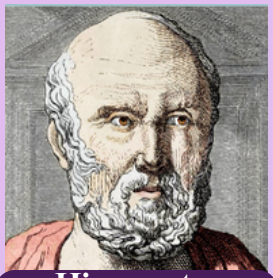
G) You need to balance your 5 elements which comprise your flow of emotions – fire, earth, metal, water, and wood. Each corresponds to a different part of the body and emotion.

PHILOSOPHERS

Confucius



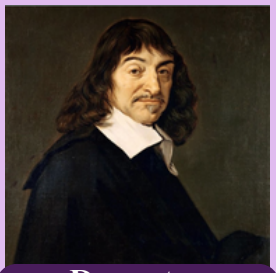
Pythagoras



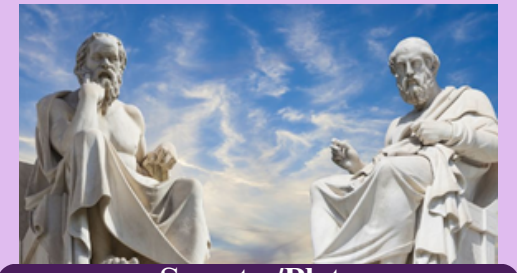
Hippocrates

Jean-Paul Sarte

Aristotle

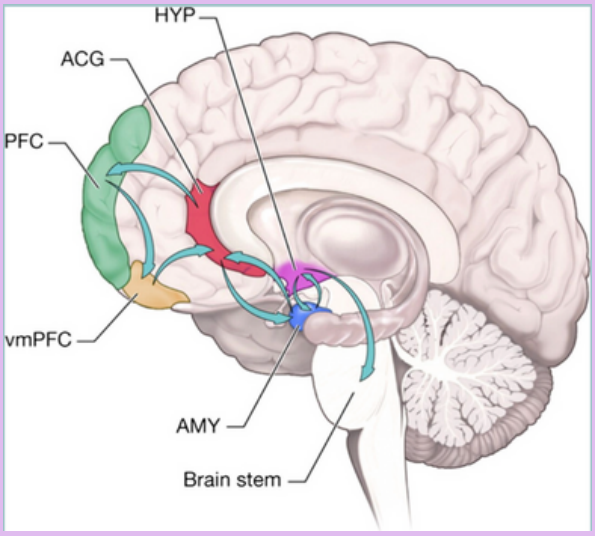


Descartes



Socrates/Plato

Q2) The Perseverance Loop



There are many regions of the brain associated with decision-making. Those with depression can get locked into a constant cycle called the perseverance loop. **What can happen to the decision-making process to cause depression?** Which step(s) differ(s) from a healthy decision-making process? Below is some background information on the normal decision-making process to help you answer these questions.

BACKGROUND INFO:

Normal Decision-Making Process Due to a Stressor

The amygdala is part of the limbic system associated with quick attenuation (tells your body what in your surroundings is the most important to focus on). The amygdala sends information to the cingulate and hypothalamus. The hypothalamus is involved in a physiological response (getting ready for flight or fight), and sends information down the spinal cord to the heart (heart rate increases). It leads to the pituitary gland releasing hormones which also causes a physiological response. The cingulate is involved in mapping out all our emotions (different areas in the cortex associated with different emotions). Cingulate sends information to the frontal cortex. The frontal cortex decides what to do about a problem. After finding a solution, the frontal cortex sends information to the cingulate and amygdala to relax.

Q3) Hashimoto's Disease

Why can Hashimoto's disease cause depression?

