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CHAPTER 2

AN INTEGRATIVE APPROACH TO PSYCHOPATHOLOGY

CHAPTER OVERVIEW

This chapter outlines the primary components of a multidimensional model of psychopathology. The multidimensional model considers genetic contributions, the role of the nervous system, behavioral and cognitive processes, emotional influences, cultural, social and interpersonal influences, and developmental factors in explaining the causes of—and even the factors that maintain—psychological disorders. This chapter describes these areas of influence as well as their interaction in producing mental disorder.

CHAPTER OUTLINE

ONE-DIMENSIONAL VERSUS MULTIDIMENSIONAL MODELS

What Caused Judy's Phobia?

Outcome and Comments

GENETIC CONTRIBUTIONS TO PSYCHOPATHOLOGY

The Nature of Genes

New Developments in the Study of Genes and Behavior

The Interaction of Genes and the Environment

Epigenetics and the Nongenomic "Inheritance" of Behavior

NEUROSCIENCE AND ITS CONTRIBUTIONS TO PSYCHOPATHOLOGY

The Central Nervous System

The Structure of the Brain

The Peripheral Nervous System

Neurotransmitters

Implications for Psychopathology

Psychosocial Influences on Brain Structure and Function

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Interactions of Psychosocial Factors and Neurotransmitter Systems

Psychosocial Effects on the Development of Brain Structure and Function

Comments

BEHAVIORAL AND COGNITIVE PSYCHOLOGY

Conditioning and Cognitive Processes

Learned Helplessness

Social Learning

Prepared Learning

Cognitive Science and the Unconscious

EMOTIONS

The Physiology and Purpose of Fear

Emotional Phenomena

The Components of Emotion

Anger and Your Heart

Emotions and Psychopathology

CULTURAL, SOCIAL, AND INTERPERSONAL FACTORS

Voodoo, the Evil Eye, and Other Fears

Gender

Social Effects on Health and Behavior

Global Incidence of Psychological Disorders

DETAILED OUTLINE

One-Dimensional versus Multidimensional Models

- The causes of abnormal behavior are complex and fascinating. You can say that psychological disorders are caused by nature (biology) and by nurture (psychosocial factors), and you would be right on both counts—but also wrong on both counts.
- To identify the causes of various psychological disorders, we must consider the interaction of all relevant dimensions: genetic contributions, the role of the nervous system, behavioral and cognitive processes, emotional influences, social and interpersonal influences, and developmental factors. Thus, we have arrived at a multidimensional integrative approach to the causes of psychological disorders.

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➢ **DISCUSSION POINT:**
Discuss the causes of Judy's phobia, or another case example of your choosing, in the context of a multidimensional vs. unidimensional framework (behavioral, biological, emotional, social, and developmental causes).

➢ **DISCUSSION POINT:**
Can you think of any cases of psychopathology that would have a unidimensional explanation? (Instructor should be prepared to play counterpoint, and repeated uses of this question will help to build an arsenal of appropriate responses.)

Genetic Contributions to Psychopathology

- The genetic influence on much of our development and most of our behavior, personality, and even IQ score is polygenic—that is, influenced by many genes. This is assumed to be the case in abnormal behavior as well, although research is beginning to identify specific small groups of genes that relate to some major psychological disorders.
- In studying causal relationships in psychopathology, researchers look at the interactions of genetic and environmental effects. In the diathesis-stress model, individuals are assumed to inherit certain vulnerabilities that make them susceptible to a disorder when the right kind of stressor comes along. In the reciprocal gene-environment or gene-environment correlation model the individual's genetic vulnerability toward a certain disorder may make it more likely that the person will experience the stressor that, in turn, triggers the genetic vulnerability and thus the disorder. In epigenetics, the immediate effects of the environment (such as early stressful experiences) impact cells that turn certain genes on or off. This effect may be passed down through several generations.

Neuroscience and Its Contributions to Psychopathology

- The field of neuroscience promises much as we try to unravel the mysteries of psychopathology. Within the nervous system, levels of neurotransmitter and neuroendocrine activity interact in complex ways to modulate and regulate emotions and behavior and contribute to psychological disorders.

➢ **DISCUSSION POINT:**
What are some disorders that students believe to be primarily biological in their origins? Discuss findings for disorders such as schizophrenia and bipolar disorder in which interactions between biology and environment determine outcome.

- Critical to our understanding of psychopathology are the neurotransmitter currents called brain circuits. Of the neurotransmitters that may play a key role, we investigated five: serotonin, gamma-aminobutyric acid (GABA), glutamate, norepinephrine, and dopamine.

➢ **DISCUSSION POINT:**
What do recent findings about the interaction of psychosocial factors with brain structure and function indicate regarding future research directions in abnormal psychology?

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Behavioral and Cognitive Psychology

- The relatively new field of cognitive psychology provides a valuable perspective on how behavioral and cognitive influences affect the learning and adaptation each of us experience throughout life. Clearly, such influences not only contribute to psychological disorders but also may directly modify brain functioning, brain structure, and even genetic expression. We examined some research in this field by looking at learned helplessness, social learning, prepared learning, and implicit memory.

  ➢ **DISCUSSION POINT:**
  What are some examples of a situation where a person may develop pathological thoughts or actions based on learned helplessness? Based on maladaptive modeling?

Emotions

- Emotions have a direct and dramatic impact on our functioning and play a central role in many disorders. Mood, a persistent period of emotionality, is often evident in psychological disorders. Some moods, such as fear and anger, are often regarded as unhealthy; however, there are clearly adaptive functions of moods, even when they don't make people feel particularly happy.

- Research has clearly illuminated the fact that some emotions have the potential to be harmful not just mentally but also physically. A consistent finding is that chronically elevated levels of anger are negatively correlated with heart health.

  ➢ **DISCUSSION POINT:**
  What are some ways in which suppression of an emotion might lead to a negative health outcome? Have students generate examples.

Cultural, Social, and Interpersonal Factors

- Social and interpersonal influences profoundly affect both psychological disorders and biology.
- The existence of cultural disorders shows us how one's cultural setting is related to definitions of pathology, as well as the emergence of specific illness symptoms. Such factors are also related to the treatment of mental symptoms.

Lifespan Development

- In considering a multidimensional integrative approach to psychopathology, it is important to remember the principle of equifinality, which reminds us that we must consider the various paths to a particular outcome, not just the result.

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KEY TERMS

multidimensional integrative approach, 33
genes, 36
diathesis-stress model, 38
vulnerability, 38
gene-environment correlation model, 40
epigenetics, 42
neuroscience, 42
neuron, 43
synaptic cleft, 43
neurotransmitters, 43
hormone, 47
brain circuits, 49
agonist, 50
antagonist, 50
inverse agonist, 50
reuptake 50
glutamate, 50
gamma-aminobutyric acid (GABA), 50
serotonin, 51
norepinephrine (also noradrenaline), 52
dopamine, 53
cognitive science, 58
learned helplessness, 59
modeling (also observational learning), 60
prepared learning, 60
implicit memory, 61
fight or flight response, 62
emotion, 62
mood, 63
affect, 63
equifinality, 70

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IDEAS FOR INSTRUCTION

1. **Activity: Brain Areas & Their Function**. To teach your students neuroanatomy and the contributions of neuroscience to psychopathology, prepare two sets of index cards. On one set, write the brain structures discussed in the text. The second set of cards should list the functions of these structures. For example, your cards could include the following:

STRUCTURE	FUNCTION
Central nervous system	Consists of the brain and spinal cord
Medulla and pons	Breathing, pumping of heart, digestion
Cerebellum	Motor coordination
Midbrain	Coordinates movement with sensory input
Reticular activating system	Processes of arousal and tension
Limbic system	Emotional experiences/basic drives of sex, aggression, hunger, and thirst
Caudate nucleus	Controls motor behavior
Cerebral cortex	Contains over 80% of neurons in the central nervous system
Left hemisphere	Verbal and other cognitive processes
Right hemisphere	Perceiving surrounding events and creating images
Temporal lobe	Recognizing various sights and sounds
Parietal lobe	Recognizing various sensations of touch
Occipital lobe	Integrates various visual input
Frontal lobe	Thinking and reasoning abilities
Peripheral nervous system	Coordination with brain stem to ensure body is working properly
Somatic nervous system	Controls our muscles
Autonomic nervous system	Regulates the cardiovascular system and endocrine system
Endocrine system	Releases hormones into the bloodstream
Sympathetic nervous system	Mobilizes body during times of stress
Parasympathetic nervous system	Renormalizes body after arousal states
Pituitary gland	Master or coordinator of endocrine system

The goal of this quick activity is to have students match various structures of the brain with their respective functions. Divide the class in half and distribute one set of index cards to each group of students. Each student should receive one card. Instruct students to find the match for their structure/function, and tell them to do the activity without talking.

The above terms and simple descriptions can also easily be converted into various "game" type activities. Students may enjoy a Jeopardy! format as a classroom activity or review session.

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2. **Activity: The Ubiquity of Emotion & Conditioning**. Conditioning is so ubiquitous in everyday experience that it is often hard to see. Have students come up with examples of classically conditioned emotional/evaluative responses and use such examples to illustrate that most conditioning is quite adaptive. If students have trouble coming up with examples, you may start with conditioned taste aversions, objects or events that students fear, or words/images that elicit an emotional response (e.g., fear, anger, disgust; seeing flashing blue lights in your rearview mirror and getting caught for speeding). Have students talk about the dimensions that are involved in the conditioned responses in keeping with the text description of emotion as involving cognition, behavior, and physiology. As a trick, you may ask students whether they have ever felt that an exam they had taken was unfair. Don't ask for a show of hands. Most students will raise their hands. You can then ask, "Why did you all raise your hands?" Use this example to illustrate the role of experience and socialization in learning and behavior (in this case, automatically raising one's hand in response to a question in the classroom without being asked to do so).

3. **Activity: Susan Mineka's Work on Vicarious Learning of Fear in Primates**. Susan Mineka and her colleagues have performed some interesting experiments demonstrating vicarious learning of fear in lab-reared monkeys. Her work to date represents the most compelling evidence for observational learning of fear. Many students find the description of her classic studies interesting in itself.

4. **The Effects of Alcohol on Students in Social Situations**. Ask the students to form small groups and have them develop an explanation for alcohol abuse and dependence using behavioral and cognitive theory. Have the groups write a summary of the group discussion to be shared with the entire class. This is a serious subject in colleges and universities, where every year there are many alcohol-related deaths often due to binge drinking.

Uh Oh! Plan B

Although instructors are skilled professionals in creating classroom experiences, things don't always go as planned. The chapter-related lecture and activity suggestions in this section are for instances when your planned lecture or activity idea do not go as planned. Implement these to recover student interest and enhance student reading.

1. **Big picture/Small picture—**The brain and its organization are extremely complicated and the detail can easily overwhelm students. The question of "why" is missing from many psychopathology lectures. Including "the big picture" of why a particular region or function of the brain is important (even providing examples as you see fit) will help the information "stick!"

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2. **Using Art as an In-Class Visual**—Encourage your students to bring colored pencils to class and label/color the parts of the brain as you discuss them. Research[1] has suggested that color and the act of color can lead to better memory of the material.

[1] Dzulkifli, M. A., & Mustafar, M. F. (2013). The Influence of Colour on Memory Performance: A Review. *The Malaysian Journal of Medical Sciences : MJMS*, *20*(2), 3–9.

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YouTube Video Clips: Chapter 2

What does it mean to be multidimensional? The concept is interdisciplinary. Watch how Michio Kaku defines the 10 dimensions of our universe. *Excerpted from Michio Kaku (2014) "The Future of the Mind" https://www.youtube.com/watch?v=p4Gotl9vRGs (10:59)*

How is mental health biological, cultural, social, and interpersonal? This lecture details specific examples of genetic research on behavior and mental illness. *Crespi, B. (2012). "Where Darwin meets Freud: Molecular Genetics, Evolution, and Psychopathology of the Social Brain". Simon Fraser University. https://www.youtube.com/watch?v=pAoueFNsvVg (1:12: 01)*

Our emotions can both inhibit and enhance our health and well-being. Watch Oprah Winfrey interview Gavin de Becker, author of the classic book, *The Gift of Fear: And Other Survival Signals that Protect us From Violence. Dell Publishing. 1998.*
https://www.youtube.com/watch?v=bBProrposzc (4:24)

SUGGESTED VIDEOS

Discovering psychology: The responsive brain. (Annenburg/CPB Collection). Examines the interaction of the brain, behavior, and the environment. Also shows how brain structure and function are influenced by behavioral and environmental factors. (30 min)

Episode One: Reality Check. (Showtime). The first episode of the *This American Life* series features the story of "Second Chance," a cloned bull version of a beloved pet. It demonstrates that despite identical genetics to its predecessor, behavioral differences exist. (29 min)

Inside information: The brain and how it works. (Films for the Humanities and Sciences:). This videotape describes how the many areas of the brain function and includes interviews with researchers in the field of neuroscience. (58 min)

The brain, mind, and behavior. (PBS). This series focuses on the nature and function of the human brain, consciousness, and the effects of the brain and hormones on behavior. (8 parts, 60 min each)

The enchanted loom: Processing sensory information. (Films for the Humanities and Sciences). Discusses how the brain is capable of sorting through vast sensory information and interpreting it on the basis of past experience and expectations. (60 min)

The human brain. (Insight Media). Investigators discuss how the brain's abilities can be enhanced through the proper environment. Also presents the case of a man who improves his condition after a serious brain injury. (25 min)

The mind. (PBS). This series focuses on mental development in the context of normal and abnormal development.

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The nervous system. (Insight Media). Explores the function of neurons as well as the central, peripheral, and autonomic nervous systems. (25 min)

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ONLINE RESOURCES

Intro to the Brain
https://www.youtube.com/watch?v=iTrQwJyxU8U
Shows different parts of the brain and introduces concept of disease-related dementia

History of Neuroscience
http://faculty.washington.edu/chudler/hist.html
Lists some of the most important events that occurred in neuroscience and psychology in chronological order, dating back to 4000 B.C.

Neuropsychology Central
http://www.neuropsychologycentral.com/resources.html
Links to online sources on neuropsychological assessment, treatments, software, and newsgroups, just to name a few.

The Whole Brain Atlas
http://www.med.harvard.edu/AANLIB/home.html
An excellent site reviewing the structure and function of the human brain. Many of the links are quite advanced, but students with a real interest in this topic may spend hours perusing the various resources.

APA
http://www.apa.org
The homepage for The American Psychological Association.

The Albert Ellis Institute
http://www.rebt.org/
The site for rational-emotive therapy, where you can find additional information on Ellis's technique.

American Psychoanalytic Association
http://www.apsa.org
The American Psychoanalytic Association's webpage.

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SUPPLEMENTARY READING MATERIAL

Additional Readings:

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.

Beck, A. T., & Clark, D. A. (1988). Anxiety and depression: An information processing perspective. *Anxiety Research*, 1, 23-36.

Blatt, S. J., & Lerner, H. (1991). Psychodynamic perspectives on personality theory. In M. Hersen, A. E. Kazdin, & A. S. Bellack (Eds.) *The clinical psychology handbook* (2nd ed.). New York: Pergamon, 147-169.

Damasio, A. R. (1995). *Descartes' error: Emotion, reason, and the human brain*. New York: Avon Books.

Ellis, A., & Harper, R. A. (1976). *A guide to rational living*. North Hollywood, CA: Wilshire Book Company.

Gross, C. G. (1998). *Brain, vision, memory: Tales in the history of neuroscience*. Cambridge: MIT Press.

Hundert, E. (1991). A synthetic approach to psychiatry's nature-nurture debate. *Integrative Psychiatry*, 7, 76-83.

Kihlstrom, J. F. (1987). The cognitive unconscious. *Science*, 237, 1445-1452.

Marshall, L. H., & Magoun, H. W. (Eds) (1998). *Discoveries in the human brain: Neuroscience prehistory, brain structure, and function*. Totowa, NJ: Humana Press.

Mineka, S., Davidson, M., Cook, M., & Keir, R. (1984). Observational conditioning of snake fear in rhesus monkeys. *Journal of Abnormal Psychology*, 93, 355-372.

Ramachandran, V. S., & Blakeslee, S. (1998). *Phantoms in the brain: Probing the histories of the human mind*. New York: William Morrow & Company.

