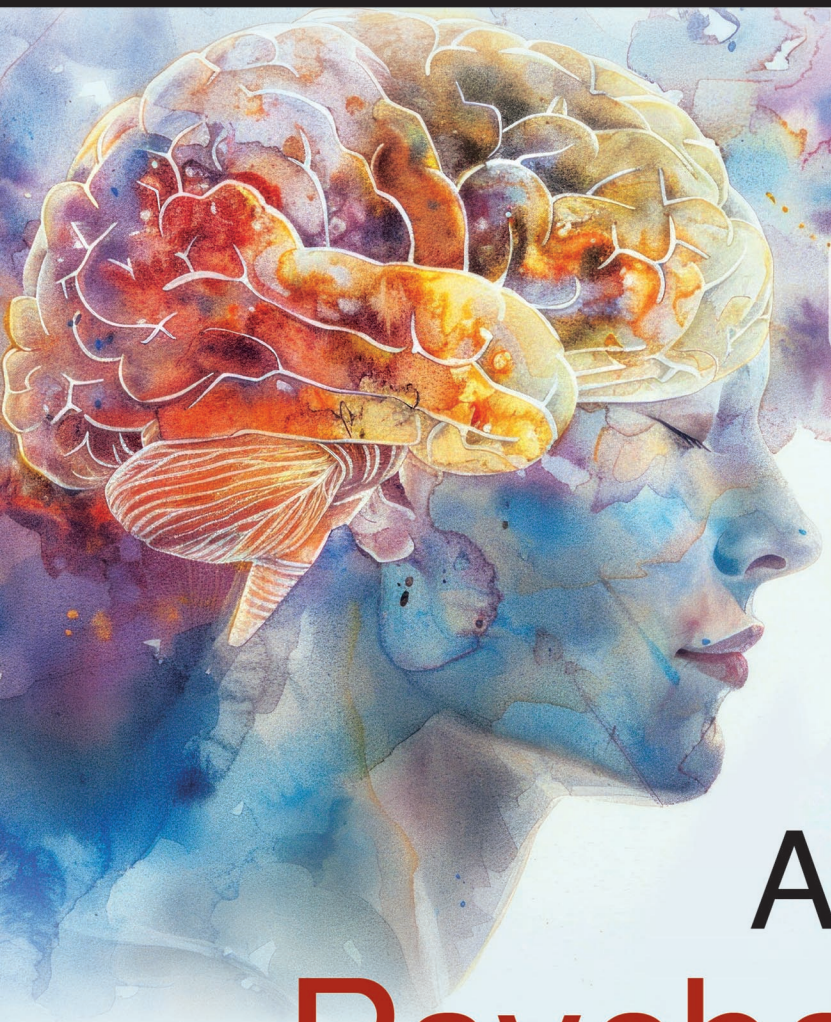

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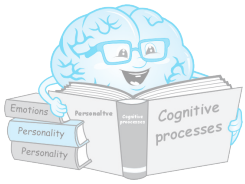
CONTENTS

CHAPTER

2 Biological Basis of Behavior



CHAPTER OUTLINE

- Body-Mind relationship
- Genetics and behavior
- Brain and behavior
- Nervous system
- Nature of behavior of an organism
- Psychology and sensation
- Types of sensation and sensory disorders

Biology of behavior is the study of behavioral functions of the nervous system particularly the brain. 'Physiological psychology' is that branch of psychology which seeks to determine how activity in the nervous system is related to both the behavior and the mind.

Many aspects of human behavior and mental functioning cannot be fully understood without some knowledge of the underlying biological processes. Our nervous system, sense organs, muscles and glands enable us to be aware of and adjust to our environment. Our perception of events depends on how our sense organs detect stimuli and how our brain interprets information originating from the senses.

BODY-MIND RELATIONSHIP

- Psychology studies human behavior involving both the body and the mind. They are interrelated and interact upon each other as mental functions and physical states affect each other.
- Body and the mind are two aspects of the living, dynamic and adjusting personality. Mind is regarded as a function of the body and does not exist in isolation from it. It is the sum total of various mental processes such as observing, knowing, thinking, reasoning, feeling, imagining, remembering, judging, etc. Mind also grows just as the body grows.
- Body is represented by physical states and bodily functions. Nervous system and glands are an important part of our body. They are also responsible for ways of thinking, feeling and doing.
- All behaviors have an anatomical and physiological basis. Physiological structures, body fluids, chemicals and mechanical events influence our overt behavior, feelings and experiences. Our mental functions like strong feelings, emotions, attitudes, motives, thinking, etc., influence our bodily activities and processes.
- Emotions are a combination of bodily responses and mental processes. While the body provides energy to fight or cope, mind contributes to the understanding and offers an explanation for one's own actions and that of others. Just as the body produces epinephrine to fight danger, the mind helps to decide whether it is needed or not **(Figure 2.1)**.

