TFN

NEP 101 - MIDTERMS

TFN LECTURE

SCIENCE - Organized body of knowledge gained through research.

SCIENTIFIC METHOD:

- Observation
- Gathering Data
- Forming hypothesis
- Experimental investigation
- Conclusion / theoretical explanation

NURSING SCIENCE - The substantive, discipline-specific knowledge that focuses on the human-universe-health process articulated in the nursing frameworks and theories.

PHILOSOPHY - Concerned with the purpose of human life, the nature of being and reality, and the theory and limits of knowledge.

NURSING PHILOSOPHY - Refers to the belief system or worldview of the profession and provides perspectives for practice, scholarship, and research.

KNOWLEDGE - Information, skills and expertise acquired by a person through formal or informal learning.

PRINCIPLE - A proposition or value that is a guide for behavior or evaluation.

PHENOMENON - Aspect of reality that can be consciously sensed or experienced.

THEORY - A set of concepts, definitions, relationships, and assumptions that project a systematic view of a phenomena.

NURSING THEORIES - Are organized bodies of knowledge to define what nursing is, what nurses do, and why they do it. It is a framework of concepts and purposes intended to guide nursing practice at a more concrete and specific level.

CONCEPT - Called the building blocks of theories. They are primarily the vehicles of thought that involve images.

MODELS - Are representations of the interaction among and between the concepts showing patterns. They present an overview of the theory's thinking and may demonstrate how theory can be introduced into practice.

CONCEPTUAL FRAMEWORK - Group of related ideas, statements, or concepts. It is often used interchangeably with the conceptual model and with grand theories.

PROPOSITIONS - are statements that describe the relationship between the concepts.

DOMAIN - Is the perspective or territory of a profession or discipline.

PROCESSES - Are organized steps, changes, or functions intended to bring about the desired result.

PARADIGM - Refers to a pattern of shared understanding and assumptions about reality and the world, worldview, or widely accepted value system.

METAPARADIGM - Is the most general statement of discipline and functions as a framework in which the more restricted structures of conceptual models develop. Much of the theoretical work in nursing focused on articulating relationships among four major concepts: **person, environment, health, and nursing**.

Person - Refers to the individual or the patient receiving care. It recognizes that each person is unique and encompasses physical, emotional, social, and spiritual dimensions.

Environment - Refers to the context in which nursing care takes place. It includes both the physical surroundings and the social and cultural factors that influence a person's health.

Health - Central concept in nursing. It goes beyond the absence of illness and encompasses physical, mental, and social well-being.

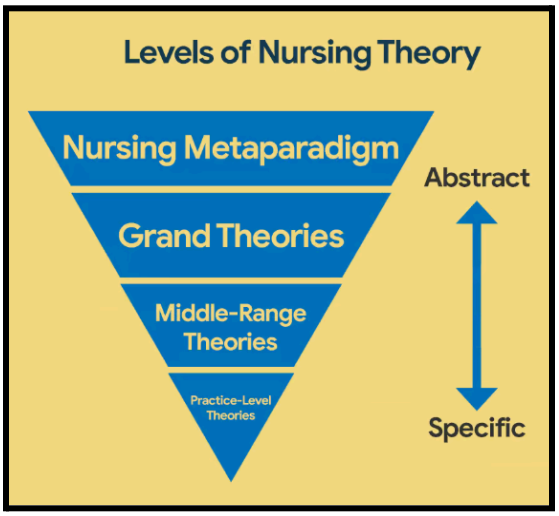
Nursing - Encompasses nurses' actions, roles, and responsibilities. It encompasses the knowledge, skills, and attitudes required to provide care to individuals, families, and communities.

Abstract Concepts - Defined as mentally constructed independently of a specific time or place.

Concrete Concepts - Are directly experienced and related to a particular time or place.

Theoretical Definitions - Define a particular concept based on the theorist's perspective.
Operational Definitions - States how concepts are measured.

Relational Statements - The relationships between two or more concepts. They are the chains that link concepts to one another.
Assumptions - Accepted as truths and are based on values and beliefs.