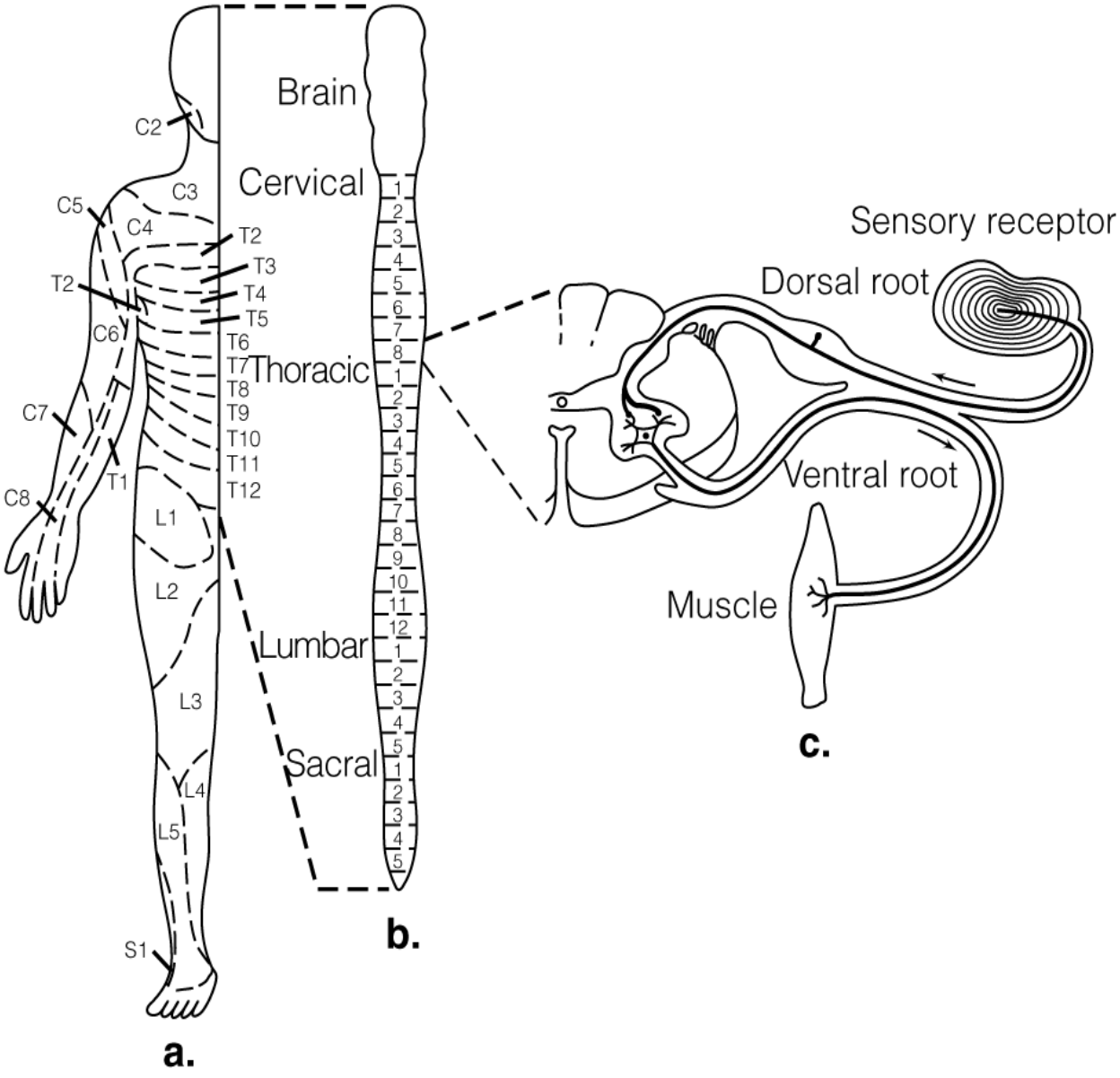
Rosenhan, D. (1973). On being sane in insane places. *Science*, 179, p. 253

Sacks, O. (1985). *The man who mistook his wife for a hat and other clinical tales*. New York: Summit Books.

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Anatomic Features of the Human Spinal Cord

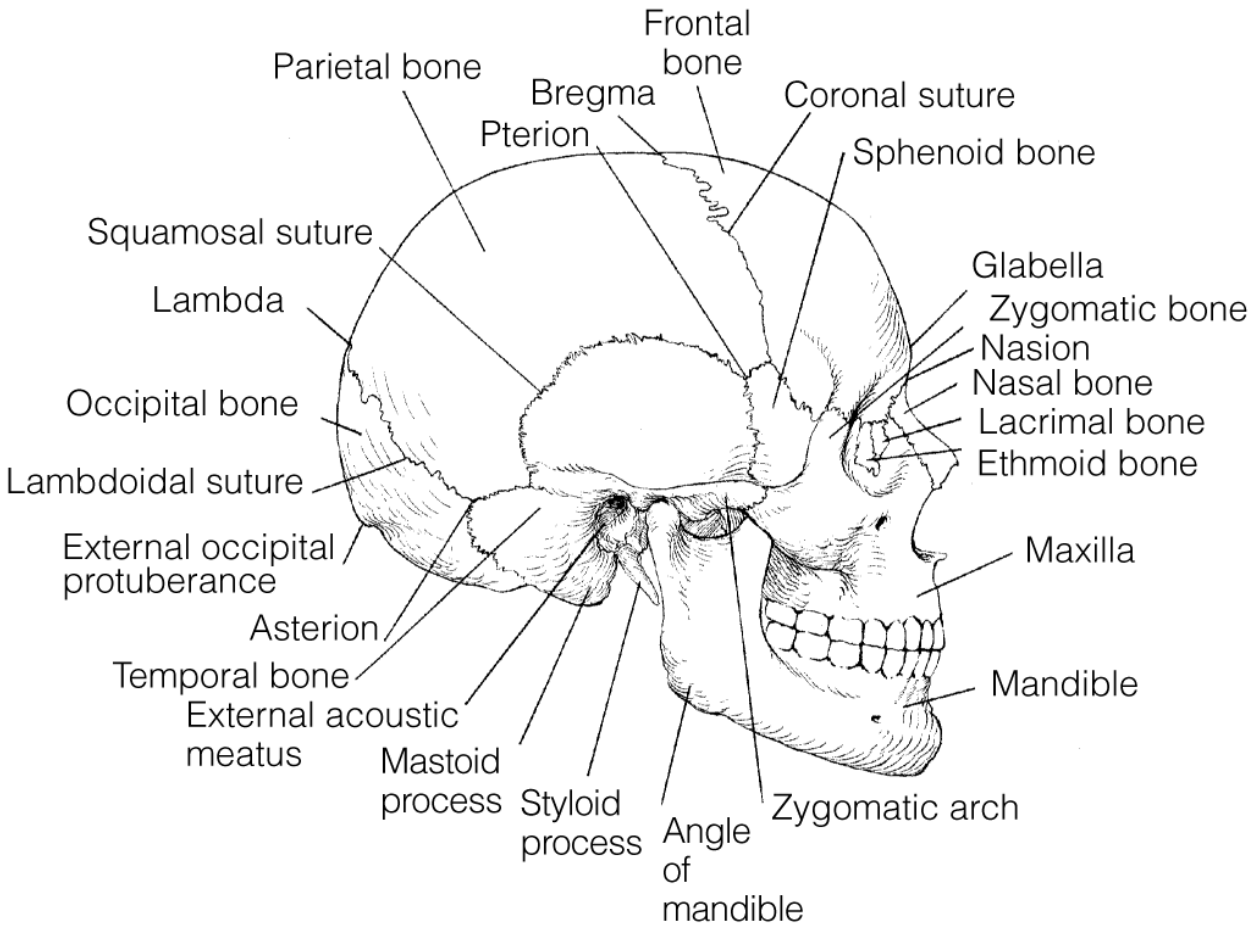


Anatomic Features: Spinal nerves and internal organization of the spinal cord (gray and white matter)

Function: Relays information to and from the brain; responsible for simple reflexive behavior

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Anatomic Features of the Human Skull

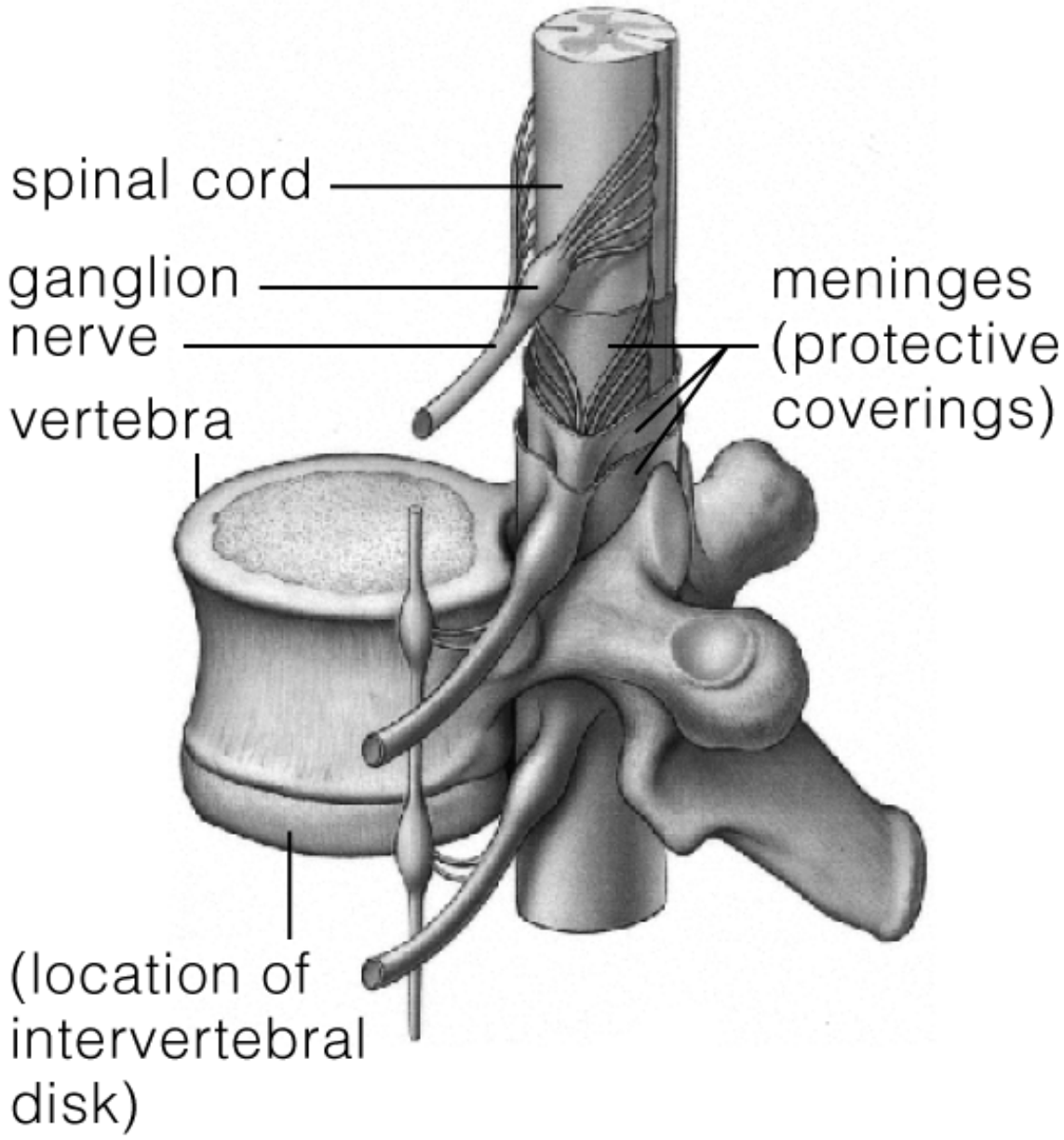


Anatomic Features: A fused connection of bony plates covering the brain

Function: Protection of the brain

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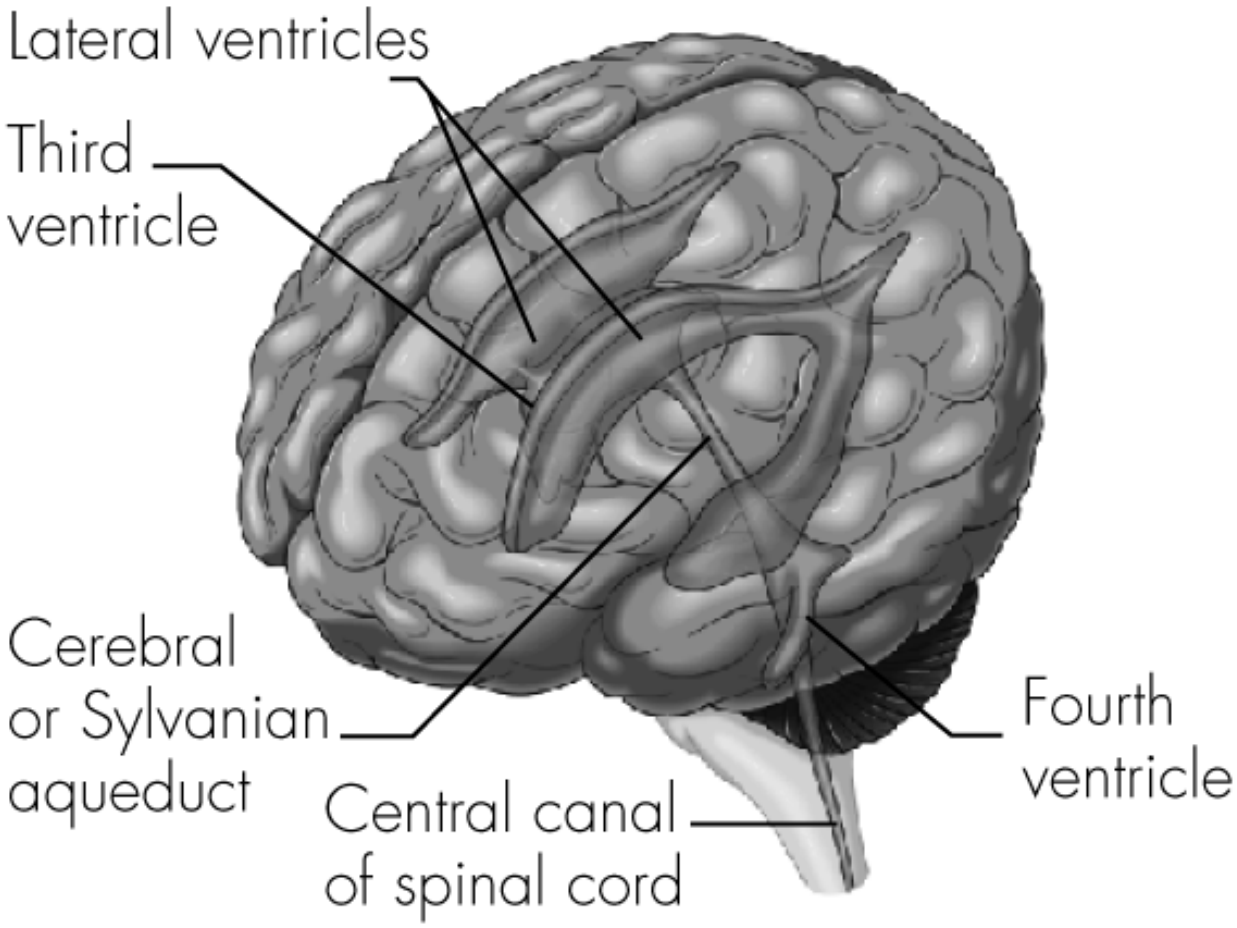
Anatomic Features Protective Meninges of the CNS



Anatomic Features: Dura mater, arachnoid membrane, and pia mater
Function: Protective covering of the central nervous system (CNS), location of venous drainage, and cerebrospinal fluid absorption

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Anatomic Features of the Ventricular System

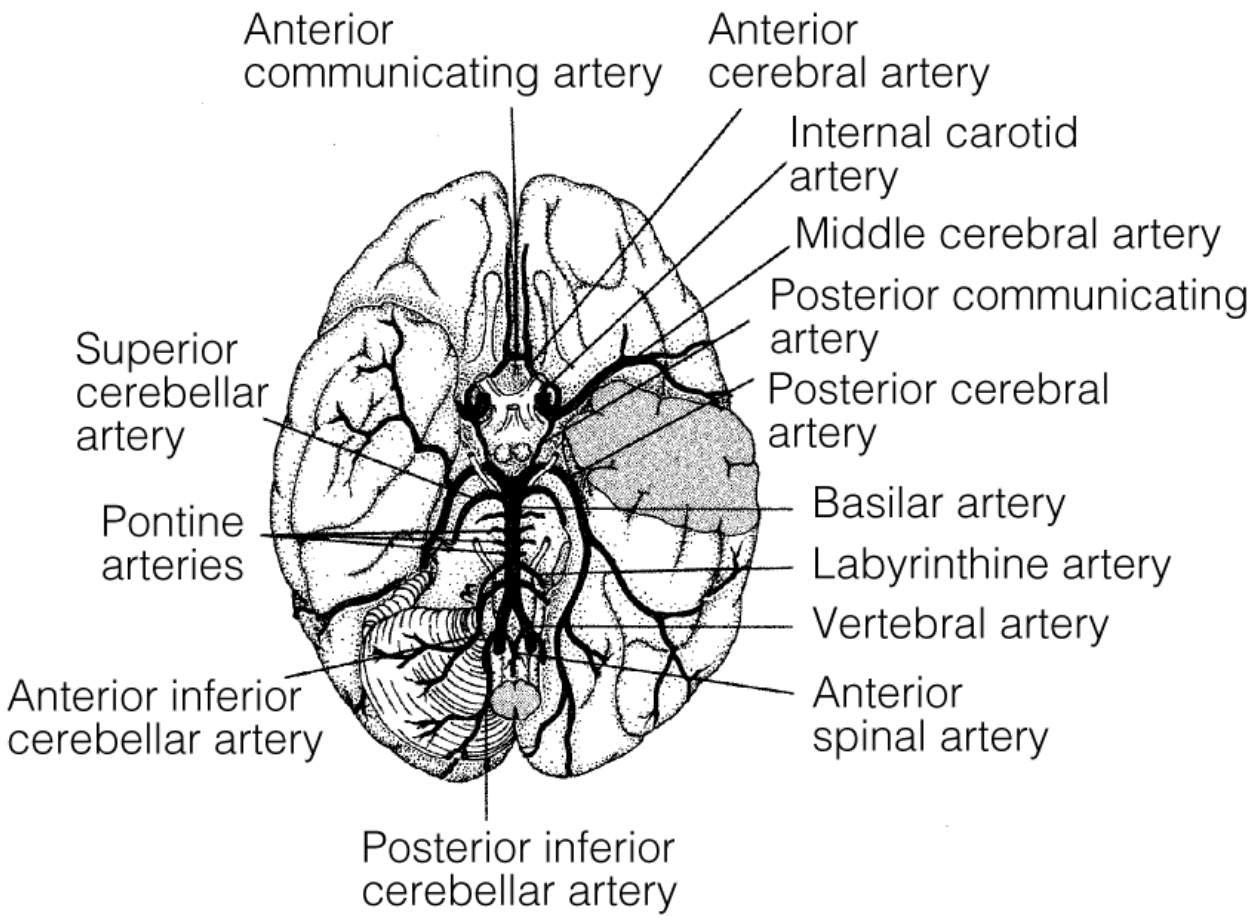


Anatomic Features: Lateral (1st and 2nd), 3rd, and 4th ventricles, choroids plexus, cerebral aqueduct, and arachnoid granulations