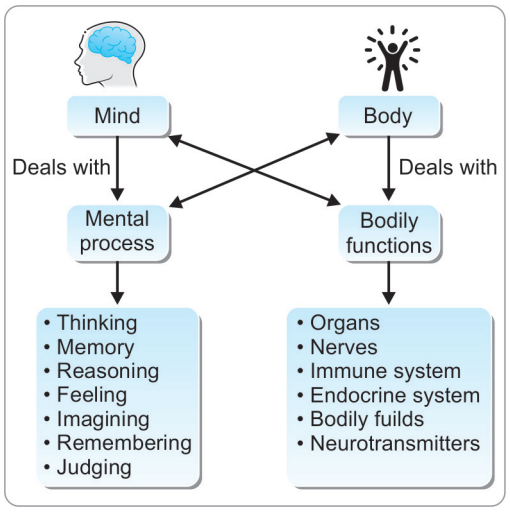


Figure 2.1: Body-mind relationship

Effects of Bodily Conditions on Mental Functioning

- Increased blood pressure causes mental excitement.
- Severe pain reduces the ability to concentrate.
- Chronic illness causes depression.
- Malfunctioning of the endocrine glands may exert full influence on one's personality resulting in lethargy, nervousness, tension, etc.
- Physical fatigue affects our mood and reduces our motivation, interest and concentration.
- Brain injury affects many psychological functions. At the same time well developed brain leads to the development of better intellectual functioning.

Effects of Mental Conditions on Bodily Functioning

- Mental processes are intimately connected to the brain and cortical processes. For example, unpleasant emotions like fear, anger and worry cause irritability, insomnia, headache, etc. Similarly depression affects thinking and memory.
- Emotional conflicts are responsible for peptic ulcer, ulcerative colitis, etc.
- Deep thinking and concentration can cause physical strain.
- According to Franz Alexander repressed feelings of hostility and aggression are expressed through the nervous system causing hypertension and cardiac diseases. Repressed feelings of dependency and wish to receive love affect parasympathetic nervous system resulting in gastrointestinal disorders or respiratory disorders.
- Unconscious motivation and conflicts give rise to many physical complaints and neurotic disorders like conversion disorders.

Relationship between body and the mind has an effect on health and illness. If the relationship is harmonious it leads to good health while an adverse relationship leads to illness. If all the body and mental processes are functioning within normal range the individual will experience good health. Disruption in any one of the processes will lead to illness.

Psychosomatic medicine deals with physical diseases caused by psychological factors. In such cases the patients should be treated for both the body and the mind, e.g., in case of peptic ulcer the treatment is given both by way of drugs and psychotherapy.

While understanding the interrelationship between the body and the mind she should also understand the emotional factors underlying the disease. It is always necessary to study the patient's physical and psychological problems so as to provide comprehensive care.

GENETICS AND BEHAVIOR: HEREDITY AND ENVIRONMENT

Heredity

Heredity is considered as 'the sum total of inborn individual traits'. Biologically, it has been defined as 'the sum total of traits potentially present in the fertilized ovum'. According to Douglas and Holland 'one's heredity consists of all the structures, physical characteristics, functions or capacities derived from parents, other ancestry or species'.

All organisms follow a life cycle which includes growth, development, reproduction and decline. Though there is essential unity

in life, the ways in which each organism exercises its capacities is different. These individual qualities of organisms and their basic properties are transmitted by means of heredity.

Mechanism of Heredity and Inheritance of Behavior

The life cycle of an individual begins with the fusion of a sperm and ovum. The origin of every human life can be traced to a single cell called zygote. When a sperm unites with an ovum, zygote is produced. The genes which are the carriers of distinctive traits are present both in the sperm and the ovum. In the fertilized ovum there are 23 pairs of chromosomes, half of which are given by the father and the other half by the mother. While females have 23 pairs of XX chromosomes, males have 22 pairs of XX chromosomes along with two single chromosomes represented by X and Y, the sex chromosomes **(Figure 2.2)**.

Occasionally through some unfortunate bodily error an aberration in chromosomes appears. If an extra chromosome appears making the total 47 rather than the normal 46, mongolism (Down's syndrome or trisomy 21 anomaly) results. A child with Mongolism suffers from deceleration of growth during the prenatal period resulting in a highly complex, multidimensional disorder involving all organs.

