Mental Illness and the Brain

- Human behavior
  - Product of brain activity
- Brain
  - Product of two mutually interacting factors
  - DNA
  - Determines individualism

Anxiety Disorders

- Fear
  - An adaptive response to threatening situations
  - Innate and species-specific
  - Learned
- Anxiety disorders
  - Caused by inappropriate expression of fear

Biological Bases of Anxiety Disorders

- Fear evoked by threatening stimulus: Stressor
- Manifested by stress response
- Stimulus-response relationship strengthened (and weakened) by experience
- Stress: Corticotropin-releasing hormone (CRH) → adrenocorticotropic hormone (ACTH) → cortisol

Biological Bases of Anxiety Disorders (cont’d)
- Stress Response

Common Anxiety Disorders

- Panic disorder
- Agoraphobia
- Obsessive-compulsive disorder
- Generalized anxiety disorder
- Specific phobias
- Social phobia
- Post-traumatic stress disorder
Anxiety Disorders

- Regulation of the HPA Axis by the Amygdala and Hippocampus
  - Both regulate CRH neurons
  - Amygdala projects to bed nucleus of the stria terminalis, which activates the HPA axis
  - Hippocampus deactivates the HPA axis
  - Glucocorticoid receptors
  - Feedback loop
  - Push-pull style regulation

Anxiety Disorders

- Treatments for Anxiety Disorders
  - Psychotherapy
  - Anxiolytic Medications
  - Role of GABA
  - Benzodiazepines
  - Serotonin-selective reuptake inhibitors (SSRIs)
  - Drug target: CRH receptors

Anxiety Disorders

- A Description of Affective Disorders
  - “Mood” Disorders
    - Depression
    - Dysthymia
  - Bipolar Disorder
    - Manic-depressive disorder
    - Mania
    - Hypomania

Anxiety Disorders

- Biological Bases of Affective Disorders
  - The Monoamine Hypothesis
    - Problems with diffuse modulatory systems
    - Reserpine
    - Monoamine Oxidase (MAO)
    - Imipramine
    - Monoamine hypothesis of mood disorders

Anxiety Disorders

- Biological Bases of Affective Disorders (cont’d)
  - The Diathesis-Stress Hypothesis
    - Genetic and nongenetic
    - Diathesis
    - HPA system
    - Impact of CRH
    - HPA function
    - Glucocorticoid receptor
    - Tactile stimulation process
    - Factors of mood and anxiety disorders

Anxiety Disorders

- Treatments for Affective Disorders
  - Electroconvulsive Therapy (ECT): Localized electrical stimulation
  - Advantage of ECT: Quick relief
  - Adverse effect of ECT: Prior memories, storage of new information
  - Structures involved: Temporal lobe
  - Psychotherapy: Help patients overcome negative views
Anxiety Disorders

- Treatments for Affective Disorders (cont’d)
  - Antidepressants

Schizophrenia

- A Description of Schizophrenia
  - Severe mental disorder
  - Symptoms of schizophrenia: Loss of contact with reality
  - Three types of schizophrenia
    - Paranoid schizophrenia
    - Disorganized schizophrenia
    - Catatonic schizophrenia

Schizophrenia

- Biological Bases of Schizophrenia (cont’d)
  - The Glutamate Hypothesis
    - Behavioral effects of phencyclidine (PCP)
      - Introduced in 1950s as an anesthetic
      - Inhibits NMDA receptors
    - Glutamate: Fast excitatory neurotransmitter in the brain, two important receptor subtypes, AMPA and NMDA

Schizophrenia

- Biological Bases of Schizophrenia
  - Genes and the Environment
    - Schizophrenia: A genetic disorder
  - Schizophrenia and the ventricle to-brain-size ratio
  - Other structural observation of the brains of schizophrenics
  - The Dopamine Hypothesis: Psychotic episodes in schizophrenia triggered by activation of dopamine receptors
  - Neuroleptic drugs

Schizophrenia

- Treatments for Schizophrenia
  - Consists of drug therapy combined with psychosocial support
  - Conventional neuroleptics, such as chlorpromazine and haloperidol, act at D2 receptors
    - Reduce the positive symptoms of schizophrenia
    - Also have numerous side effects
  - NMDA receptor

Treatments for Affective Disorders

- Lithium
## Concluding Remarks

- Impact of neuroscience on psychiatry
- Mental illness
- Chemical synaptic transmission is affected by drugs
- Genes and environment play an important role
- Environmental stresses may contribute to schizophrenia
- Appropriate sensory stimulation in early childhood