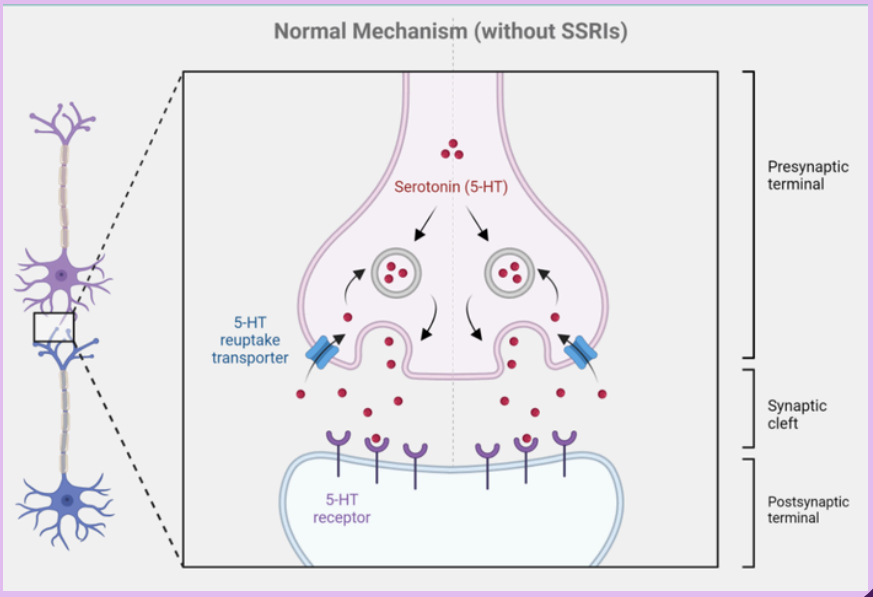
Q4) Depression in Women

Factors such as pregnancy, menopause, and birth control can have a significant effect on a woman's mood and concentration. **Why?** Hint: Think about how hormones and neurotransmitters are changing through these processes.

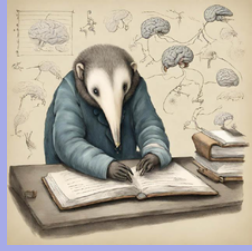
Question 5: Serotonin (5-HT) Mechanism

Selective serotonin reuptake inhibitors (SSRIs) inhibit serotonin (5-HT) transporters at the presynaptic axon terminal. **What would this do to the serotonin (5-HT) mechanism? Why may this be useful in treating depression?**

(Use the diagram to the right to assist you with answering these questions.)



MOOD DISORDERS
WORKSHEET 2



This assignment investigates genetics, environment, and antidepressants.
There are **five questions**.

Q1) Diet and Depression

Sierra grew up eating an American diet that included such items as chicken nuggets, pizza, pasta, and salads. She continued to do so until a year ago when she decided to cut out meats and adopt a plant based diet. Since she doesn't like beans or legumes, this diet is primarily a green one. Sierra has been feeling depressed for awhile and unable to find pleasure in things she used to like to do. She was surprised when her husband told her he wanted a divorce if she didn't do something. This led Sierra to seek therapy and she was prescribed SSRIs to alleviate her depression. Following the 8 week trial period, she tells her therapist that the medication isn't working and so they decide to try a different medication. **Speculate on why she isn't getting better.**

Q2) Cortisol

George is a florist who has already tried several antidepressants that haven't worked as well as he hoped. His therapist has decided to try an MAOI. George actually feels much better after a couple weeks of using his MAOI. George is delivering some arrangements to a local culinary festival with complimentary wine tasting and cheese pairings and decides to hang around. **What may happen to George if he indulges himself in delicious foods and free wine? What chemical compound in the wine and cheese would cause this?**

Q3) 5-HTT Alleles

What does the 5-HTT or 5-HTTLPR gene code for? Describe the neuropsychological characteristics caused by short and long promoter regions ahead of the gene? What have imaging studies shown about the activity of brain regions in S- (short) carriers and LL (long) individuals?

Q4) Antidepressants and Their Mechanisms

Explain the difference between a nonselective and a selective reuptake inhibitor.

Q5) Case Study

Create a depression patient case study on the interaction of their 5-HTT genes and their environment. Include the following:

A) Where is the patient currently living? Is this an individualist or collectivist culture?
B) Is the region where the patient is living aligned with the culture this patient grew up in?
C) Given both a. & b., what symptoms would this patient likely present with?
D) Describe their 5-HTT genotype (do they have long or short alleles)
E) Age
F) Gender

Lastly, discuss how the above factors are connected.