When chromosomes are studied under a microscope bands of markings appear

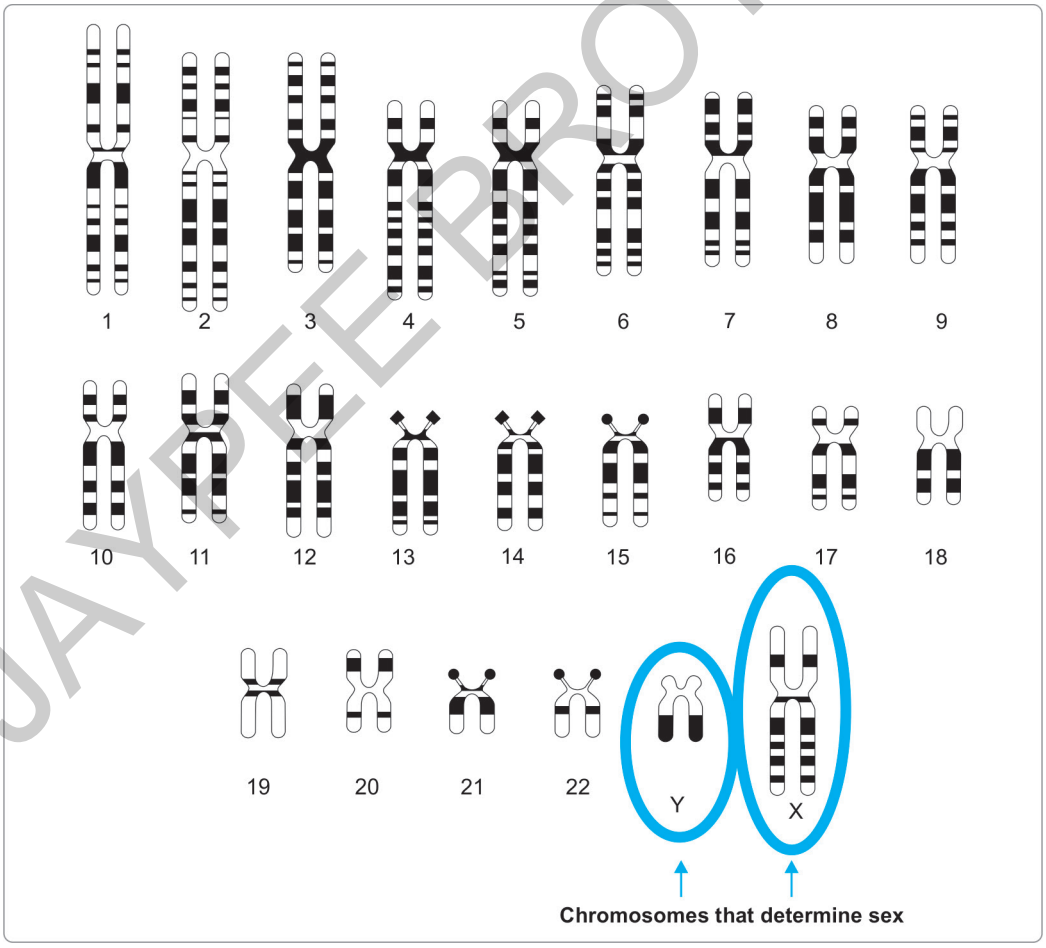


Figure 2.2: Mechanism of heredity

representing an entity called genes which appear to be the actual determiners of traits. Each chromosome is made up of many genes. A man has probably not less than 2,000 and not more than 50,000 genes in the chromosomes. Each gene is the determiner of a specific characteristic such as straight nose or a deep lobed ear. At present, it appears that there is no simple one-to-one relationship between genes and traits, i.e., one gene may influence many characteristics or traits or conversely many genes may combine to determine one characteristic.

Action of the genes on the cytoplasm changes the shape and other characteristics of the cells. The heredity basis of individual differences lies in the unlimited variety of possible gene combinations that can occur. No two siblings get an identical heredity as they do not inherit the same genes from their parents. Fraternal or dizygotic twins born to the same parents are different from each other because of different pairs of germ cells. However, identical or monozygotic twins develop from the same sperm and ovum, have exactly the same set of genes and resemble each other completely.

Determination of traits is not only due to combination of genes but also due to their dominant or recessive nature. For example, eye color was traditionally described as a single gene trait, with brown eyes being dominant over blue eyes. If one parent carries only brown and the other only blue, their offspring will have brown eyes. Many people however, carry both and if two recessive blues happen to match up in the assorting process of meiosis and fertilization, the child would have blue eyes even though parents and all the immediate relatives have brown eyes.

Some characteristics are sex linked, i.e., one sex shows the characteristics while the other sex not apparently affected is the carrier. One such trait is color blindness, e.g., the sons of a color blind man and normal woman do not inherit the defect but the daughters may be carriers of the disorder to another generation of males, their sons. Another example is hemophilia: a bleeding disorder which rarely occurs in women but is transmitted by them to their sons (Stern, 1960).

Occasionally a change occurs in the reproductive cells of a living thing which causes the introduction of completely new traits in the next generation. Such changes are called mutations. Mutant plants and animals might have characteristics that breeders can use to improve existing varieties. In human beings mutations are almost always undesirable. Their causes are not clear but are known to be induced by atomic radiation.

Heredity is the basis for development of human personality. It is like the raw material in the hands of the artist out of which the potter or tailor prepares the specific objects. Any amount of molding and treatment with special processes will still retain the basic properties of the raw material.

Many aspects of human behavior and development range from physical characteristics such as height, weight, eye and skin color. The complex patterns of social and intellectual behavior are influenced by person's genetic endowment. They also include physical deficiencies and the nature of glandular functioning. Heredity is a source of both similarities and differences among individuals **(Figure 2.3)**.

Environment

The child inherits traits and characteristics of his parents and forefathers through genes at the time of conception. Therefore, what he possesses at the time of conception is all due to heredity.