Function: Balancing intracranial pressure, cerebrospinal fluid production, and circulation

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Anatomic Features of the Brain's Vascular System

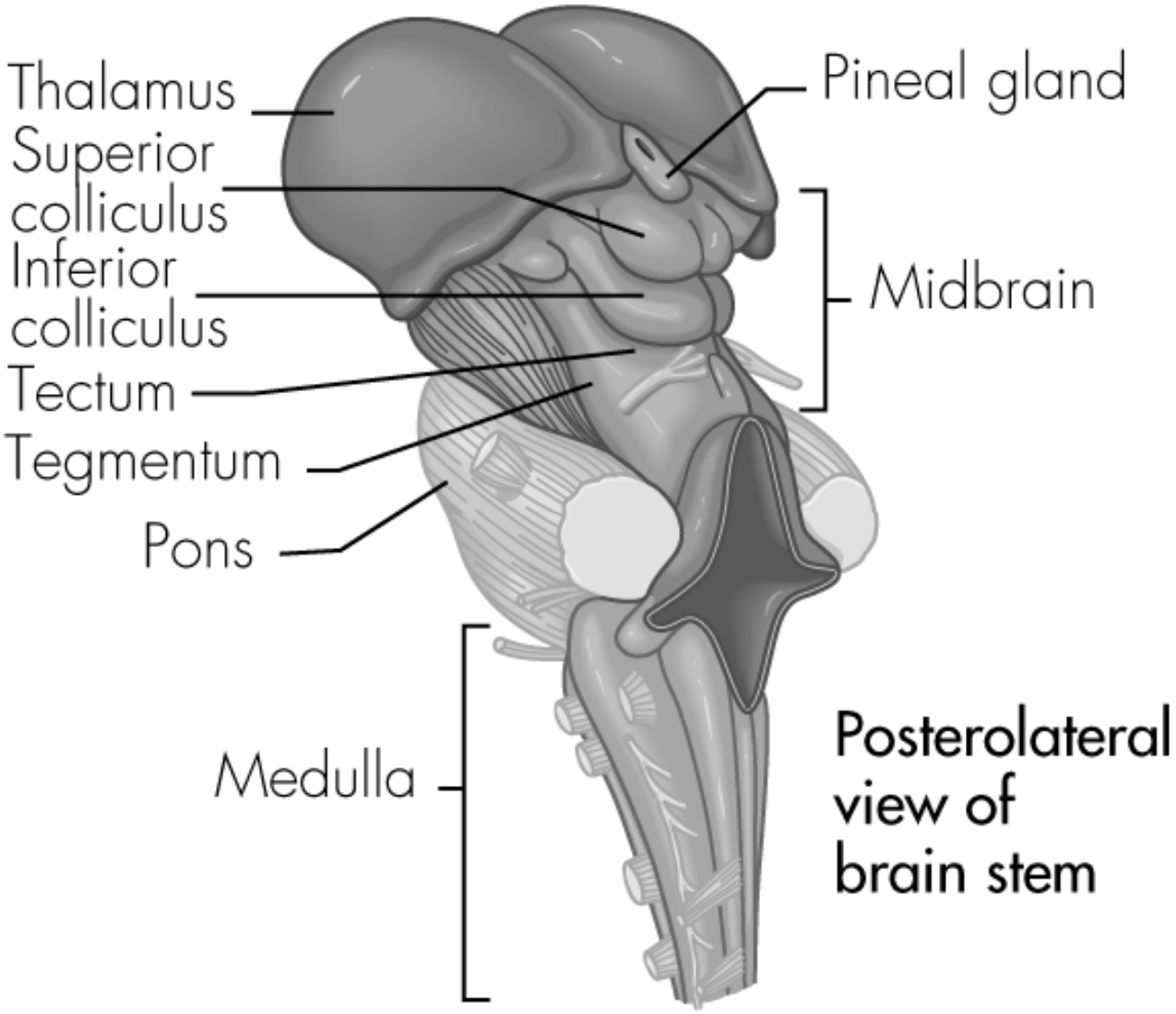


Anatomic Features: Arteries, veins, circle of Willis

Function: Arteries provide nourishment, oxygen, and other nutrients to the brain; the veins carry away waste products

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Anatomic Features of the Lower Brain Stem

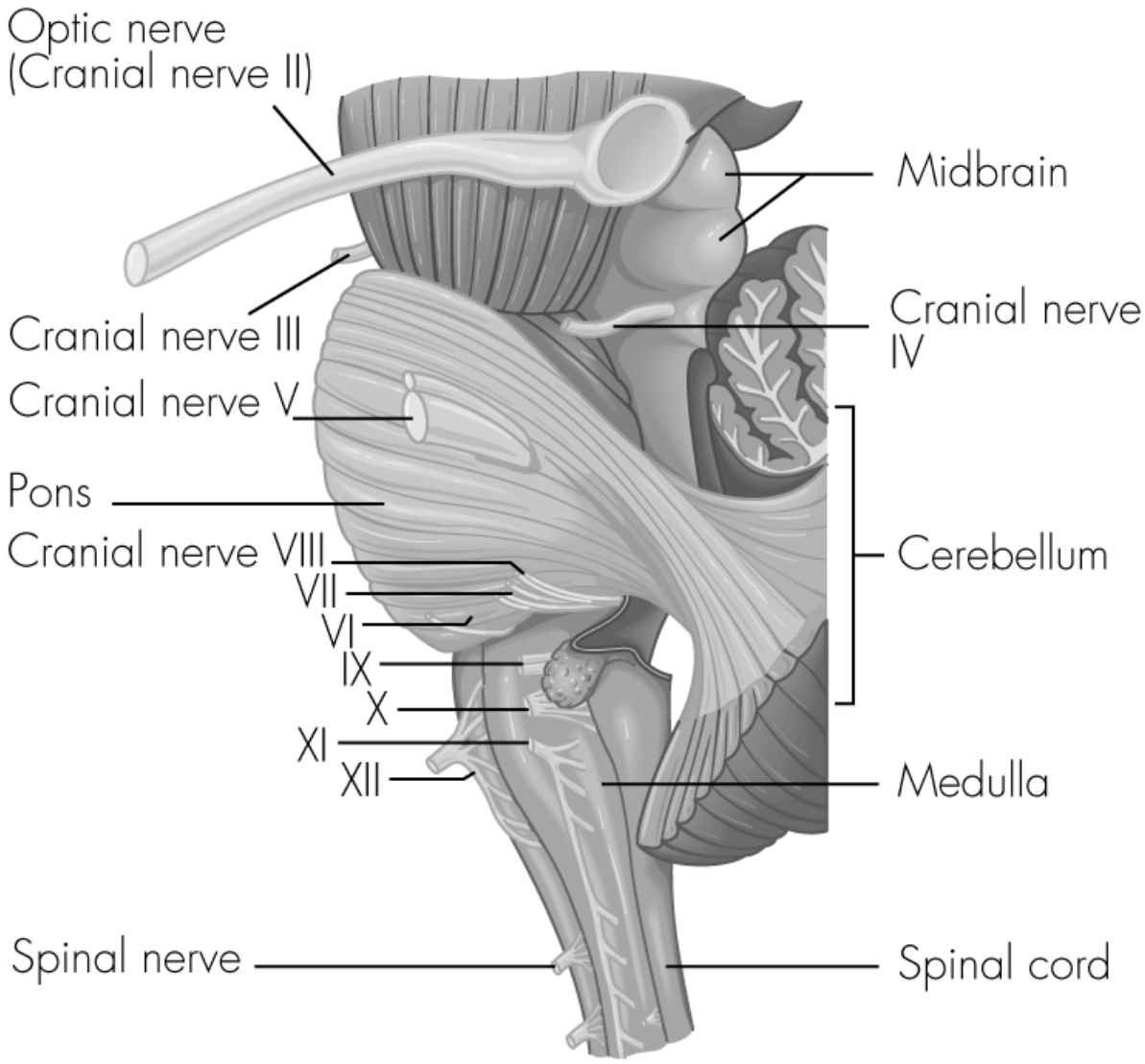


Anatomic Features: Hindbrain contains the medulla oblongata (myelencephalon), and pons (metencephalon); midbrain contains the tectum and tegmentum, cranial nerves, reticular activating system

Function: Relays information to and from the brain; responsible for simple reflexive behavior

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Anatomic Features of the Cranial Nerves

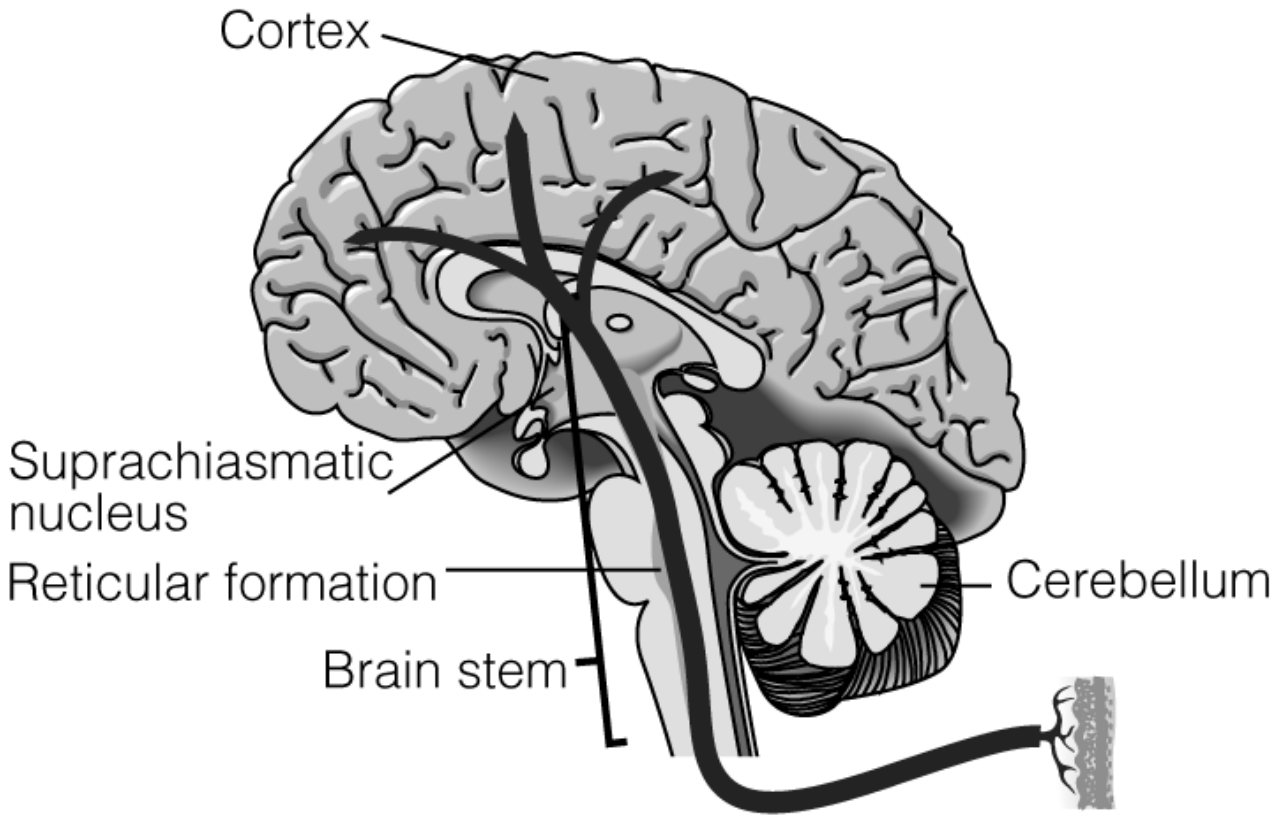


Anatomic Features: Located within the brain stem

Function: Conducts specific motor and sensory information

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Anatomic Features of the Reticular Formation

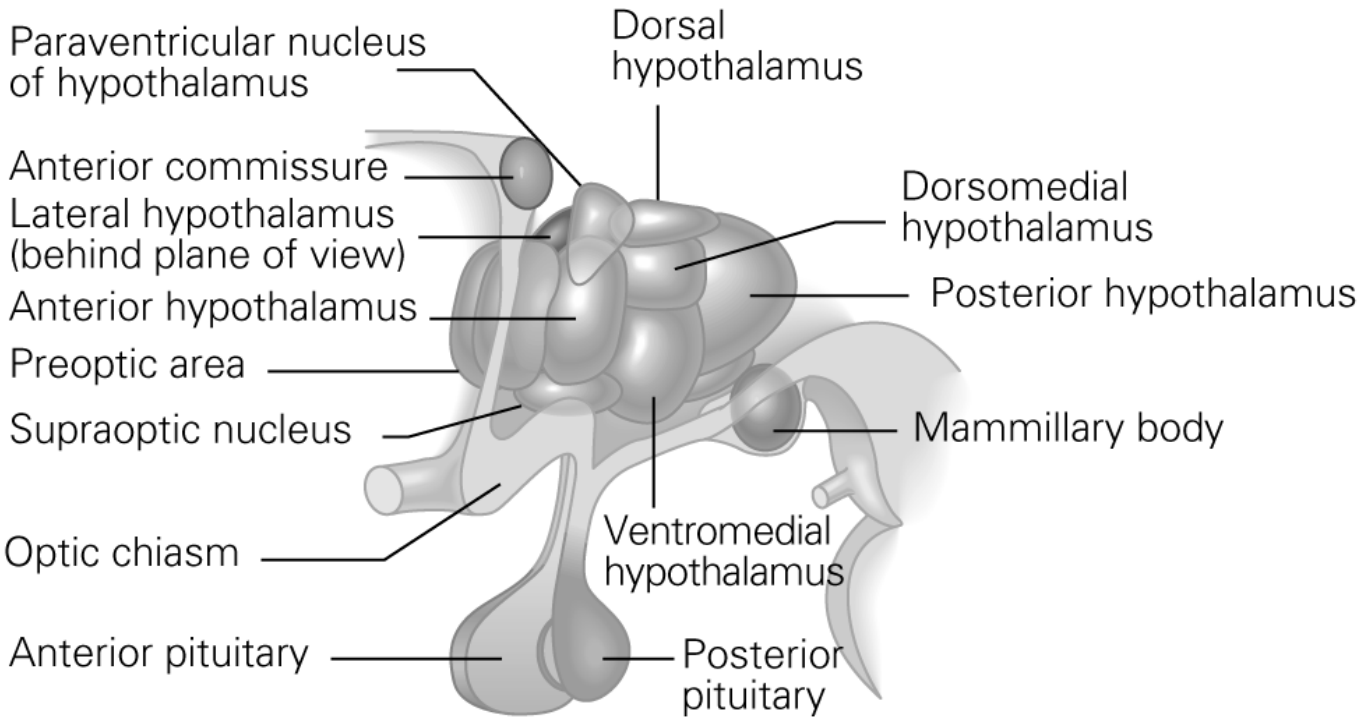


Anatomic Features: Neural network within the lower brain stem connecting the medulla and the midbrain

Function: Nonspecific arousal and activation, sleep and wakefulness

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Anatomic Features of the Hypothalamus

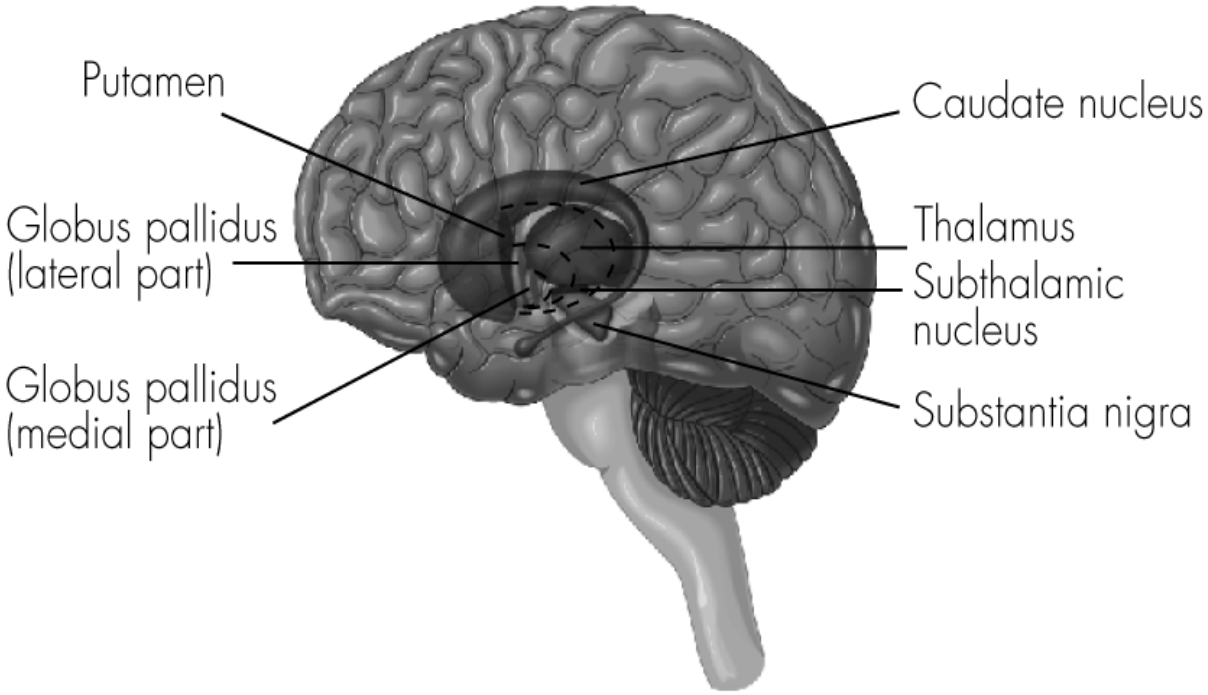


Anatomic Features: Hypothalamic nuclei, major fiber systems, and third ventricle

Function: Activates, controls, and integrates the peripheral autonomic mechanisms, endocrine activity, and somatic functions, including body temperature, food intake, and the development of secondary sexual characteristics