MOOD DISORDERS
WORKSHEET 3

This assignment investigates bipolar disorder with associated brain regions.
There are **five questions**.

Q1) Bipolar Disorder Type

Ashley is a 19-year-old college student who suffers from bouts of unproductivity, low mood, and disinterest in leaving her dorm room. She is constantly called "lazy" by her parents, sleeps during lectures if she attends at all, and has trouble making friends because of how often she snaps over minor inconveniences. However, after 10-14 days, she has a renewed energy and interest in exploring her college town, talking to strangers at coffee shops and catching up on her class assignments. She will often stay up all night picking up new hobbies like crocheting, soap-making, planting, etc because she has so many ideas flooding her mind for her etsy shop. After a few days, she again feels overwhelmed and exhausted and will abandon her new ventures and go back to hibernating in bed with tremendous guilt and self-loathing. **Which bipolar disorder is her behavior and symptoms most consistent with? Explain your reasoning.**

Q2) Diagnosing Bipolar Disorder

How might one use the Altman Self-Rating Mania Scale to diagnose bipolar disorder? Include the criteria for diagnosing manic/depressive episodes using symptoms.

Q3) Amygdala and Parahippocampal Gyrus

Studies have shown increased activity in the right amygdala and parahippocampal gyrus for those who are at risk or have already been diagnosed with bipolar disorder. What is the function of the amygdala and parahippocampal gyrus? Considering what you learned about amygdala activation and facial recognition, how would hyperactivity in these two regions underlie the talents of a comedian?

Q4) Hyper-intensity Signals in White Matter

White matter contains millions of axons surrounded by myelin sheaths that facilitate communication between the brain and spinal cord. Hyper-intensity signals are known to signal cell deaths in certain regions of white matter in the brain. **How does the increased prevalence of hyper-intensities make sense considering what research has revealed about cortical thinning in bipolar patients?** (**Note:** Refer to the image on the next page while answering these questions.)