After conception, how he develops is the outcome of the interaction between his heredity and environment. The forces of environment begin to play their part and influence the growth and development of an individual right from the time of fertilization of the ovum by the sperm. Therefore, from the environmental point of view not only what happens after birth is important but what goes on inside the womb of the mother after conception is equally significant.

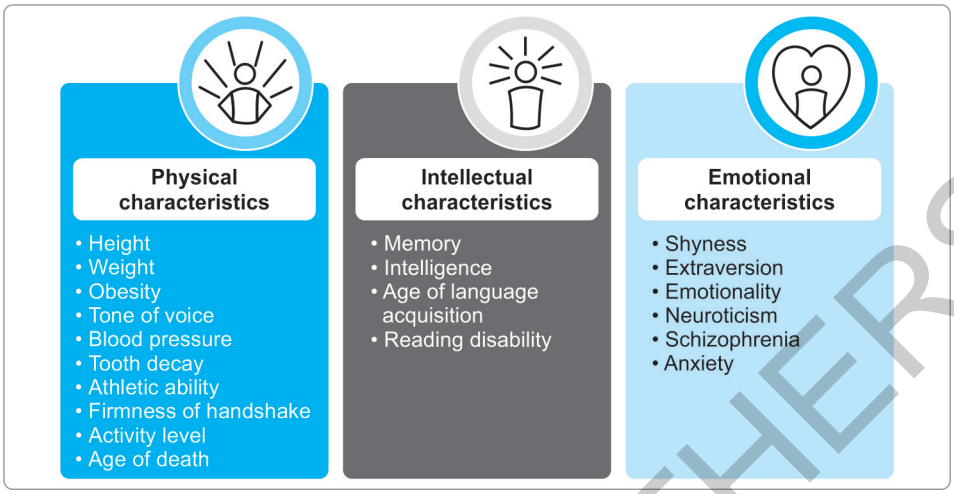


Figure 2.3: Characteristics influenced by genetic factors

Environment covers the social, moral, economical, political, physical and intellectual factors that influence the development of the individual from time to time.

Definitions

- Environment is everything that affects the individual except his genes.
  —Boring, Langfield and Weld
- Environment covers all the outside factors that have acted on the individual since he began life. **—Woodworth**

Types of Environment

There are three types of environment that affect the individual directly or indirectly **(Figure 2.4)**:

1. **Intercellular environment:** It relates to embryonic development. The cytoplasm is in the intercellular environment because the genes surrounded by it are influenced by and in turn influence its characteristics. Endocrine glands and hormones also produce intercellular influence. Many congenital deformities are the result of

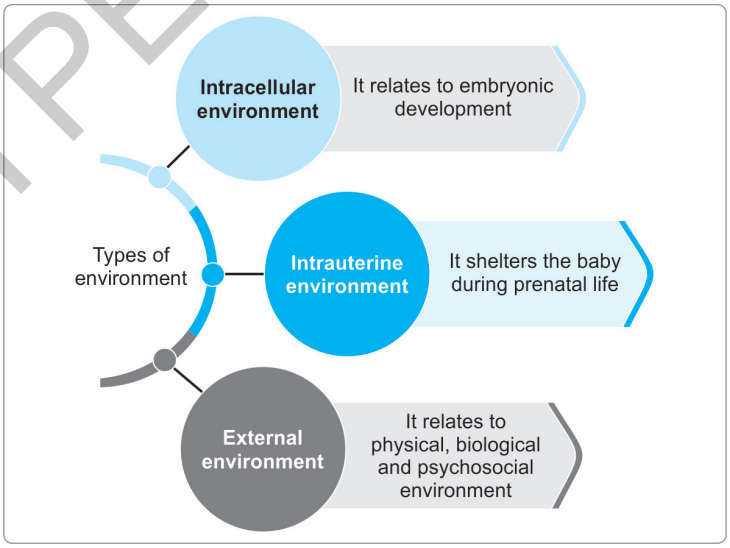


Figure 2.4: Types of environment

overactive or underactive endocrine function.

2. **Intrauterine environment:** It shelters the baby during prenatal life. In the womb the growing organism is surrounded by amniotic fluid and attached to the mother by the umbilical cord. Thus, growth of the embryo depends on the nourishment provided by the mother. The physiological and psychological states of the mother during pregnancy, her habits and interests etc., all influence the development of the child.

   After birth the child is exposed to numerous environmental forces which are purely external in nature.

3. **External environment:** It can be divided into three kinds:
   a. *Physical environment:* Non-living things like water, air, housing, soil, climate, heat, light, radiation, noise, etc., form the physical environment. These affect the body and mind of the growing child. Thus it is necessary to provide a decent home and locality for good physical and mental health of the child.
   b. *Biological environment:* It refers to the living component of man's external environment which consists of plants, animals, insects, bacteria and viruses. It is necessary that the child be allowed to grow in a good, healthy biological environment. The child should be kept away from disease carrying germs, bacteria and viruses.
   c. *Psychosocial environment*: It includes cultural values, customs, habits, beliefs, attitudes, morals, religion, education, occupation, social and political organization, etc. Parents, members of the family, friends, classmates, neighbors, teachers, mass communication and recreation are also included in this environment. These different environmental forces have a desirable impact upon the physical, social, emotional, intellectual, moral and aesthetic development of an individual. Their influence is a continuous one which begins with the emergence of life and goes on till death.