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Anatomic Features of the Basal Ganglia

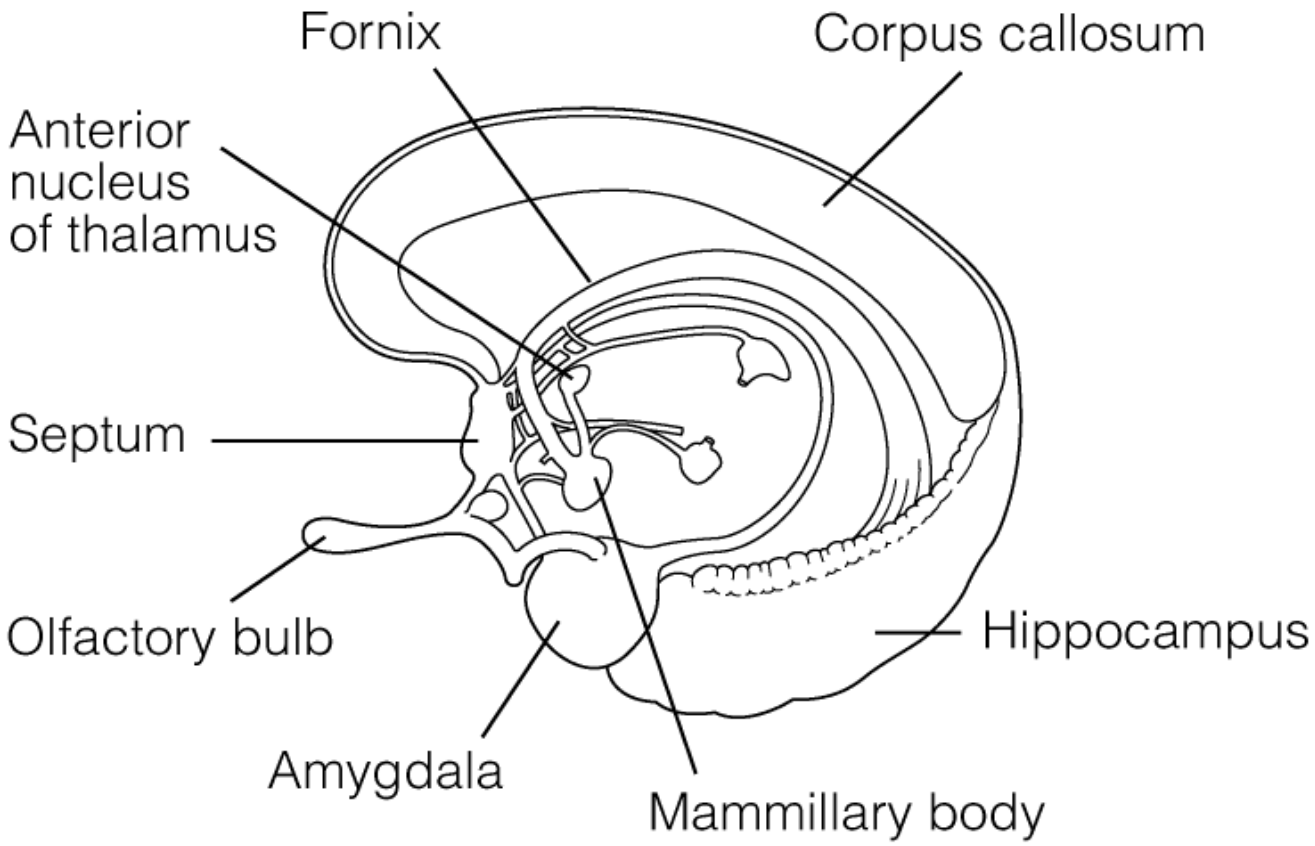


Anatomic Features: Structures of the caudate nucleus, putamen, globus pallidus, substantia nigra, and subthalamic nuclei

Function: Important relay stations in motor behavior (such as the striato-pallido-thalamic loop); connections from part of the extrapyramidal motor system (including cerebral cortex, basal nuclei, thalamus, and midbrain); coordinates stereotyped postural and reflexive motor activity

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Anatomic Features of the Limbic System

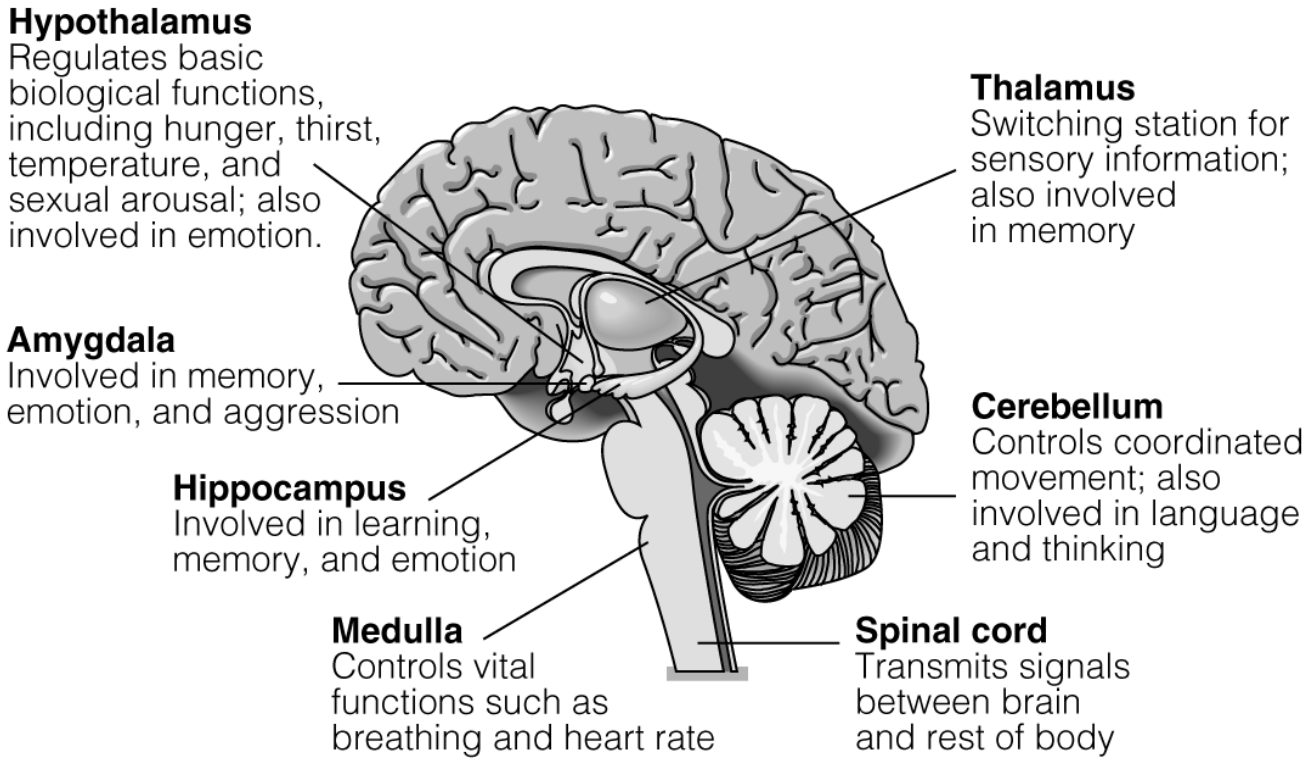


Anatomic Features: Structures of the amygdala, hippocampus, parahippocampal gyrus, cingulate gyrus, fornix, septum, and olfactory bulbs

Function: Closely involved in the expression of emotional behavior and the integration of olfactory information with visceral and somatic information

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Anatomic Features of the Cerebral Hemispheres



Anatomic Features: Structures of the frontal, parietal, occipital, and temporal lobes

Function: Higher cognitive functioning, cerebral specialization, and cortical localization

02
Chapter

Chapter 2

An Integrative Approach to Psychopathology

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02
Chapter

Outline

- One-Dimensional vs. Multidimensional Models
- Genetic Contributions to Psychopathology
- Neuroscience and its Contributions to Psychopathology
- Behavioral and Cognitive Psychology
- Emotions
- Cultural, social and interpersonal factors
- Lifespan development

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02
Chapter

Focus Questions

- *What are the features of unidimensional and multidimensional models of psychopathology?*
- *How do genes interact with environment to influence behavior?*
- *How do different brain regions and neurotransmitters influence psychopathology?*
- *How to behavioral, emotional and cognitive science influence explanations of mental illness?*
- *How do cultural factors affect psychopathology?*

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02 Chapter

One-Dimensional vs. Multidimensional Models (slide 1 of 2)

- One-dimensional Models
  - Explain behavior in terms of a single cause
  - Could mean a paradigm, school, or conceptual approach
  - Tend to ignore information from other areas
  - Example: Explaining obsessive-compulsive disorder as the result of family history alone

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02 Chapter

One-Dimensional vs. Multidimensional Models (slide 2 of 2)

- Multidimensional Models
  - Interdisciplinary, eclectic, and integrative
  - "System" of influences that cause and maintain suffering
  - Draw upon information from several sources
  - Abnormal behavior results from multiple influences

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02 Chapter

Multidimensional Models of Abnormal Behavior

- Major Influences
  - Biological
  - Behavioral
  - Emotional
  - Social & cultural
  - Developmental
  - Environmental

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What Caused Judy's Phobia? (slide 1 of 2)

- Behavioral factors
  - Conditioned response to sight of blood
- Biological factors
  - Genetics – inherited tendencies
  - Physiology (e.g., lightheadedness)
- Emotional influences
  - Fear and anxiety
- Social factors
  - E.g., attention from others

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02 Chapter

What Caused Judy's Phobia? (slide 2 of 2)

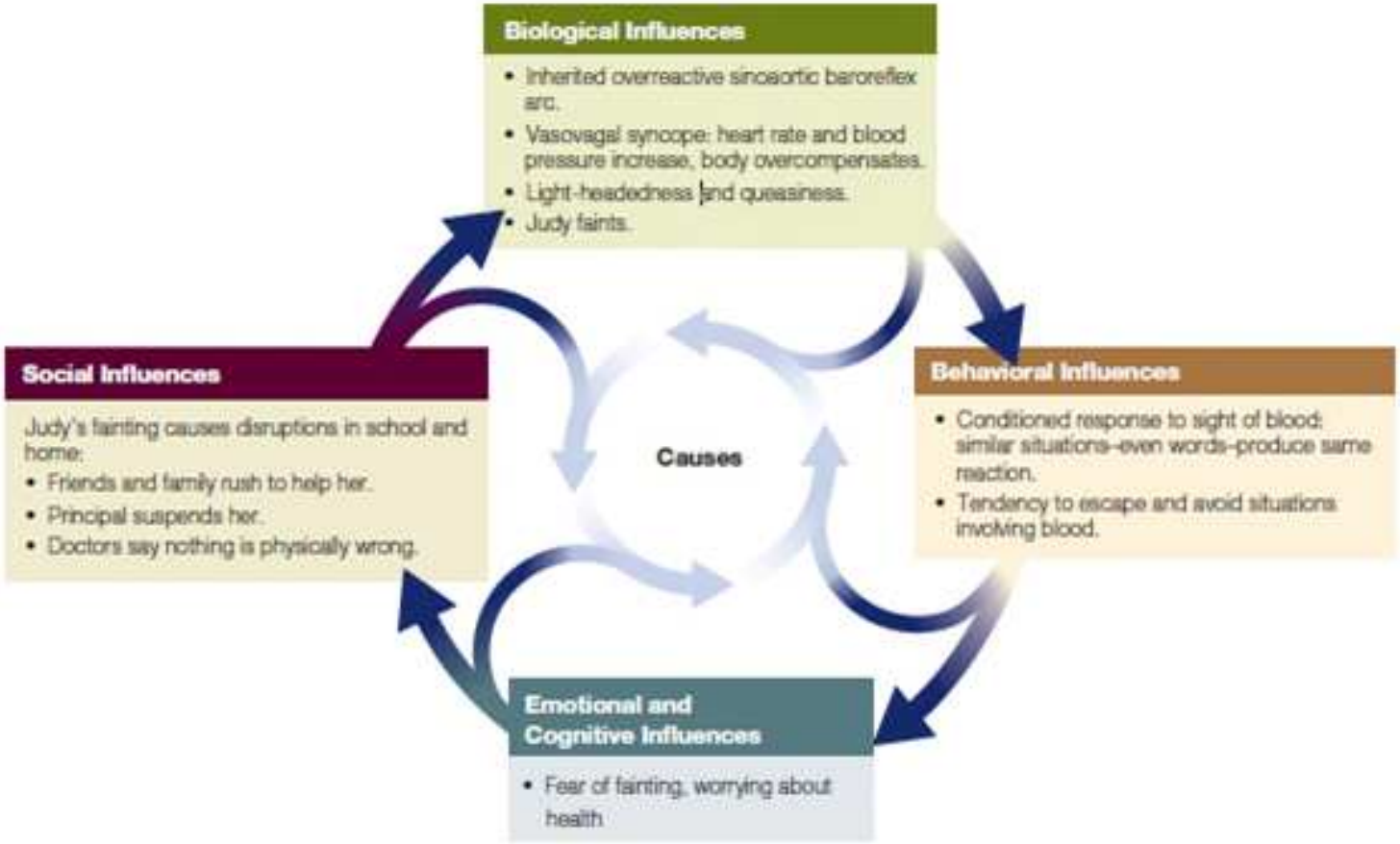


FIGURE 2.1
Judy's case.

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02
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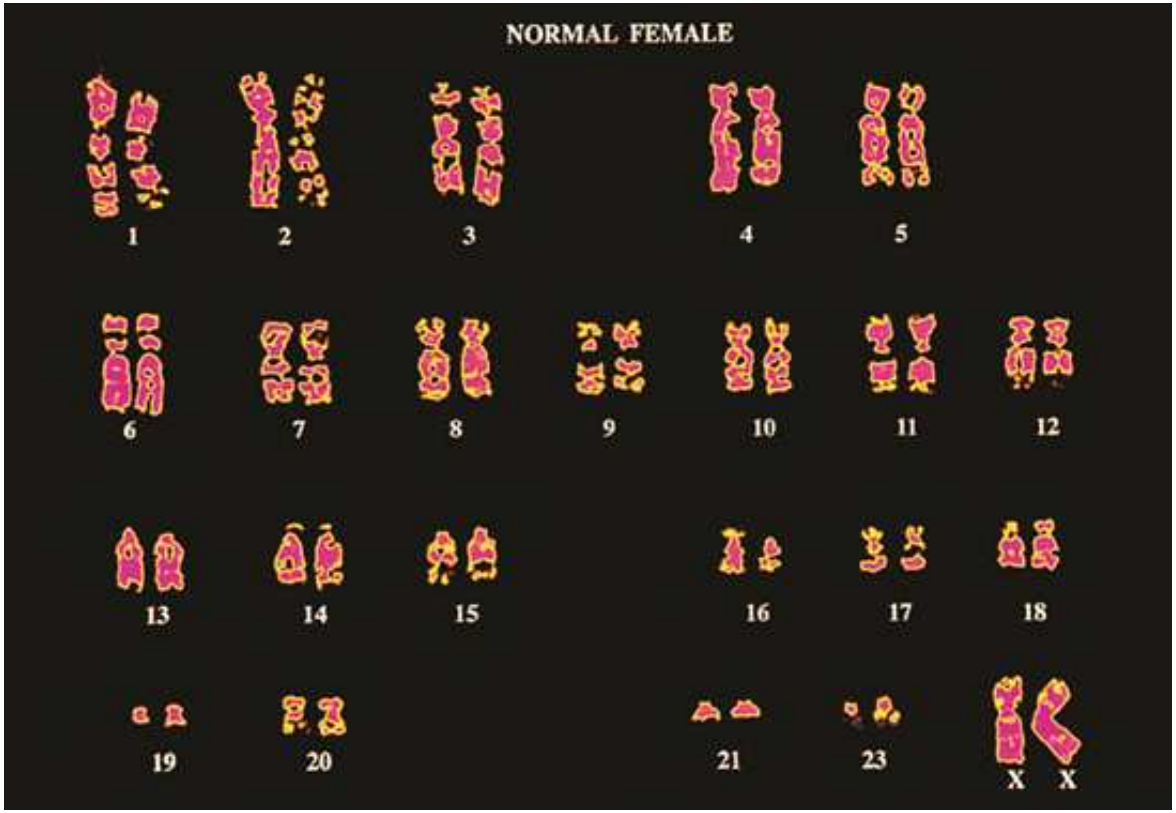
Genetic Contributions to Psychopathology