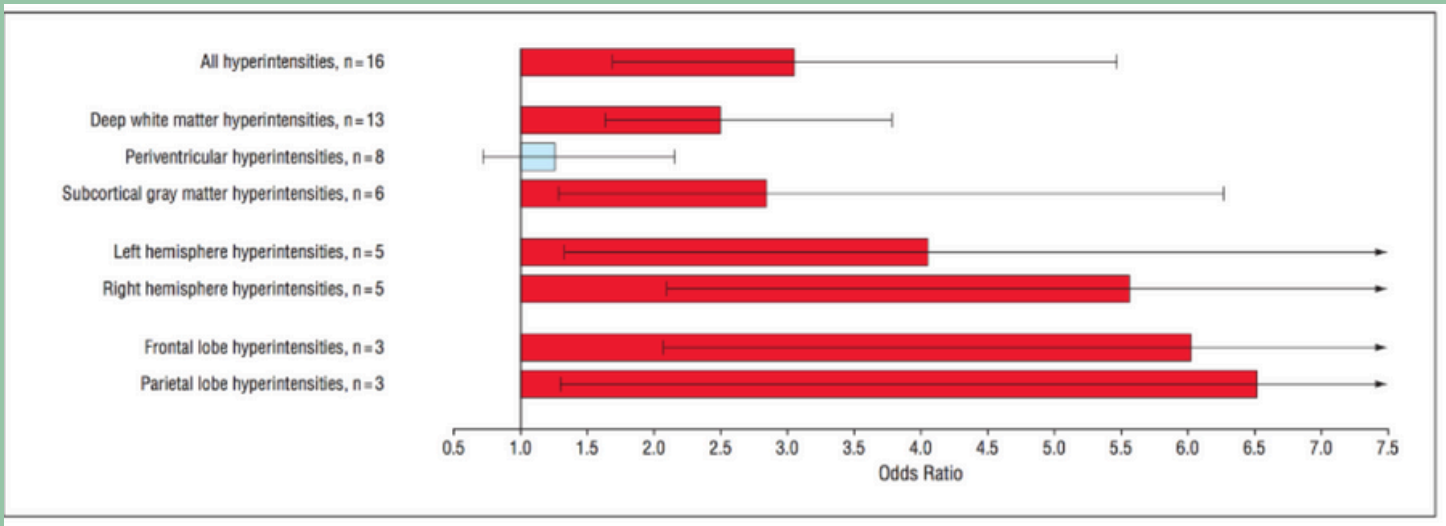
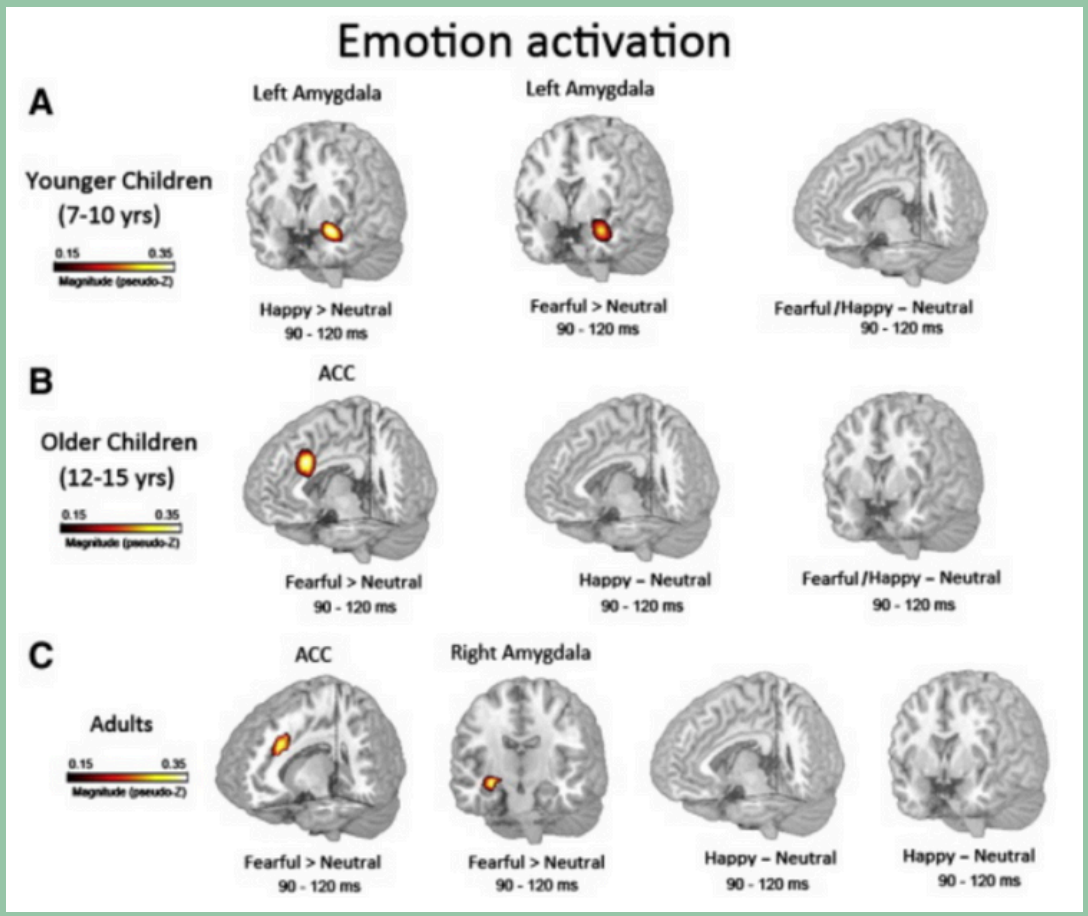


Figure 4. Binary variables from the bipolar-control meta-analysis. Odds ratios are shown for each type of hyperintensity with 95% confidence intervals. An odds ratio greater than 1 means the hyperintensity is more common in patients with bipolar disorder than controls. Red bars represent significant differences, and blue bars are nonsignificant differences. n Indicates the number of studies included in each meta-analysis.