One example of the influence of environment upon potential height is found among the first and second generations of Japanese people in the United States (US). The children are generally taller than their parents because they have had the advantages of better food and better living conditions. Another example is the children of third world countries whose growth and development have been stunted by drought and famine. As food becomes available, many of these children show marked improvement in their physical conditions.

Interaction between Heredity and Environment

Each individual enters the world with certain hereditary characteristics transmitted to him through his parents. He grows up in a certain environment with its human, social and material surroundings. Everything he does as a child or adult results from the complex interactions between heredity and environment.

- The relative influence of heredity and environment differs from one individual to another and from one human trait or condition to another.
- Heredity and environment are interdependent forces. Inheritance is an important factor in the development of artistic abilities like music. Heredity supplies the potential talent while favorable environment brings it out.
- Heredity and environment are equally important in shaping the temperament of the child. Heredity lays down the essential foundations while environment can change these foundations for better or worse.
- Heredity provides the raw material from which a person is made. How the material is molded and what he becomes depends chiefly on the environment. Good material placed in good hands results in a fine finished product. Poor material no matter how carefully fashioned can never become a first rate product.

- Our inheritance prescribes the limits beyond which it may not be possible for any individual to develop however wholesome and stimulating the environment maybe.

Today no one believes that nature or nurture alone completely determines the course of our development. Psychologists agree that development is shaped by the interaction of heredity and environment. Within this interaction our genetic endowment for many characteristics provides us with a reaction range of possible levels that we may ultimately reach depending on the quality of our experience in the environment. Heredity and environment are interdependent forces. The influence of heredity and environment is so interrelated that they are practically inseparable.

The knowledge of the mechanism of heredity and the influence of environment on the personality development is important for a nurse to understand the behavior of a patient.

BRAIN AND BEHAVIOR: NERVOUS SYSTEM, NEURONS AND SYNAPSE

- The entire behavior is effectively managed and controlled by the coordination and functioning of the nervous system.
- How we will behave in a particular situation depends upon the judgment of our brain.
- Sense impressions received through sense organs do not bear any significance unless they are given a meaning by the nervous system.
- Learning also to a great extent is controlled by the nervous system.
- Proper growth and development of nerve tissues and nervous system as a whole helps in the task of proper intellectual development.
- Any defect in the spinal cord or the brain seriously affects the intellectual growth.
- Emotional behavior is also influenced by the nervous system especially at the time of anger, fear and other emotional changes. During emotional outbursts nerve tissues alter levels of hormonal secretion by some glands consequently influencing the emotional behavior of the individual.
- The process of growth and development is also directly and indirectly controlled by the functioning of the nervous system.
- Personality of an individual is greatly influenced through the mechanism of nervous system.
- Through its receptors the nervous system keeps us in touch with our environment, both external and internal. Like other systems in the body the nervous system is composed of organs particularly the brain, spinal cord, nerves and ganglia. These in turn consist of various tissues including nerve, blood and connective tissues. Together these carry out the complex activities of the nervous system.

Human behavior involves the body-mind interaction of the various bodily factors. The most important are:

- The sense organs called receptors
- The muscles and endocrine glands called effectors
- The nervous system which is the connecting or integrating mechanism called connectors

1. Receptors (Psychology of Sensations)

Behavior in all its forms and shapes certainly has a biological or physiological base. It is based on various stimuli present both in the external environment and that lying within our body. Stimuli in the form of various sensory experiences are received by our sensory organs known as receptors.

External Receptors

External receptors are those sensory mechanisms that help us make contact with the outer world, e.g., eyes, ears, nose, tongue and skin. The specific receptor cells for receiving the external stimuli lie within these sensory organs.

Sense organs

- Our sense organs help in assimilating knowledge of the world around us. Each of our sense organs has a distinct function to perform.

- Sense organs consist of receptors which are specialized sensitive cells associated with endings of sensory nerve fibers. These receptors are stimulated by objects outside the body and also by internal conditions.
- When receptors malfunction they lead to sensory defects or disorders—visual, auditory, cutaneous, olfactory, gustatory and kinesthetic disorders.

Internal Receptors

Internal receptors are associated with internal stimuli present in our body. They are responsible for feelings of pain, hunger or nausea. Another variety of these internal receptors helps us in maintaining balance, bodily posture and equilibrium and also exercise control over the muscles.

2. Effectors (Muscular and Glandular Controls of Behavior)

Effectors are termed as organs of responses. What is received through sensory organs in the form of sensory input is responded through bodily reactions and motor activities carried out through muscles and glands particularly the hormones secreted by the ductless glands that are responsible for most of our behavior patterns. The underactivity or overactivity of these glands causes deficiency or excess of hormonal secretion. This affects the entire personality makeup of the individual.