- Nature of genes
  - Deoxyribonucleic acid (DNA) – the double helix
  - 46 chromosomes in 23 pairs
  - Dominant vs. recessive genes
  - Determine parts of physical and mental characteristics
    - Phenotype vs. genotype

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02
Chapter

Karyotype of a Normal Female



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02 Chapter

Genetic Contributions to Psychopathology (slide 1 of 2)

- Development and behavior is almost always polygenetic
  - Rare exceptions: single-gene determinants (e.g., Huntington's disease, phenylketonuria)
- Generally speaking, genes account for less than 50% of variations in psychopathology

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New Developments in the Study of Genes and Behavior

- One study: heritability estimates ranged from ~30 to 60% for cognitive traits
- Adverse life events can trump the influence of genes
  - Example: If only one identical twin experiences a traumatic life event, the twins' cognitive abilities may be more discrepant later
- Recent research suggests that genetic contributions should not be considered without also considering the environment

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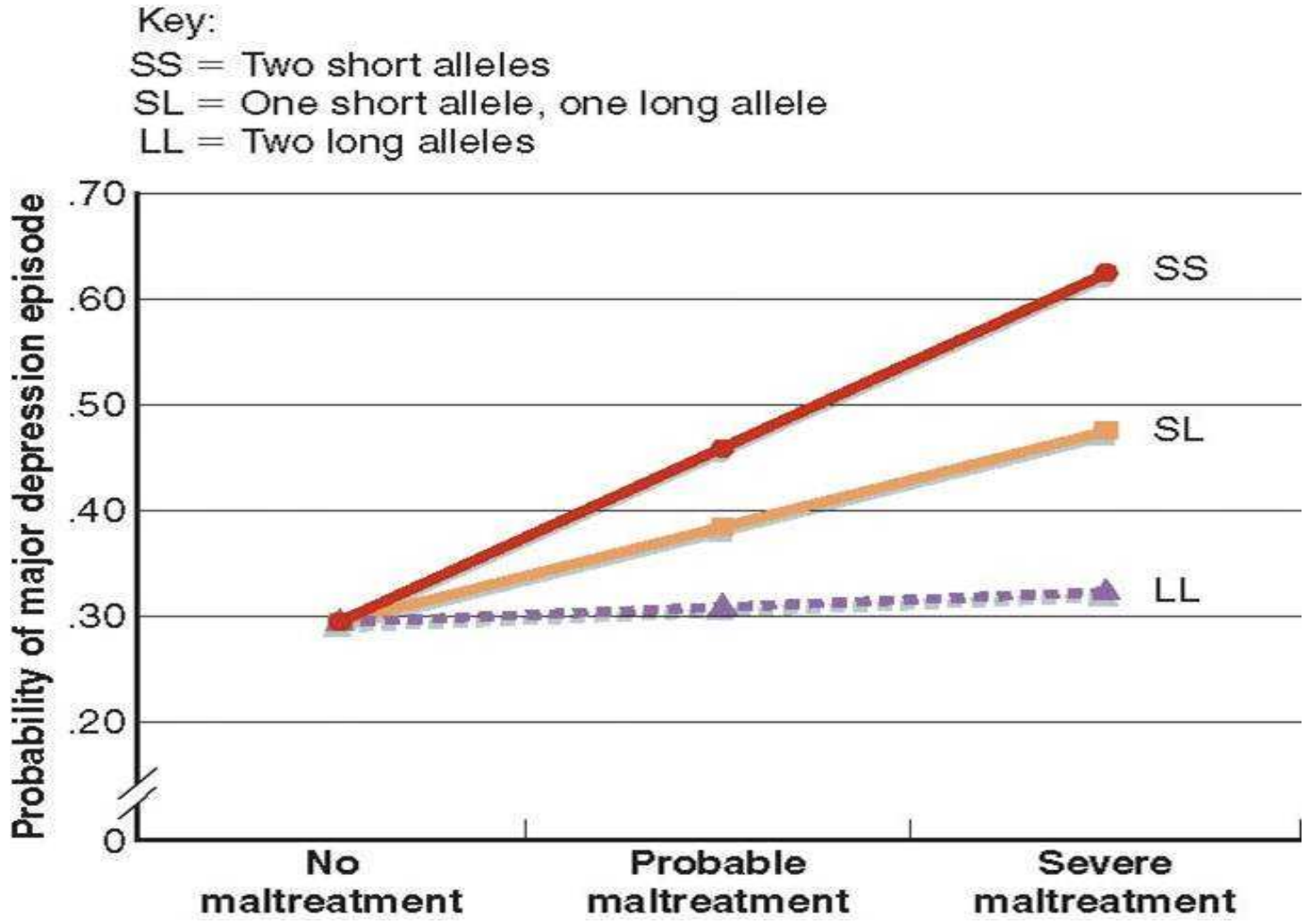
The Interaction of Genetic and Environmental Effects

- Eric Kandel and gene-environment interactions
  - The genetic structure of cells actually changes as a result of learning experiences
    - E.g., an inactive gene may become active because of environmental influences

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The Interaction of Genetic and Environmental Effects (slide 1 of 3)



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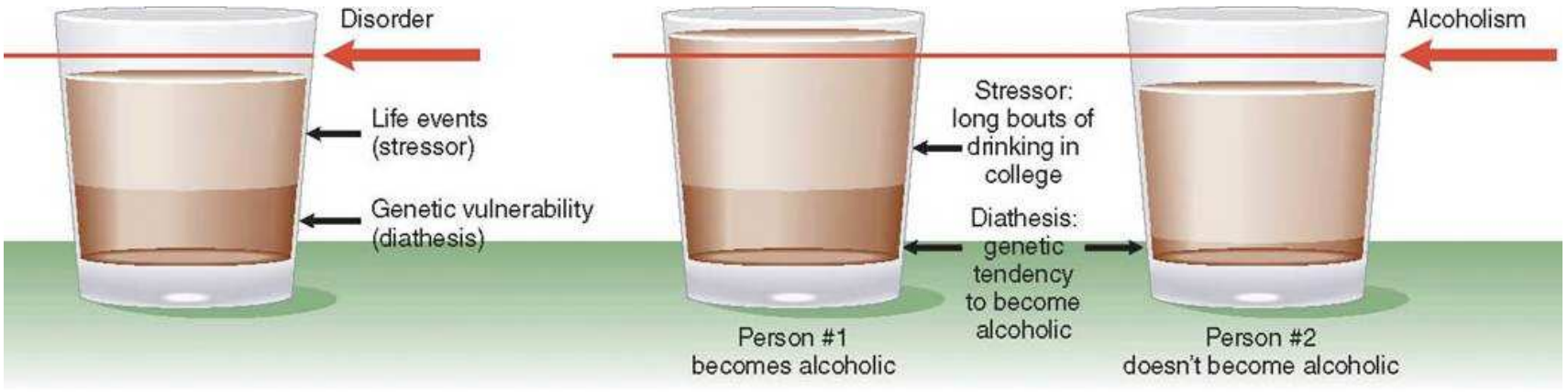
The Interaction of Genetic and Environmental Effects (slide 2 of 3)

- Diathesis-stress model: Disorders are the result of underlying risk factors combining with life stressors that cause a disorder to emerge

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The Diathesis-Stress Model



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The Interaction of Genetic and Environmental Effects (slide 3 of 3)

- Reciprocal gene-environment model
  - Outcomes are a result of interactions between genetic vulnerabilities and experience
  - Examples: depression, impulsivity
- Genetics may make people more likely to seek out certain environments, thus affecting their experiences

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Gene-Environment Correlation model



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Epigenetics and the Nongenomic "Inheritance" of Behavior

- Epigenetics
  - Environmental influences (e.g., stress, nutrition) actually affect the expression of certain genes both for the individual and descendants

  - Cross fostering studies of development
  - Rats who were born to anxious moms (i.e. genetic influence = anxiety) but raised by calm moms (i.e. environmental influence = calm) grew up calm
    - i.e., environment "overrides" genes

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Neuroscience and its Contributions to Psychopathology

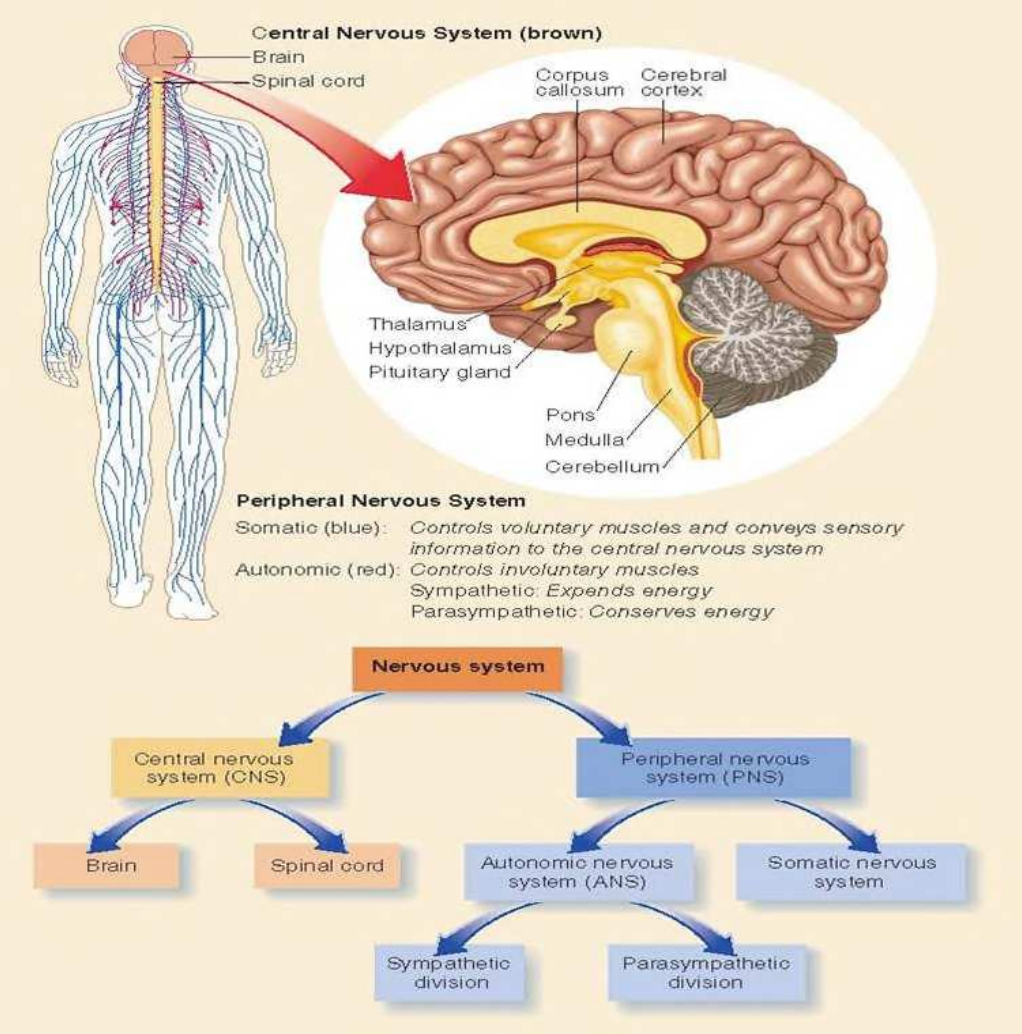
- The field of neuroscience
  - The role of the nervous system in disease and behavior

- The central nervous system
  - CNS
    - Brain and spinal cord
  - PNS
    - Somatic and autonomic branches

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The Central Nervous System



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Neuroscience and the Central Nervous System (slide 1 of 2)

- The Neuron
  - Soma – cell body
  - Dendrites – branches that receive messages from other neurons
  - Axon – trunk of neuron that sends messages to other neurons
  - Axon terminals – buds at end of axon from which chemical messages are sent
  - Synapses – small gaps that separate neurons

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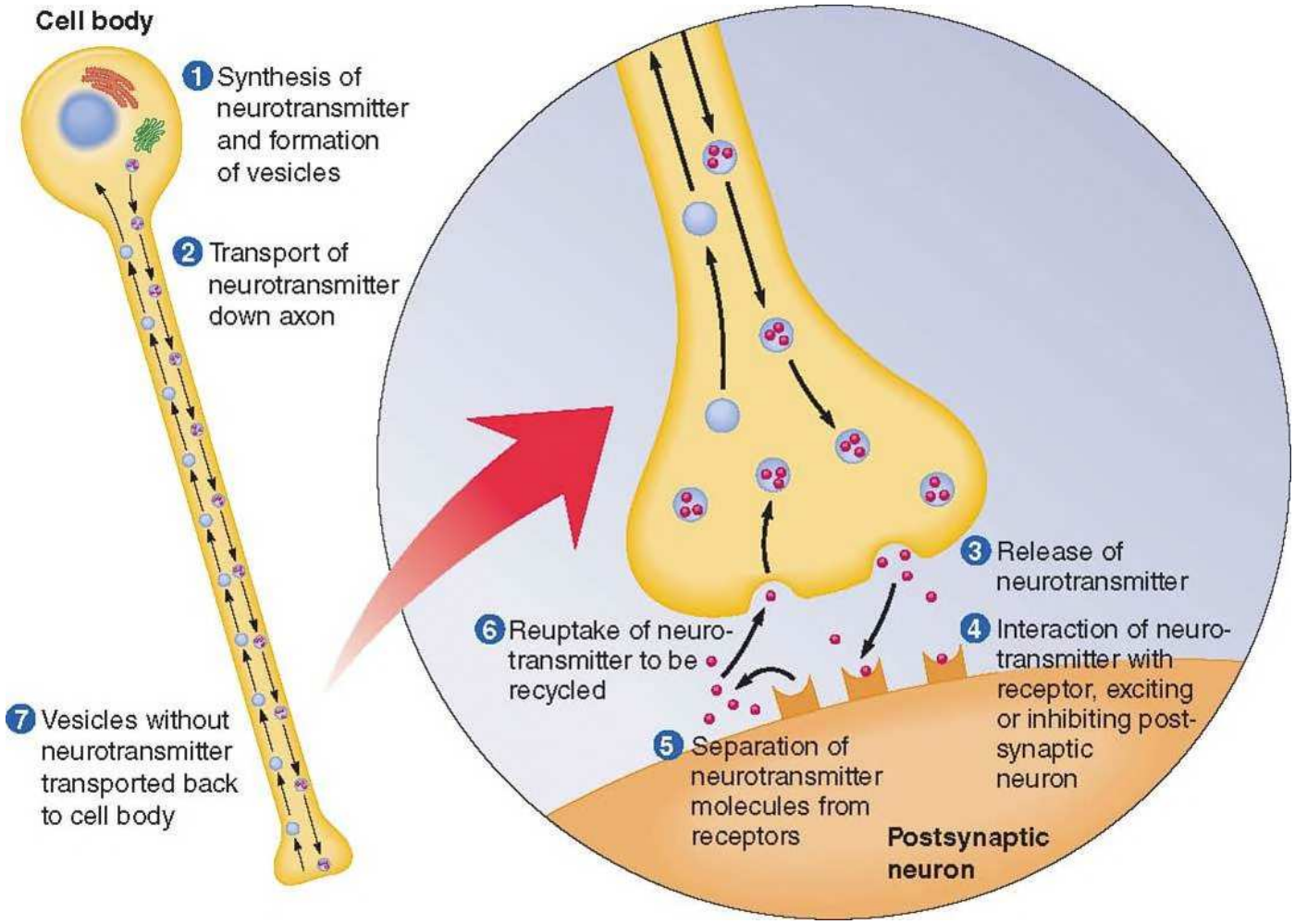
Neuroscience and the Central Nervous System (slide 2 of 2)

- Neurons operate electrically, but communicate chemically
  - Neurotransmitters are the chemical messengers

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Neuron Transmissions



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The Structure of the Brain

- Two main parts:
  - Brain stem
    - Basic functions
    - Contains hindbrain, midbrain, thalamus and hypothalamus (between brainstem and forebrain)
  - Forebrain
    - Higher-order functions
    - Contains limbic system, basal ganglia, cerebral cortex (larges part of the brain, the wrinkled outer structure)

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Neuroscience and Brain Structure (slide 1 of 4)

- Hindbrain – regulates automatic processes
  - Medulla – heart rate, blood pressure, respiration
  - Pons – regulates sleep stages
  - Cerebellum – involved in physical coordination
- Midbrain
  - Coordinates movement with sensory input
  - Contains parts of the reticular activating system (RAS)

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Neuroscience and Brain Structure (slide 2 of 4)

- Limbic system
  - Involved in emotional processing, aggression
  - Thalamus – receives and integrates sensory information
  - Hypothalamus – eating, drinking, aggression, sexual activity
- Basal ganglia: Thought to partially control motor activity

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Neuroscience and Brain Structure (slide 3 of 4)

- Forebrain
  - Most sensory, emotional, and cognitive processing
  - Cerebral cortex contains two specialized hemispheres (left and right)
    - Each hemisphere has four lobes with specialized processes