Q5) Left versus Right Brain Activation

There are three bipolar disorder age groups shown below. Each patient was shown a photo of a neutral expression, fearful expression, and happy expression on peoples' faces. **Looking at the below figures, how might the degree of response in a bipolar adult differ from a normal adult in regional response to fearful and happy faces? Considering what you learned about regions associated with perseverance in depression, would bipolar patients have more or less perseverance and why?**



MOOD DISORDERS
WORKSHEET 4

This assignment investigates metabolic comorbidity, uric acid, and neuroinflammation. There are five **questions**.

Q1) Case Study- Metabolic Comorbidity

Consider a patient with bipolar disorder who also has a history of obesity and hypertension. Why is it important to identify and study overlaps in the prevalence of these diseases?

Q2) Historical Biochemistry and Uric Acid Mania Story

Reflect on the 'uric acid mania story' involving an experiment where guinea pigs were injected with urine from both normal individuals and those experiencing mania. The urine from manic individuals seemed to have a more detrimental effect on the guinea pigs, and it was found to contain high levels of uric acid crystals. What major breakthrough regarding the treatment of bipolar disorder resulted from this experiment?

Q3) Neural Inflammation in Mood Disorders

Neural inflammation is a key feature in various mood disorders, including bipolar disorder. Discuss the hypothesized mechanisms by which inflammation can contribute to the symptoms of mania and depression. Why is this relevant to glutamate activity in the brain, including amygdala and parahippocampal gyrus hyperactivity?

Q4) Pharmacological Treatments of Bipolar Disorder

List the 1st and 2nd line medications that would be used to treat each of the following phases of Bipolar disorder along with any “known” mechanism.

A) Mania
B) Depression
C) Rapid Cycling

Q5) Purines and Bipolar Disorder

Describe what foods result in elevated blood uric acid levels. How do uric acid levels differ between males and females sex and why is this relevant to the diagnosis of Bipolar Disorder?

MOOD DISORDERS
WORKSHEET 5

This assignment investigates anxiety disorder and Post Traumatic Stress Disorder (PTSD). There are **five questions**.

Q1) Matching Anxiety Disorders

Match each description below to one of the following anxiety disorders: generalized anxiety disorder, panic disorder, acute stress disorder, and social anxiety disorder. You can use one term more than once or not at all.

A) Michelle recently narrowly avoided a car accident but witnessed a severe crash in front of her that harmed the passengers. A month after the accident, she repeatedly experienced nightmares about dying in car accidents and was unable to stay asleep for long periods of time. Michelle was forced to quit her job because she was unable to make the commute, would dissociate throughout the day, and couldn't focus on her projects. Her older brother tried to take her to get her favorite mac and cheese, but she was unable to step into his car. She became irritable around her family, would constantly put down her younger sisters, and could not be comforted by their support.

B) Kelly has been homeschooled her whole life because of her immense fear of social circles in public schools. When she goes grocery shopping, she sweats when the employees greet her at the door and always uses self-checkout. She avoids asking for help if she can't find a product out of embarrassment because she doesn't want to be perceived. When she can't bring herself to go out, she uses Doordash and Grubhub to obtain a meal. She starts relying so heavily on these apps that she goes into debt and has to pick up more hours at her remote data entry job for money. Kelly has never been in a relationship and has no friends. Her family avoids talking to her because she never responds.

C) Shawn is worried his boss will fire him because he excuses himself for 15 minutes every 2 hours, but the breaks have been getting longer since 6 months ago. However, he only does this because he feels like he is almost dying this often. During these moments his heart races, and he has trouble breathing. His chest feels tight, his head feels foggy, and he loses his sense of time and reality. Shawn is unable to move his body or call for help during these events because he is worried about this being a serious illness. He doesn't want to get fired because his wife recently left him, and is fearful he would not be able to support his children.