Muscles

Our behavior and activity involves movement of different parts of our body. Muscles help the organism to carry out motor activities in order to respond to various stimuli. There are mainly three types of muscles, viz. smooth muscles, cardiac muscles and skeletal muscles.

1. **Smooth muscles** are primarily concerned with the process of digestion, excretion and blood circulation. Their contraction and relaxation produce constriction and dilation of blood vessels thus increasing or decreasing blood pressure.
2. **Cardiac muscles** function smoothly in a rythmic fashion but when one is emotionally upset their normal functioning is disturbed causing heart trouble.
3. **Skeletal or striped muscles** enable the individual to perform voluntary motor activities ranging from walking to the fine psychomotor skills like typing, etc.

Glands

Glands play an important role in human behavior. They also assist in the digestion of food, elimination of waste products, production and prolongation of emotional states and regulation of metabolism of the body. There are two types of glands: Duct glands and ductless glands.

1. **Duct glands** release their chemical secretion through little ducts or tubes into the body cavities or on the surface of the body. Some of the duct glands are:
   - Salivary glands
   - Gastric glands
   - Sweat glands
   - Lacrimal glands
   - Kidneys
   - Sex glands

   The duct glands either become overactive or underactive under the influence of emotions. There is a close and intimate connection between human behavior and secretions of duct glands.
2. **Ductless or endocrine glands** secrete chemical substances called hormones. The hormones are released into the blood-stream and are carried to all parts of the body. They play a vital role in the determination of human personality. They affect the development of the body, mind, metabolism, secondary sex characteristics and emotional behavior. The endocrine glands are:
   - Pituitary gland
   - Thyroid gland
   - Parathyroid gland
   - Adrenal glands
   - Male sex glands or gonads
   - Pancreas

   The functioning of all the endocrine or ductless glands exercises a great influence on the various aspects of growth and development

of human personality. The underactivity or overactivity of these glands caused by the deficiency or excess of the hormones secreted by them affects not only the growth and development of the individual but also the entire behavior. A slight imbalance of the hormones may cause unusual restlessness, anxiety and weakness. Our physical strength, thinking and reasoning powers and decision making ability all depend upon the health of the glands **(Figure 2.5)**.

3. Connectors

Connectors or adjusters help in regulating, controlling or coordinating the activities of receptors and effectors. The ability to play a piano, drive a car or hit a tennis ball depends on muscle coordination. It is necessary for the body to provide messages to the muscles to coordinate. These messages are passed through specialized cells called 'neurons'.

Neuron

- A nerve cell with all its branches is called a neuron. These are the basic elements of the nervous system.
- A neuron has a nucleus, a cell body and a cell membrane to enclose the whole cell. There are tiny fibers extending out from the cell body called 'dendrites'.
- Their role is to receive messages through electrical impulses from the sense organs or adjacent neurons and carry them to the cell body.
- The messages from the cell body further travel the length of a nerve fiber known as the axon **(Figure 2.6)**.
- A group of axons bundled together like parallel wires in an electrical cable is referred to as the nerve.
- The axon (not all of them) is surrounded by a fatty covering called the 'myelin sheath'. It serves to increase the velocity with which the electrical impulses travel through the axons.

There are three types of neurons:

1. **Sensory neurons:** They help in the process of sensation and perception.
2. **Motor neurons:** They are responsible for physical movements and activation of glands.
3. **Interneurons or association neurons:** They carry signals in the form of memories and thoughts and add reflex or automatic activities.