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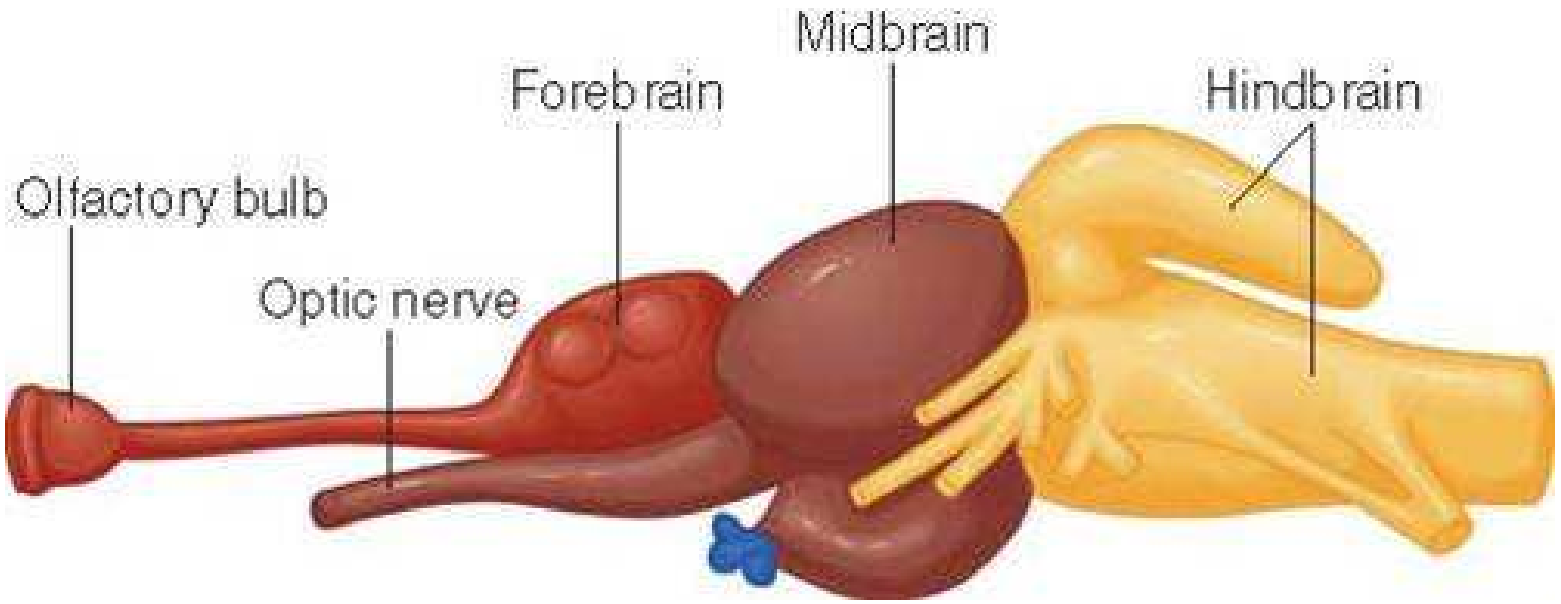
Neuroscience and Brain Structure (slide 4 of 4)

- Lobes of the Cerebral Cortex and some of their important functions
  - Frontal – thinking and reasoning abilities, memory
  - Parietal – touch recognition
  - Occipital – integrates visual input
  - Temporal – recognition of sights and sounds, long-term memory storage

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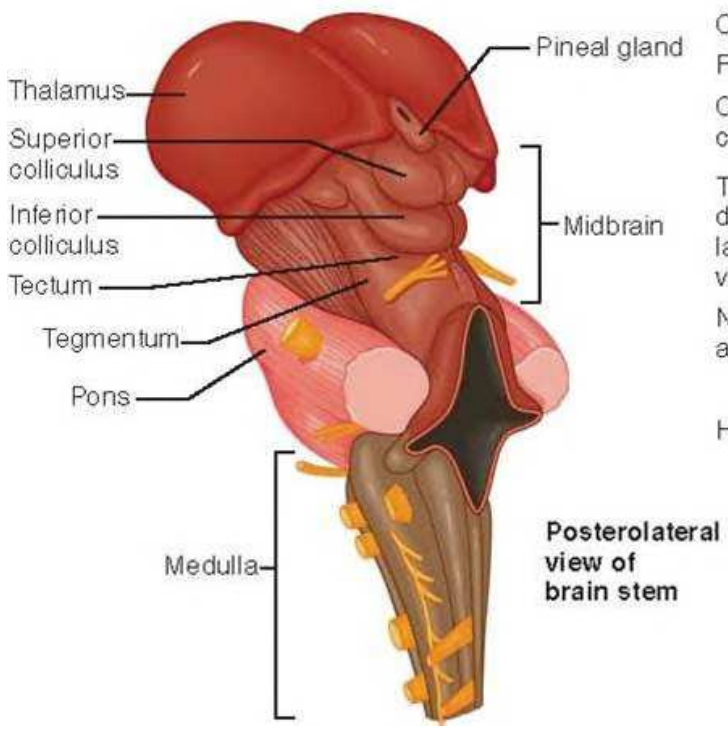
The Divisions of the Brain

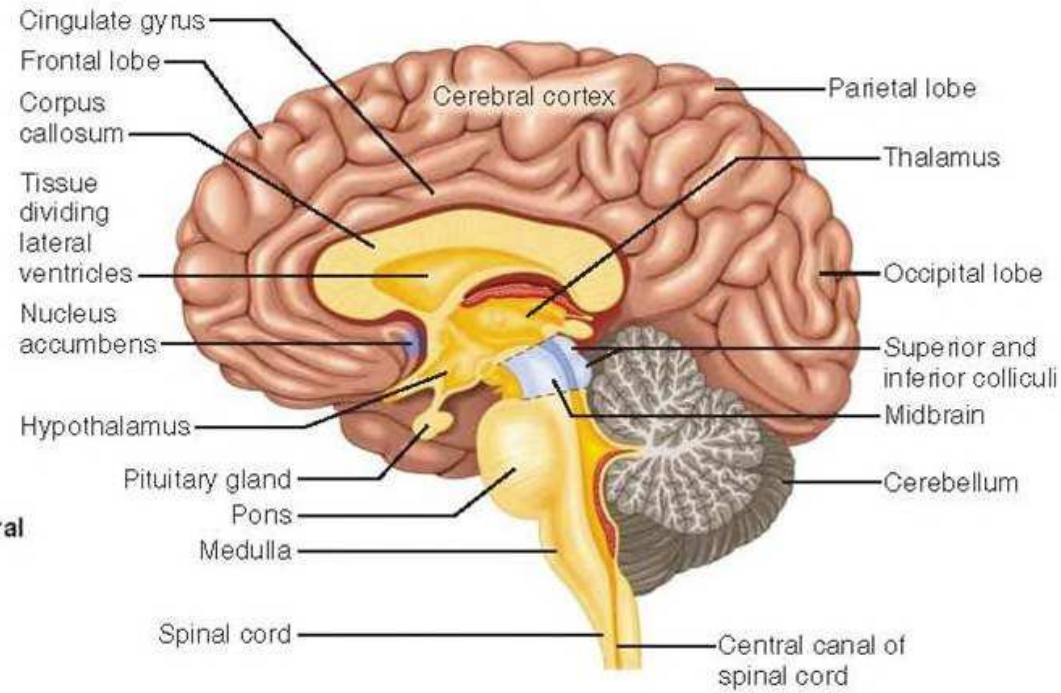


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Major Structures of the Brain

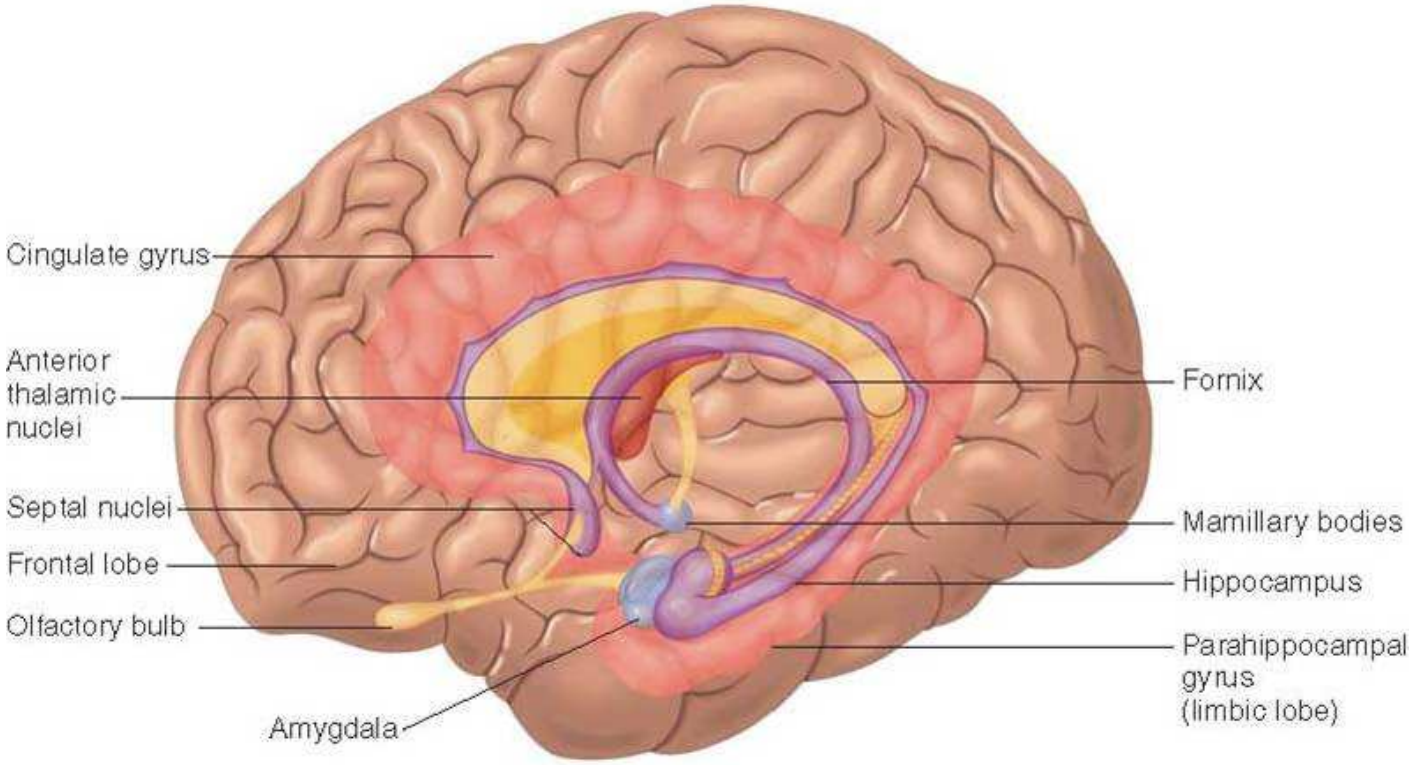




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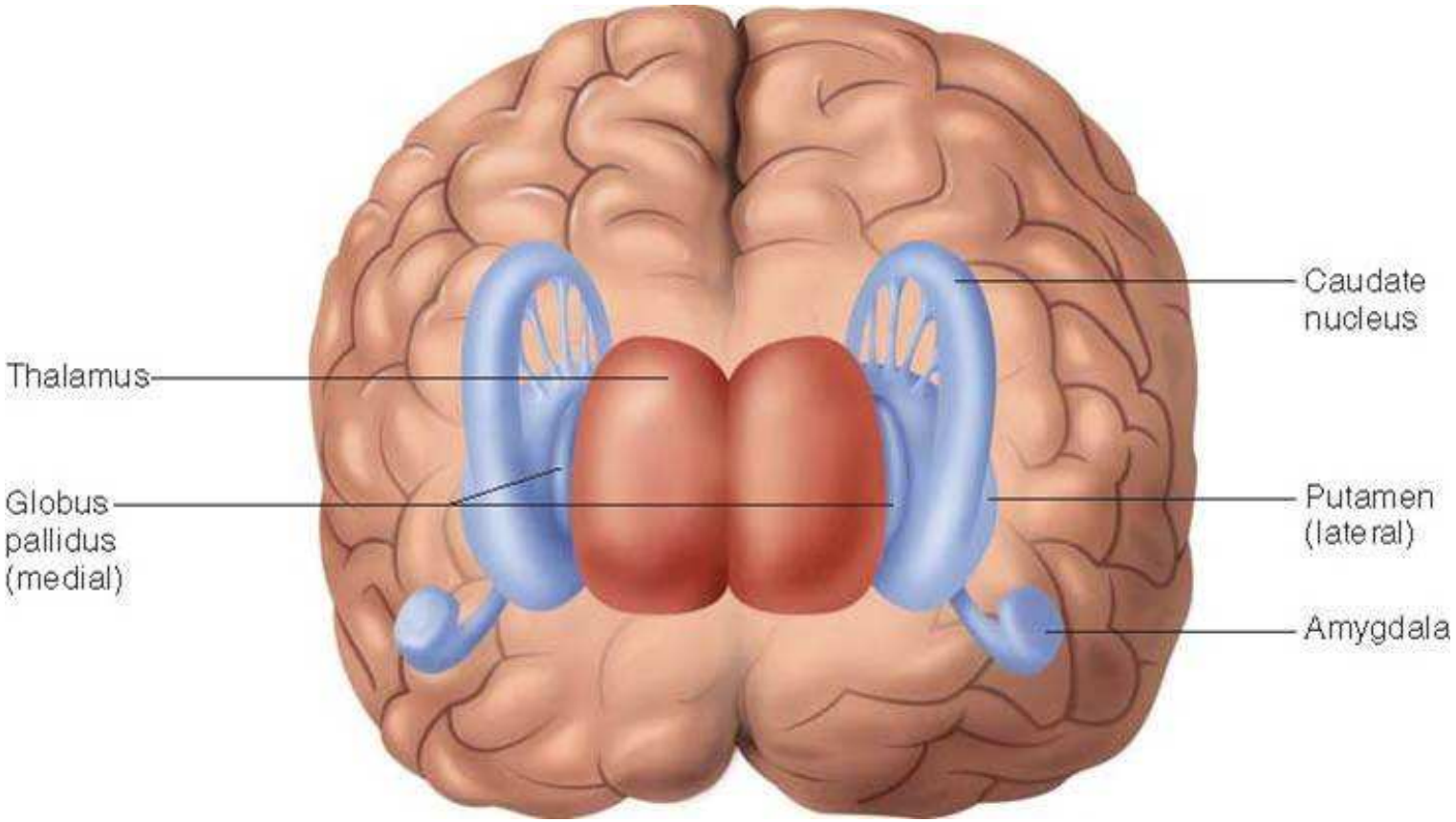
The Limbic System



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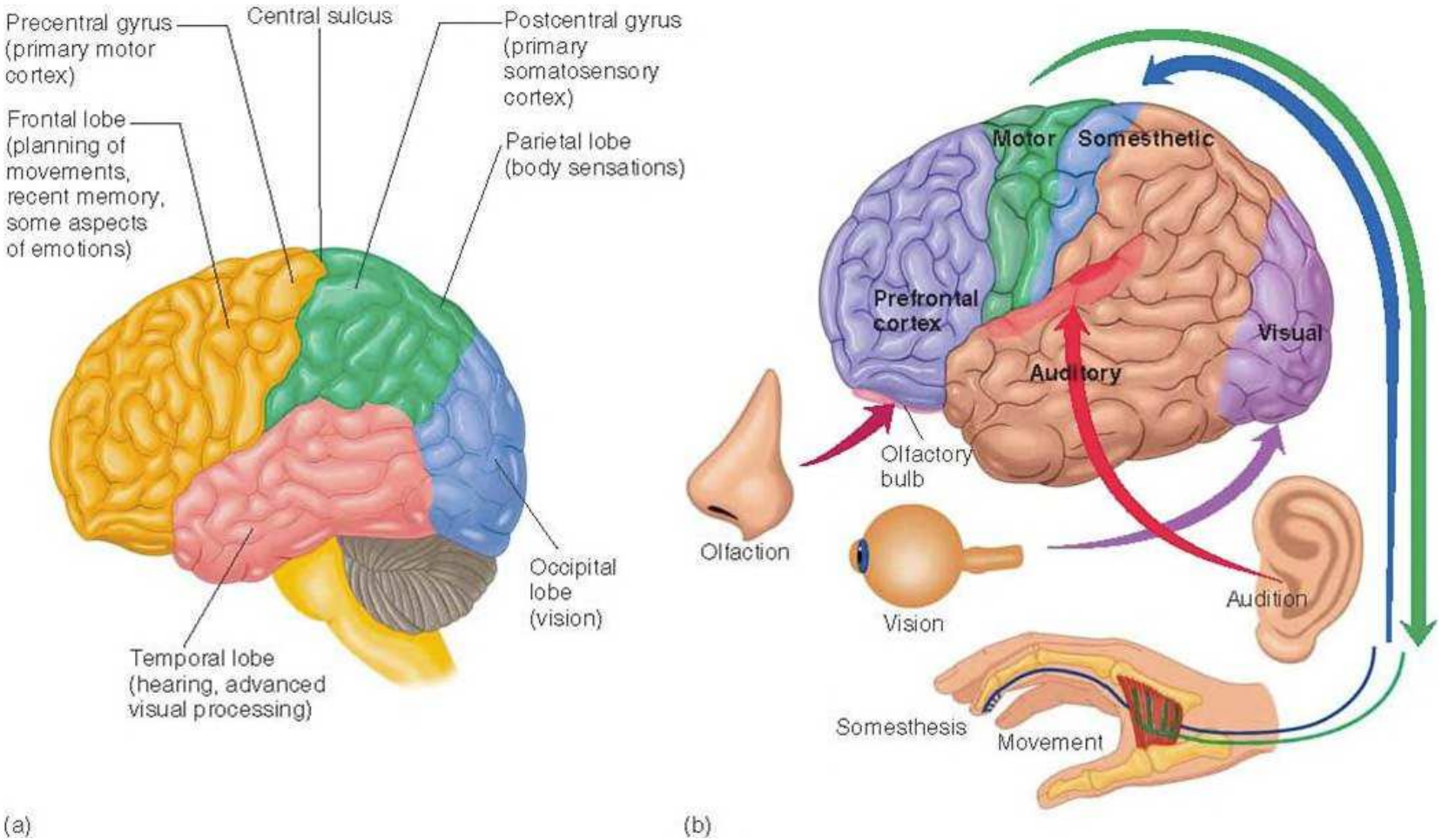
The Basal Ganglia



