McCance: Pathophysiology, 6th Edition

Chapter 18: Neurobiology of Schizophrenia, Mood Disorders, and Anxiety Disorders

Key Points – Print

SUMMARY REVIEW

Schizophrenia

1. Schizophrenia is a collection of symptoms characterized by thought disorders. Thought disorders reflect a break between the cognitive and the emotional sides of one's personality.
2. Schizophrenic symptoms are generally classified into positive and negative symptoms. Positive symptoms include hallucinations, delusions, formal thought disorder, and bizarre behavior. Negative symptoms include flattened affect, alogia, anhedonia, attention deficits, and apathy.
3. Schizophrenia has a strong genetic predisposition.
4. In early development, environmental factors (viral infection, nutritional deficiencies, or prenatal birth complications) may interfere with genetically programmed neural development leading to alterations in brain structure and function.
5. Structural brain abnormalities are present in schizophrenia. Brain imaging studies reveal an enlargement of the cerebroventricles and widening of the fissures and sulci in the frontal cortex. In addition, there is a reduction in the volume of the thalamus, which may disrupt communication among cortical brain regions, and the temporal lobe, which may be responsible for the manifestations of positive symptoms.
6. In schizophrenia the frontal lobe shows a progressive loss in volume and a worsening of negative symptoms despite the use of antidepressant medications. Functional alterations in the dorsolateral prefrontal cortex, such as reduced blood flow and metabolism, compromise the ability to engage in goal-directed and cognitive problem-solving behavior.
7. Neurochemical abnormalities in dopamine and excitatory amino acid neurotransmission are found in schizophrenic brains.
8. The first generation of conventional antipsychotic drugs block the dopamine D_2 receptor. The second generation of effective treatment in schizophrenia is called atypical antipsychotic drugs, which block not only D_2 receptors but also a combination of dopamine, serotonin, and other neurotransmitter receptors. Antipsychotic drugs block the dopamine D_2 receptor or a combination of dopamine and serotonin receptors. Antipsychotic medications, however, are not always effective in treating individuals with severe negative symptoms. In addition to drug medications, psychosocial therapy is used to increase drug compliance and to encourage coping strategies.

Mood Disorders: Depression and Bipolar Disorder

1. Major depression and bipolar disorder are two common mood disorders. The former is characterized by an intense and sustained unpleasant state of sadness and hopelessness. Individuals with recurrent patterns of depression and mania, the latter characterized by extreme levels of energy and euphoria, have a bipolar illness.
2. Environmental triggers such as psychosocial stress appear to facilitate the onset of depression in individuals with a genetic vulnerability.
3. A reduction in brain monoamine neurotransmission is linked to depression, whereas an elevated monoamine level is associated with mania.
4. Individuals with major depression commonly have elevated levels of the stress hormone cortisol. Neuroendocrine abnormalities involving thyroid hormones also are found in depression.
5. Structural brain alterations that include reduced frontal lobe and limbic system volumes are found in depression and bipolar illness. Functional brain imaging studies show that depressed individuals have alterations in blood flow to prefrontal and limbic brain regions that include the amygdala, a structure implicated in emotional behavior.
6. Pharmacotherapy involving the use of MAOIs, TCAs, SSRIs, and atypical antidepressants is effective in the treatment of mood disorders. Manic and bipolar individuals are treatable with lithium or mood stabilizers. The clinical effects of drugs used in the treatment of mood disorders often take several weeks to develop. Severely depressed and manic people who do not respond to medication are administered ECT.

Anxiety Disorders

1. Fear and anxiety are normal emotional states that reflect individuals' evolutionary heritage. However, when these mental states persist and become uncontrollable, an individual may develop an anxiety disorder. Panic disorder, generalized anxiety disorder, PTSD, and OCD are examples of uncontrollable fear and anxiety states that require medical attention.
2. Panic disorder consists of panic attacks characterized by intense autonomic arousal that occurs spontaneously and may last for up to 1 hour. During a panic attack the individual experiences multiple symptoms including lightheadedness, a pounding heart, and difficulty breathing. In addition, the intense occurrence of autonomic responses is accompanied by heightened fear and anxiety that often continue between panic attacks.
3. Brain regions involved in the production of panic attacks are the locus ceruleus, hippocampus, and amygdala. A reduction in $GABA_A$-BZ receptor binding also may contribute to the pathophysiology of panic disorder.
4. Panic disorder is generally treatable with CBT and antidepressants such as TCAs and SSRIs. BZs are used as an adjunct or augmentation therapy for individuals who are nonresponsive to SSRIs or TCAs.

5. GAD is characterized by excessive and persistent worries about life events. Individuals exhibit varying levels of motor disturbances, irritability, and fatigue that may be linked to fluctuations in psychosocial stress. Many GAD individuals manifest symptoms of depression.
6. Pathophysiology in norepinephrine, serotonin, and $GABA_A$-BZ systems is found in those with GAD.
7. Treatment of GAD usually involves a combination of behavioral therapy and drug medications, especially serotonin/norepinephrine reuptake blockers.
8. PTSD develops after exposure to a life-threatening or traumatic experience. Individuals experience recurring thoughts and flashbacks and nightmares of the terrifying event.
9. In PTSD structural and/or functional alterations exist in the hippocampus, amygdala, and prefrontal cortex, which are neural components of a fear-based memory system.
10. Treatment of chronic PTSD is difficult. Methods involve psychotherapy and SSRI pharmacotherapy.
11. OCD is characterized by irrational thoughts and ritualized acts that impair normal functioning and cause severe distress.
12. Pathophysiology in the basal ganglia–frontocortical circuitry and serotonin and dopamine functions is linked to OCD.
13. OCD is a chronic illness that requires long-term treatment consisting of CBT and drug medication, such as SSRIs. Severe OCD may require neurosurgery to disconnect the basal ganglia from the frontal cortex.