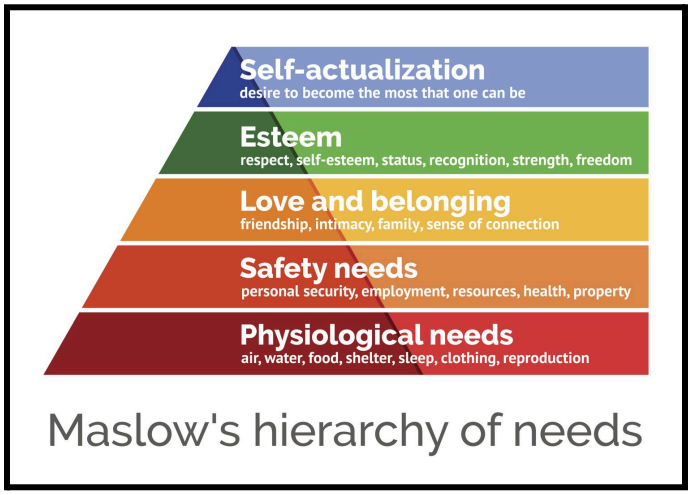
Grand Nursing Theories - Are abstract, broad in scope, and complex, therefore requiring further research for clarification. Do not guide specific nursing interventions but rather provide a general framework and nursing ideas.
•**Florence Nightingale** – Environmental Theory
•**Dorothea Orem** – Self-Care Deficit Theory
•**Sister Callista Roy** – Adaptation Model

Middle-Range Nursing Theories - More limited in scope and present concepts and propositions at a lower level of abstraction.
•**Hildegard Peplau –** Interpersonal Relations Theory
•**Madeleine Leininger –** Transcultural Nursing Theory
•**Katharine Kolcaba –** Comfort Theory

Practice-Level Nursing Theories - Are situation-specific theories that are narrow in scope and focus on a specific patient population at a specific time.
•**Swanson's Theory of Caring**
•**Mercer's Maternal Role Attainment Theory**
•**Ruland & Moore's Peaceful End-of-Life Theory**

Descriptive Theories - First level of theory development. They describe the phenomena and identify its properties and components in which it occurs.
There are two types of descriptive theories: factor-isolating theory and explanatory theory.
1. **Factor-Isolating Theory** - Also known as category-formulating or labeling theory. Theories under this category describe the properties and dimensions of phenomena.
2. **Explanatory Theory** - Describe and explain the nature of relationships of certain phenomena to other phenomena.

Prescriptive Theories - Address the nursing interventions for a phenomenon, guide practice change, and predict consequences. Includes propositions that call for change.
Needs-Based Theories - Theories under this group are based on helping individuals to fulfill their physical and mental needs.
Interaction Theories - These theories emphasized nursing on the establishment and maintenance of relationships. They highlighted the impact of nursing on patients and how they interact with the environment, people, and situations.
Outcome Theories - These theories describe the nurse as controlling and directing patient care using their knowledge of the human physiological and behavioral systems.



Illness - Is a state in which a person's physical, emotional, intellectual, social, developmental, or spiritual functioning is diminished or impaired compared with previous experience.
Disease - An alteration in body function resulting in reduction of capacities or a shortening of the normal life span.

Classification of diseases
Hereditary - due to defect in the genes of one or other parent which is transmitted to the offspring
Congenital - due to a defect in the development, hereditary factors, or prenatal infection
Metabolic - due to disturbances or abnormality in the intricate processes of metabolism.
Deficiency - results from inadequate intake or absorption of essential dietary factors.
Traumatic- due to injury
Allergic - due to abnormal response of the body to chemical and protein substances or to physical stimuli.
Neoplastic - due to abnormal or uncontrolled growth of cell.
Idiopathic - cause is unknown; self-originated; of spontaneous origin
Degenerative - results from the degenerative changes that occur in the tissue and organs.
Iatrogenic - results from the treatment of the disease

Acute Illness - An acute illness usually has a short duration and is severe.
Chronic Illness - chronic illness usually longer than 6 months, and can also affect functioning in any dimension.
Remission- periods during which the disease is controlled and symptoms are not obvious.
Exacerbations - The disease becomes more active given again at a future time, with recurrence of pronounced symptoms.
Sub-Acute - Symptoms are pronounced but more prolonged than the acute disease.