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The Human Cerebral Cortex and its Functions



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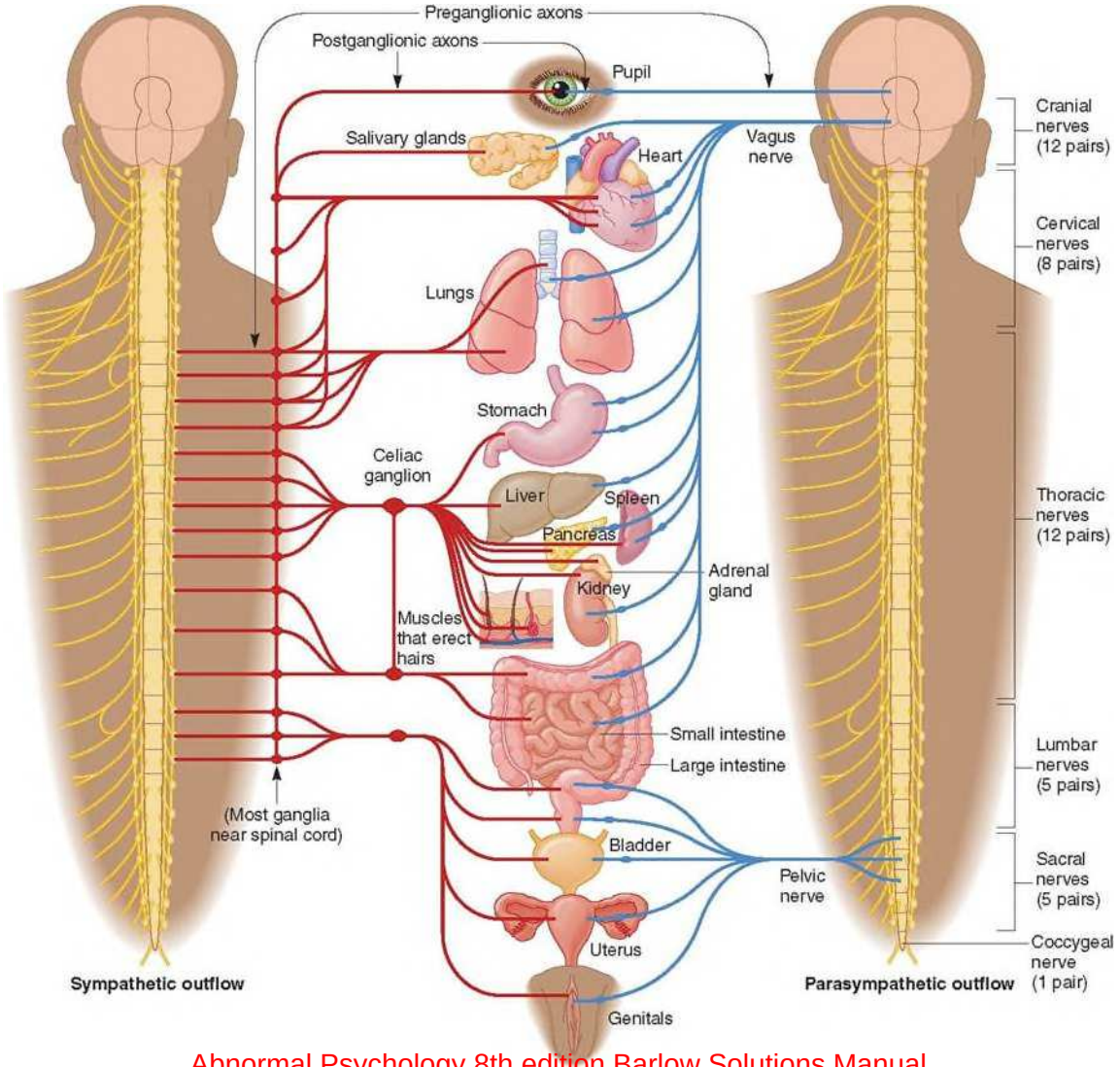
Peripheral Nervous System

- Somatic branch of PNS
  - Controls voluntary muscles and movement
- Autonomic branch of the PNS
  - Involuntary processes
  - Sympathetic and parasympathetic branches
  - Regulates cardiovascular system & body temperature
  - Also regulates the endocrine system and aids in digestion

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The Sympathetic and Parasympathetic Nervous Systems



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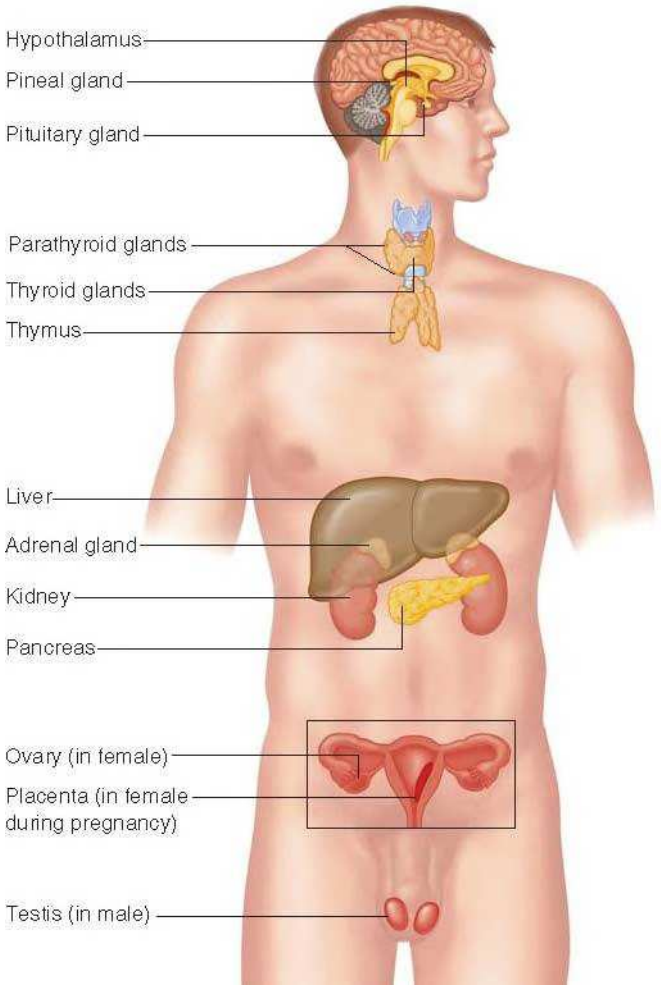
Neuroscience: Endocrine Systems

- The Endocrine System
  - Regulates release of hormones
- The Hypothalamic-Pituitary-Adrenalcortical axis (HPA axis)
  - Integration of endocrine and nervous system function
- Dysregulated hormones implicated in some forms of psychopathology

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Endocrine Glands



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Neurotransmitters

- Functions of Neurotransmitters
  - “Chemical messengers” - transmit messages between brain cells
  - Other chemical substances in the brain
    - Agonists
    - Inverse agonists
    - Antagonists
    - Most drugs are either agonistic or antagonistic

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Neuroscience: Functions of Main Types of Neurotransmitters

- Main types of neurotransmitters
  - Serotonin (5-HT)
  - Glutamate
  - Gamma aminobutyric acid (GABA)
  - Norepinephrine
  - Dopamine

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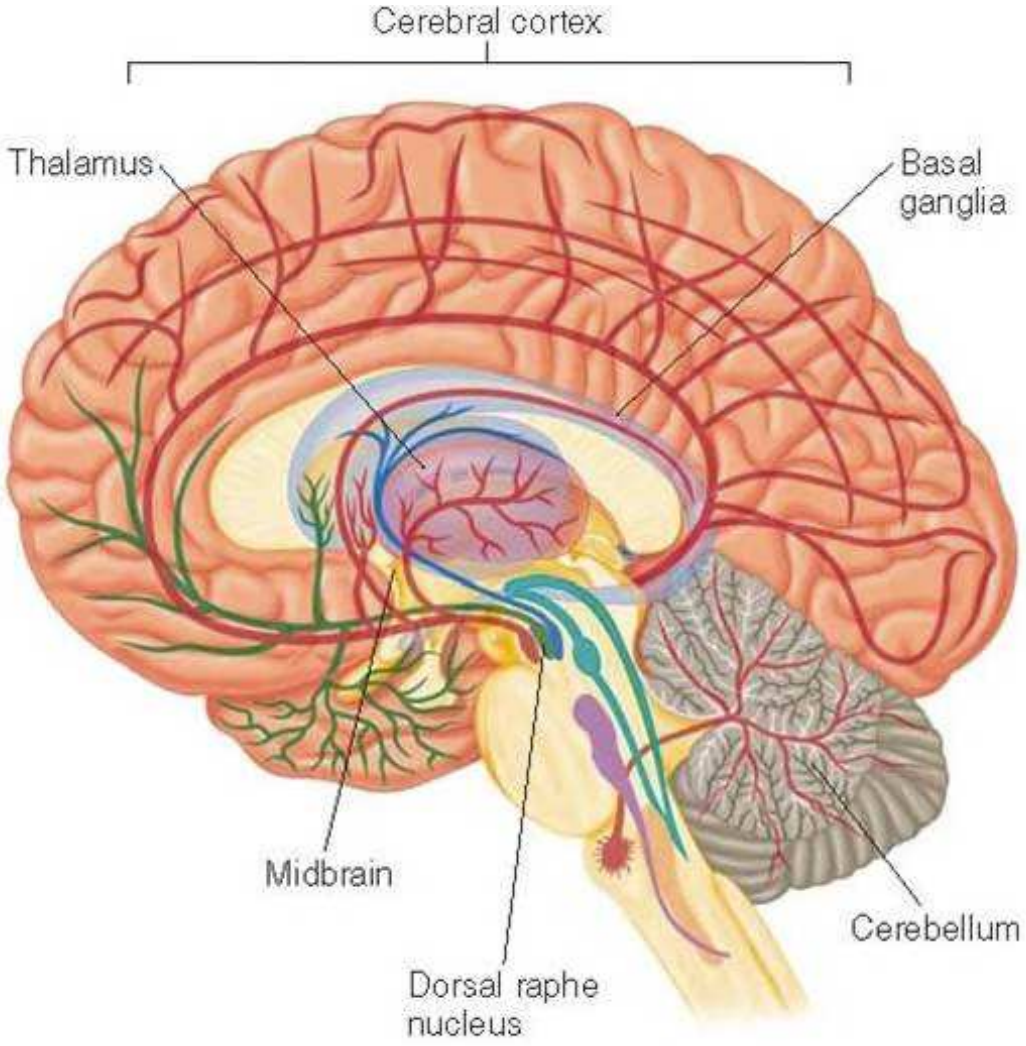
Serotonin

- Also known as 5-hydroxytryptamine (5-HT)
- Influences information processing, behavior, mood and thoughts
- Dysregulated serotonin may contribute to depression
- Very low serotonin linked to instability and impulsivity

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Serotonin Pathways in the Brain



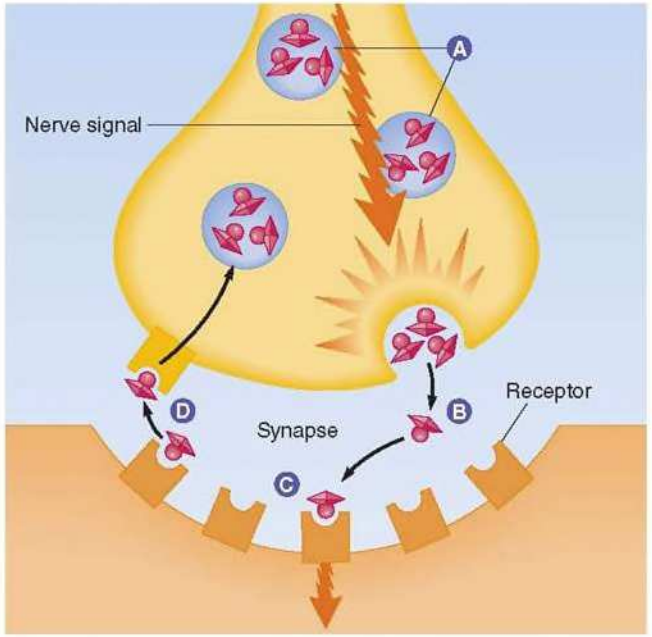
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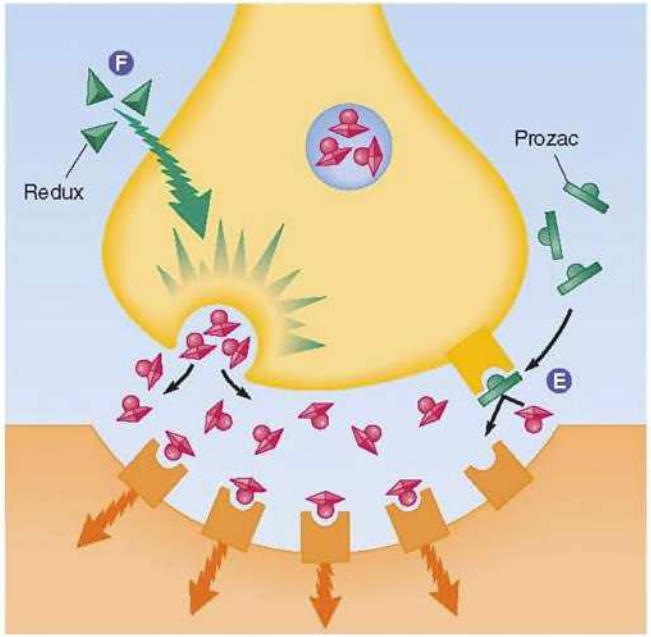
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Manipulating Serotonin in the Brain

How Neurotransmitters Work
Neurotransmitters are stored in tiny sacs at the end of the neuron (A). An electric jolt makes the sacs merge with the outer membrane, and the neurotransmitter is released into the synapse (B). The molecules diffuse across the gap and bind receptors, specialized proteins, on the adjacent neuron (C). When sufficient neurotransmitter has been absorbed, the receptors release the molecules, which are then broken down or reabsorbed by the first neuron and stored for later use (D).

How Serotonin Drugs Work
Prozac enhances serotonin's effects by preventing it from being absorbed (E). Redux and fenfluramine (antiobesity drugs) cause the release of extra serotonin into the synapse (F). Unfortunately, these drugs have been recalled by the FDA for dangerous cardiovascular side effects (see Chapter 8).





Receptor Variation
There are at least 15 different serotonin receptors, each associated with a different function.



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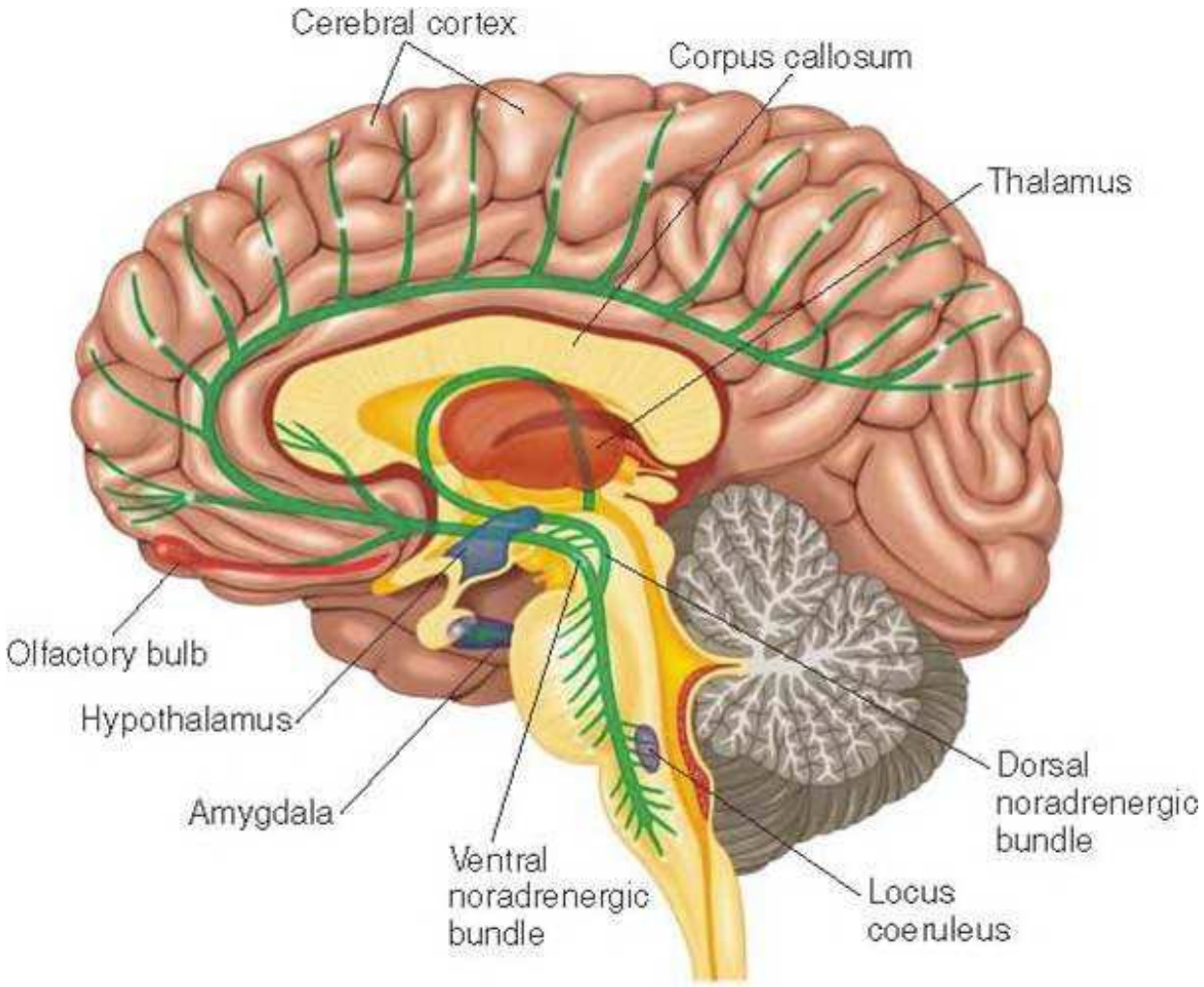
Norepinephrine