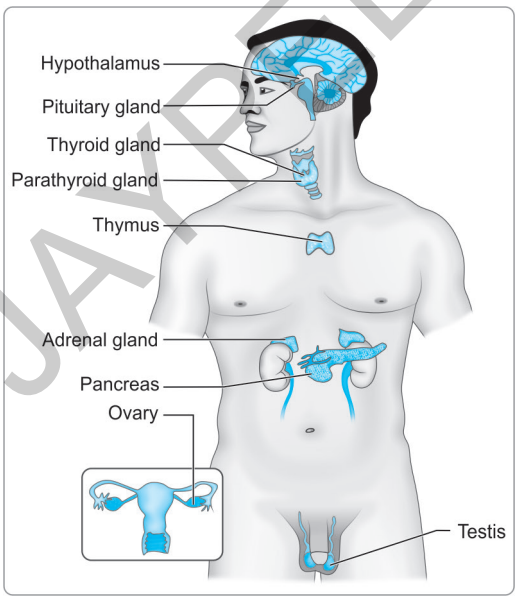


Figure 2.5: Location of major endocrine glands

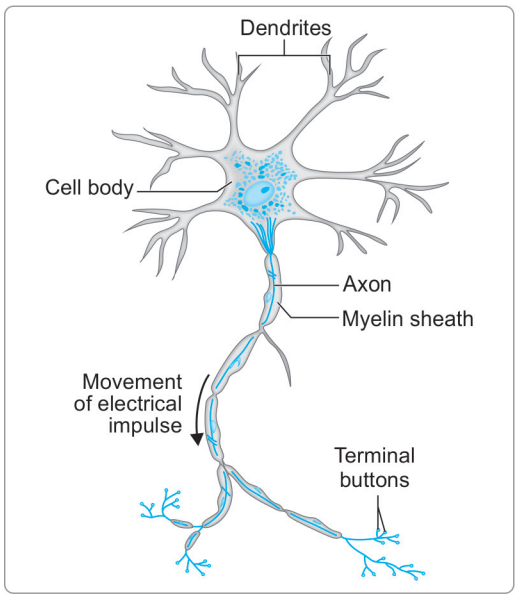


Figure 2.6: Structure of neuron

Neural Impulse

- Neurons are the receivers and transmitters of messages. These messages are always in the form of electrochemical impulses.
- A neuron in its resting position is supposed to maintain a sort of electrical equilibrium, i.e., state of polarization. This state of polarization may be disturbed on account of the effect of trigger like action of a stimulus applied to the membrane. It causes a sudden change in the electrical potentiality of the neuron resulting in depolarization and initiation of neural impulses. These impulses are carried along the neuron axons.
- There is a fluid-filled space called the synapse between the axon of the neuron and the receiving dendrite of the next neuron.
- Enlargements of the axon endings of transmitting neurons are called boutons. These contain neurotransmitter chemicals which are stored in small vesicles.
- A nerve impulse reaching these boutons causes a neurotransmitter to be released into the synapse. This enables the neurons to send messages to many other neurons.
- It makes it possible for a single neuron to receive messages from thousands of other neurons.

Synapse

- Information is transmitted through the body from one neuron to another. The junction between two neurons is called a synapse **(Figure 2.7)**.
- The small space between the axon terminals of one neuron and the cell body or dendrites of another is called the synaptic cleft.
- Neurons conducting impulses toward the synapse are called presynaptic neurons and those conducting impulses away are called postsynaptic neurons.
- A chemical called a neurotransmitter is stored in the axon terminals of the presynaptic neuron. An electrical impulse through the neuron causes the release of this neurotransmitter into the synaptic cleft.

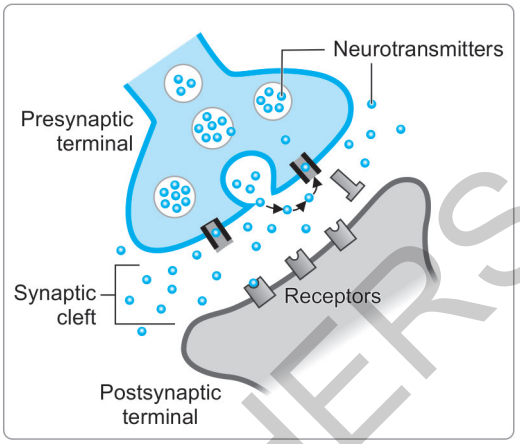


Figure 2.7: Synapse.

- The neurotransmitter then diffuses across the synaptic cleft and combines with receptor sites that are situated on the cell membrane of the postsynaptic neuron.
- The cell body or dendrite of the postsynaptic neuron also contains a chemical inactivator which is specific to the neurotransmitter released by the presynaptic neuron.
- When the synaptic transmission is complete the chemical inactivation quickly inactivates the neurotransmitter to prevent unwanted continuous impulses.

Neurotransmitters

- Neurotransmitters play an important role in human emotion and behavior. These are chemicals that convey information across synaptic cleft to neighboring target cells.
- They are stored in small vesicles in the axon terminals of neurons.
- When electrical impulse reaches this point the neurotransmitters are released from the vesicles.
- They cross the synaptic cleft and bind with receptor sites on the cell body of dendrites of the adjacent neuron. This either allows or prevents the impulse from continuing its course.
- After the neurotransmitter has performed its function in the synapse it either returns to the vesicles to be stored and used again or is inactivated and dissolved by enzymes.

Neurotransmitters	Functions
Adrenaline/epinephrine ***Fight or Flight*** Produced in stressful situations. Increases heart rate and blood flow, leading to physical boost and hightened awareness.	**GABA** ***Calming*** Calms firing nerves in the central nervous system. High levels improve focus, low levels cause anxiety also contributes to motor control and vision.
Noradrenaline/norepinephrine ***Concentration*** Affects attention and responding actions in the brain. Contracts blood vessels, increasing blood flow.	**Acetylcholine** ***Learning*** Involved in thought, learning, and memory. Activates muscle action in the body. Also associated with attention and awakening.
Dopamine ***Pleasure*** Feelings of pleasure, also addiction, movement and motivation. People repeat behaviors that lead to dopamine release.	**Glutamate** ***Memory*** Most common neurotransmitter: Involved in learning and memory, regulates development and creation of nerve contacts.
Serotonin ***Mood*** Contributes to well-being and happiness. Helps sleep cycle and digestive system regulation. Affected by exercise.	**Endorphins** ***Euporia*** Released during exercise, excitement and sex. Produces a sense of well-being and pain reduction.