D) Farrah is a high school student who is having trouble going to school. Her grades have been slipping in Physical Education because she intentionally leaves her PE uniform at home so she doesn't have to participate. She is fearful of participating in social situations and eating in the cafeteria. Recently, her family has gotten only more worried about her because she's been claiming she contracted mono so she is unable to go to school even though the doctors say she doesn't have mono.

Q2) Obsessive-Compulsive Disorder

Create a patient who has been diagnosed with Obsessive-Compulsive Disorder (OCD), and explain how they fit the DSM V criteria for OCD. Include symptoms for obsessions and compulsions.

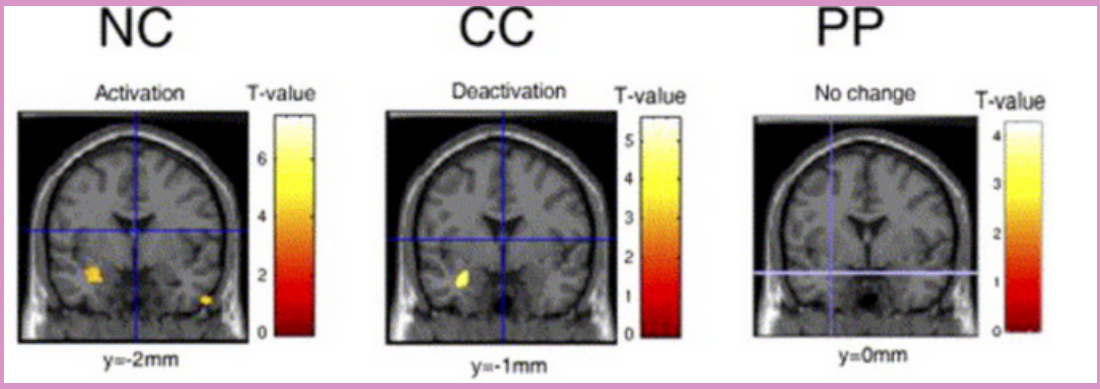
Q3) Left vs. Right Amygdala

Give an example of what type of test would stimulate the (a) left and (b) right amygdala. Explain why.

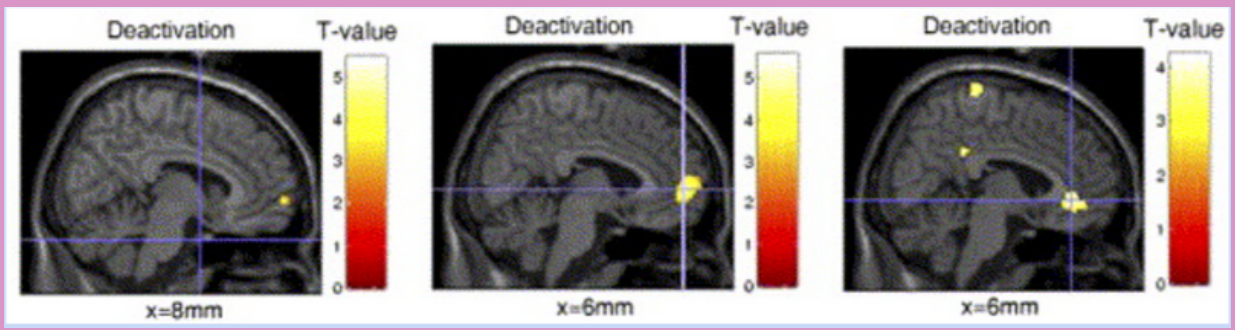
Q4) Different Responses to Traumatic Events

Following a traumatic event, some people may develop Post Traumatic Stress Disorder Symptoms (PTSD). In patients with PTSD, traumatic reminders can cause a diverse range of anxiety symptoms. Britton et al. looked at trauma-specific activity in normal controls (NC), combat veteran controls not diagnosed with PTSD (CC), and combat veterans diagnosed with PTSD (PP). Click here for the link to the paper if interested.