- Also called noradrenaline
- Involved in alarm responses and basic bodily processes (e.g. breathing)

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Norepinephrine Pathways



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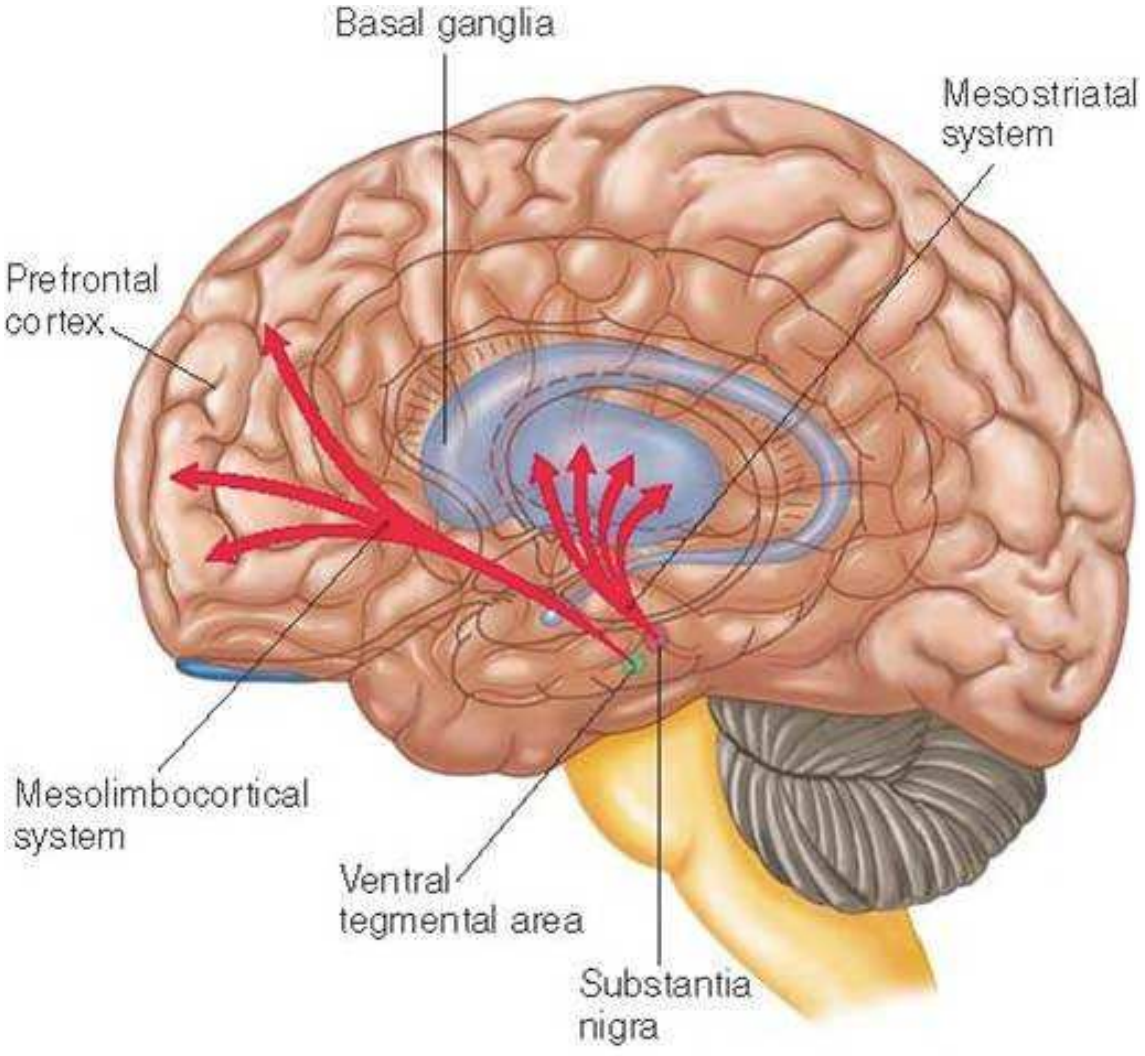
Dopamine

- Implicated in depression and ADHD
- Link between excessive dopamine and schizophrenia
- Link between reduced dopamine and Parkinson's disease

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Dopamine Pathways



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Implications for Psychopathology

- Certain types of brain activity may be associated with abnormal behavior
- Example: OCD
  - Patients have increased activity in part of the frontal lobe (orbital surface)
  - Man developed OCD after
  - This overactivity is reduced after effective treatment

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Psychosocial Influences on Brain Structure and Function (slide 1 of 3)

- Psychosocial influences on the brain
  - Neurological activity may change as a result of psychotherapy > suggests that psychosocial influences affect brain function
  - Placebos may also change brain function
  - Psychotherapy
  - Stress and early development
- Interactions of psychosocial factors with brain structure and function
  - Developmental disorders
  - Environment and brain structures

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Psychosocial Influences on Brain Structure and Function (slide 2 of 3)

- More stimulating environments appear to promote neurodevelopment
- Stress and early development
  - *Sense of control over environment* appears important

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Psychosocial Influences on Brain Structure and Function (slide 3 of 3)

- Monkeys were given neurochemical designed to trigger extreme anxiety
  - Monkeys raised in uncontrollable environment responded with panic
  - Monkeys raised in controllable environment responded with aggression

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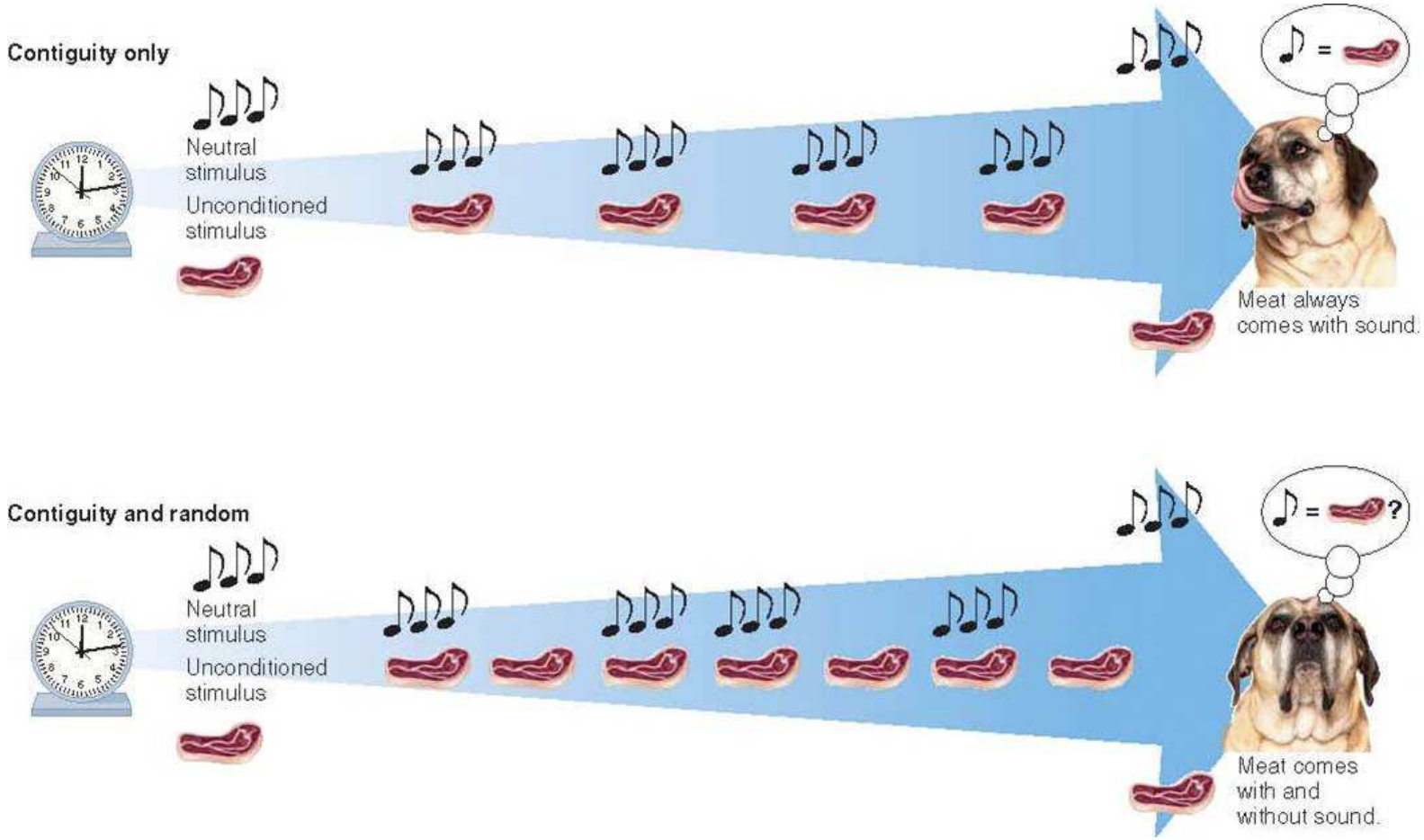
The Contributions of Behavioral and Cognitive Science

- Conditioning and cognitive processes
  - Early research on classical conditioning: Simple associations are learned between two things that tend to occur together
  - Later research indicated that it is not always that simple – influenced by higher-order cognitive processes

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Classical Conditioning



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The Contributions of Behavioral and Cognitive Science (slide 1 of 4)

- Other types of learning
  - Respondent and operant learning
    - Learn to repeat behaviors followed by desirable consequences and decrease behaviors followed by undesirable consequences

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The Contributions of Behavioral and Cognitive Science (slide 2 of 4)

- Other types of learning
  - Learned helplessness
    - First demonstrated in animal models, but may contribute to the maintenance of depression
    - Rats given occasional shocks
      - Gave up trying to control the shocks if attempts were ineffective (i.e., “learned” not to bother trying)

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The Contributions of Behavioral and Cognitive Science (slide 3 of 4)

- Other types of learning
  - Social learning
    - Based on research of Albert Bandura
    - Modeling and observational learning: Learn to copy the behaviors that seem to turn out well for other people

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The Contributions of Behavioral and Cognitive Science (slide 4 of 4)

- Other types of learning
  - Prepared learning
    - It is easier to learn associations that would have been helpful to our ancestors
    - Example: Easier to acquire a fear of spiders because it was adaptive for our ancestors to fear (possibly poisonous) spiders

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Cognitive Science and the Unconscious

- There may be a dissociation between behavior and consciousness
  - Implicit memory
    - Acting on the basis of experiences that are not recalled
  - Blind sight
    - Some people who are blind can still sense objects that would be in their visual field even if they do not experience sight
  - Some experimental tests reveal implicit processing

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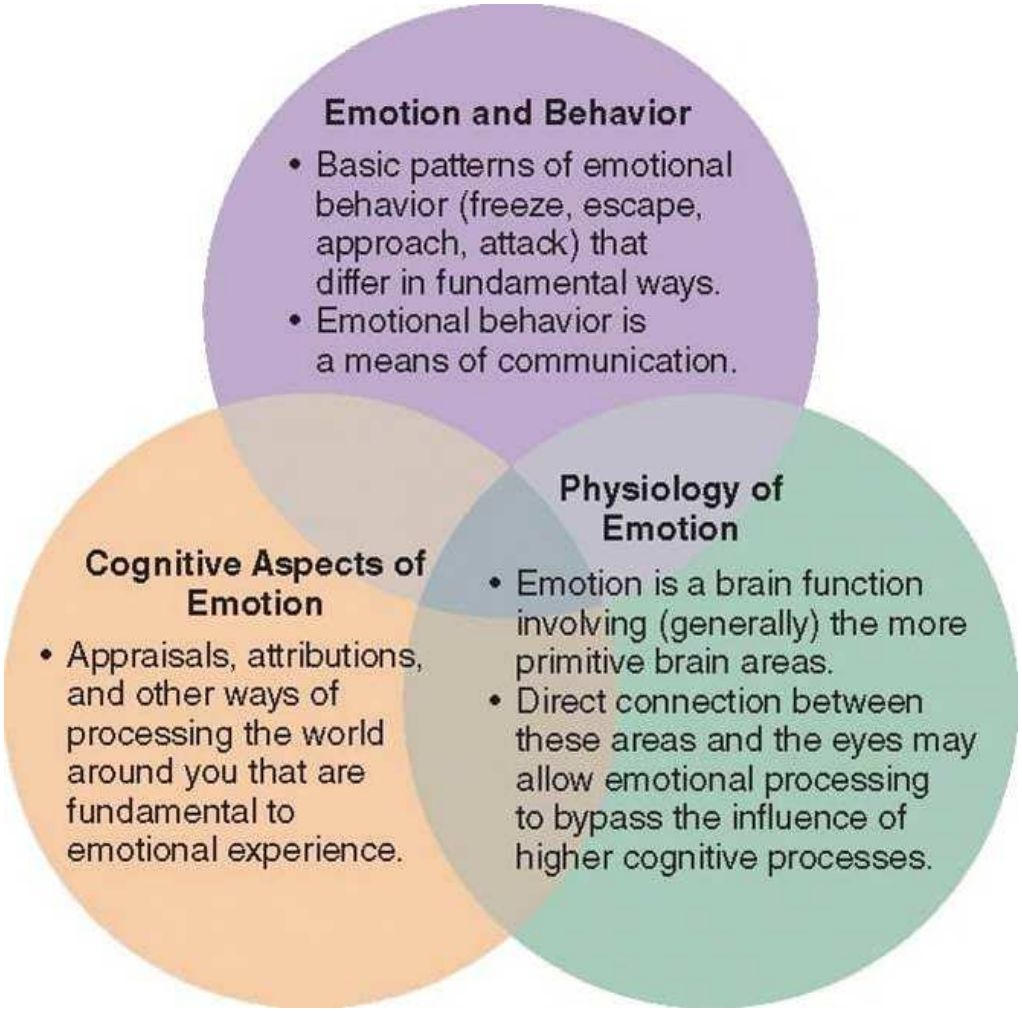
The Role of Emotion in Psychopathology

- The nature of emotion
  - To elicit or evoke action
  - Action tendency different from affect and mood
- Components of emotion
  - Behavior, physiology, and cognition
  - Example of fear: Anxious thoughts, elevated heart rate, tendency to flee

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Components of Emotion



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Anger and Your Heart

- Chronic hostility increases risk for heart disease
- This effect is stronger than many physiological risk factors
- Efficiency of heart pumping is decreased when angry
  - This effect is reversed when people practice forgiveness toward an offense

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Emotions and Psychopathology

- Suppressing negative emotions increases sympathetic nervous system activity
- Dysregulated emotions are key features of many mental disorders
  - Example: Panic attack = fear occurring at the wrong time

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Cultural, Social, and Interpersonal Factors in Psychopathology (slide 1 of 3)

- Cultural factors
  - Influence the form and expression of behavior
- Example: Children raised to be autonomous are less fearful
- Example: Culturally-bound fears
  - Susto (Latin America): symptoms of anxiety occurring when an individual believes (s)he has been struck by black magic

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Cultural, Social, and Interpersonal Factors in Psychopathology (slide 2 of 3)

- Gender effects
  - Men and women may differ in emotional experience and expression
  - Examples:
    - 90% of insect phobia sufferers are female
    - Most bulimia sufferers are female
    - Alcohol use disorders are more common in men
  - May be related to gender roles: Certain ways of coping with emotion are more acceptable for men or women

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Cultural, Social, and Interpersonal Factors in Psychopathology (slide 3 of 3)

- Effect of social support
  - Low social support related to mortality, disease, and psychopathology
  - Frequency and quality important
  - Social support especially important in the elderly

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Social Stigma of Psychopathology

- Culturally, socially, and interpersonally situated
- Problems with social stigma
  - May limit the degree to which people express mental health problems
    - E.g., concealing feelings of depression > unable to receive support from friends
  - May discourage treatment seeking

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Global Incidence of Psychological Disorders

- Mental health accounts for 13% of world disease burden
- Mental health care very limited in developing countries
  - Sub-Saharan Africa: only one psychiatrist per 2 million people
- Even in the US, only 1 in 3 people with a mental disorder has received any treatment

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Life-Span and Developmental Influences Over Psychopathology

- Life-span developmental perspective
  - Addresses developmental changes
  - Influence and constrain what is normal and abnormal
- The principle of equifinality
  - From developmental psychopathology
  - Several paths to a given outcome
  - Paths vary by developmental stage

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Summary of the Multidimensional Perspective of Psychopathology (slide 1 of 2)

- Multiple causation
  - The rule, not the exception
- Take a broad, comprehensive, systemic perspective
  - Biological and neuroscientific
  - Cognitive and emotional
  - Social, cultural, and developmental factors

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Summary of the Multidimensional Perspective of Psychopathology (slide 2 of 2)

- A multidimensional, comprehensive approach puts us in the best position to:
  - Understand the causes of psychopathology
  - Alleviate and prevent psychopathology

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