Figure 2.8: Key neurotransmitters and their main functions

- The process of being stored for reuse is called reuptake.
- Deficiency or an excess of neurotransmitters can produce severe behavioral disorders.

Some of the key neurotransmitters and their main functions are listed in **Figure 2.8**.

NERVOUS SYSTEM

Nervous system is the master controlling, communicating and the regulatory system in the body. Nervous system controls and coordinates all essential functions of the human body. It is the center of all mental activity including thought, learning and memory. Together with the endocrine system, the nervous system is responsible for regulating and maintaining homeostasis.

The human nervous system can be divided into two parts: the central nervous system (CNS) and the peripheral nervous system (PNS). While the central nervous system constitutes of the brain and the spinal cord, the peripheral nervous system constitutes of the somatic system and the autonomic system **(Flowchart 2.1)**.

Central Nervous System

Central nervous system consists of the brain and the spinal cord which act as the integrating and command centers of the nervous system. They interpret incoming sensory information and issue instructions based on past experience and current conditions. Brain is composed of three divisions: the forebrain, midbrain and hindbrain.

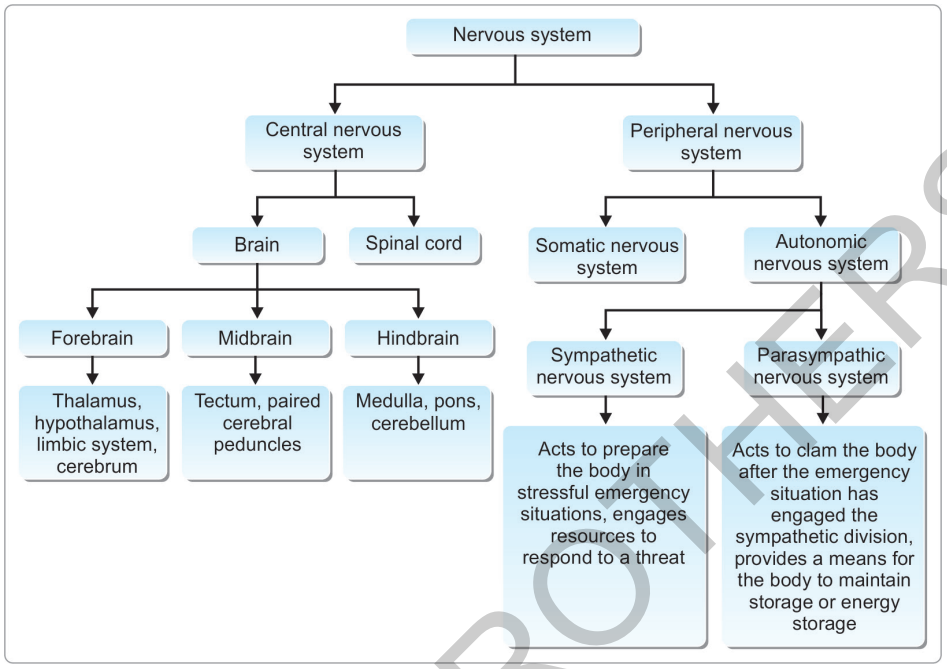
Forebrain

Its important structures are thalamus, hypothalamus, limbic system and the cerebrum.

Thalamus

As all sensory impulses pass through *thalamus* to the higher centers it is termed as the relay station. In addition, the thalamus exercises some control over the autonomic nervous system and also plays a role in the control of sleep and alertness.

Flowchart 2.1: Schematic diagram of the relationship between parts of the nervous system



Hypothalamus

It lies below the thalamus. It exerts a key influence on all kinds of emotional as well as motivational behavior. Centers in the hypothalamus have control over important body processes like eating, drinking, sleeping, temperature control and sex. It also has control over the activities of pituitary gland.

Limbic system

It consists of structures in the thalamus, hypothalamus and cerebrum which form a ring around the lower part of the forebrain. Major structures within this system include the olfactory bulb, septal nuclei, hippocampus, amygdala and cingulate gyrus of the cerebral cortex. The limbic system often called the emotional brain functions in the emotional aspects of behavior related to survival, memory, smell, pleasure and pain, rage and aggression, affection, sexual desire, etc.

Cerebrum

It is the most complex and largest part of the brain. The cerebrum is covered by a thick layer of tightly packed neurons called the cerebral cortex. It is divided into two hemispheres—the left and right hemispheres.

Right and left hemispheres

Cerebral cortex is responsible for many higher order functions like language and information processing. The cerebral cortex is divided into sensory, motor and association areas **(Table 2.1)**.

- Sensory area receives sensory input.
- Motor area controls movement of muscles.
- Association area is involved with more complex functions such as writing.
- Each cerebral hemisphere is divided into four lobes: frontal, parietal, occipital and temporal lobes. Each part of the cerebrum is responsible for different mental functions. The visual area lying in the occipital lobe is connected with the visual organs or the eyes through the optic nerve. It is the seat of visual sensations.
- The auditory area lies in the temporal lobe and is connected with the auditory organs or the ears through the auditory nerves. It is the seat of auditory sensations and also involved in memory.

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