The image below shows the amygdala activity of NC, CC, and PP groups after a traumatic event. What is being described in the images below?



The image below shows the ventromedial prefrontal cortex (vmPFC) and rostral anterior cingulate (rACC) activity of NC, CC, and PP groups after a traumatic event. What is the finding shown in the images below?



Q5) CCk-4

CCK-4 was able to induce panic attacks in some subjects and not in others. Click here for the link to the paper if interested. **What might account for this? What region was identified to be associated with predicting future panic attacks?**

MOOD DISORDERS
WORKSHEET 6

This assignment investigates psychopharmacology and genetics.
There are **five questions**.

Q1) Anxiety and Benzodiazepines

A patient with a history of severe depression and chronic anxiety has come to their doctor with a chief complaint that their anxiety has suddenly worsened severely. The doctor likely suspects that this was an episodic spike in their anxiety exacerbated by the patient having recently been served with an eviction notice at her apartment.
Discuss what treatment with benzodiazepines might do for this patient, making sure to note the mechanisms involved and the complication of withdrawal.

Q2) GABA Receptors and Benzodiazepines

Describe how populations of GABA receptors are imaged in human subjects. What does comparison of GABA populations in patients with and without anxiety suggest about brain activity? How does long-term treatment with Benzodiazepines change the binding population of GABA receptors?

Q3) Case Studies

For each case study problem, **identify likely treatment options based on the presented symptoms and patient history**. You should consider evidence-based interventions such as Cognitive-Behavioral Therapy (CBT), medication management, lifestyle modifications, and stress-reduction techniques to develop comprehensive treatment plans tailored to address the specific needs of each patient.

A) Case Study- OCD

Patient: Alex

Background: Alex is a 30-year-old graphic designer who has been struggling with Obsessive-Compulsive Disorder (OCD) for the past five years. Alex's OCD symptoms began after a traumatic event in his childhood, leading to persistent intrusive thoughts and compulsive behaviors.

Symptoms: Obsessions: Fear of contamination, ruminating on intrusive thoughts about harming loved ones. Compulsions: Excessive hand washing, checking appliances repeatedly, counting rituals.

Story: Alex views himself as a perfectionist, but recently his need for order and symmetry has escalated to the point where he spends hours arranging and rearranging objects on his desk. He is consumed by intrusive thoughts of harm coming to his loved ones if he doesn't perform these rituals. His quality of life has deteriorated, and he finds it difficult to focus on his creative work as a result of these compulsions.

A) Case Study- GAD

Patient: Mia

Background: Mia is a 25-year-old social worker who has been diagnosed with Generalized Anxiety Disorder (GAD). Mia's anxiety symptoms have worsened over the past year due to increasing work stress and financial challenges.
Symptoms: Excessive worry about job performance, health concerns, and family issues. Physical symptoms such as restlessness, muscle tension, and difficulty sleeping.

Story: Mia's GAD has led to constant feelings of unease and apprehension, affecting her ability to focus at work and causing strain in her personal relationships. She often feels overwhelmed by her worries and struggles to relax or enjoy activities she once found pleasurable.

Q4) Cholinergics

We have learned during recent lectures that amygdala activation typically sends information about threat to the anterior cingulate and frontal cortex, causing a state of panic in some patients. The mushroom amanita muscaria has been used throughout history as an anxiolytic. The main compounds are muscarine and muscimol. Research the mechanism of action for muscimol and muscarine. **Describe how GABAergic & cholinergic drugs affect neural circuits associated with anxiety disorders?**

Q5) SNPs and Mood Disorders

Discuss the potential impact of Single Nucleotide Polymorphisms (SNPs) in calcium channel signaling genes on the development of multiple mood disorders. Describe the mechanism by which calcium channel SNPs might contribute to the pathophysiology of mood disorders.