THREE LEVELS OF PREVENTION
A. Primary Prevention - seeks to prevent a disease or condition it. a prepathologic state ; to stop something from ever happening.
* health Promotion
* health education
* marriage counseling
* genetic screening
*good standard of nutrition adjusted to developmental phase of life

B. Secondary Prevention
* use of specific immunization
* attention to personal hygiene
* use of environmental sanitation
* protection against occupational hazards
* protection from accidents- use of specific nutrients
* protections from carcinogens
* avoidance to allergens

C. Tertiary Prevention - occurs after a disease or disability has occurred and the recovery process has begun; Intent is to halt the disease or injury process and assist the person in obtaining an optimal health status. To establish a high-level wellness, "To maximize use of remaining capacities".

Epidemic - attacks a large number of individuals In the community at the same time. (e.g. SARS)
Endemic - presents more or less continuously or recurs in a community. (e.g. malaria, goiter)
Pandemic - an epidemic which is extremely widespread Involving an entire country or globe.
Sporadic - a disease in which only occasional cases occur. (e.g. dengue, leptospirosis)

Florence Nightingale
- Environmental Theory.
- Founder of Modern Nursing
- Notes on Nursing: What it Is, What It Is Not
- Defined Nursing as “the act of utilizing the environment of the patient to assist him in his recovery.”
- Stated that nursing “ought to signify the proper use of fresh air, light, warmth, cleanliness, quiet, and the proper selection and administration of diet – all at the least expense of vital power to the patient.”

- Identified five (5) environmental factors: fresh air, pure water, efficient drainage, cleanliness or sanitation, and light or direct sunlight.

Hildegard E. Peplau
- Theory of Interpersonal Relations
- Nursing as "An interpersonal process of therapeutic interactions between an individual who is sick or in need of health services and a nurse specially educated to recognize, respond to the need for help."
- It helps nurses and healthcare providers develop more therapeutic interventions in the clinical setting.

She identified four phases of the nurse client relationship namely:
1. Orientation: the nurse and the client initially do not know each other's goals and testing the role each will assume. The client attempts to identify difficulties and the amount of nursing help that is needed.
2. Identification: the client responds to help professionals or the significant others who can meet the identified needs. Both the client and the nurse plan together an appropriate program to foster health;
3. Exploitation: the clients utilize all available resources to move toward a goal of maximum health functionality;
4. Resolution: refers to the termination phase of the nurse-client relationship, it occurs when the client's needs are met and he/she can move toward a new goal.
- Peplau further assumed that nurse-client relationship fosters growth in both the client and the nurse.

Virginia Henderson
- Nursing Need Theory
- Increasing the patient's independence to hasten their progress in the hospital.
- Emphasizes the basic human needs and how nurses can assist in meeting those needs.
- "The nurse is expected to carry out a physician's therapeutic plan, but individualized care is the result of the nurse's creativity in planning for care."

Faye Glenn Abdellah
- 21 Nursing Problems Theory
"Nursing is based on an art and science that molds the attitudes, intellectual competencies, and technical skills of the individual nurse into the desire and ability to help people, sick or well, cope with their health needs."
- Changed the focus of nursing from disease-centered to patient-centered and began to include families and the elderly in nursing care.
- The nursing model is intended to guide care in hospital institutions but can also be applied to community health nursing, as well.

Ernestine Wiedenbach
- The Helping Art of Clinical Nursing conceptual model.
- Definition of nursing reflects on nurse-midwife experience as "People may differ in their concept of nursing, but few would disagree that nursing is nurturing or caring for someone in a motherly fashion."
- Guides the nurse action in the art of nursing and specified four elements of clinical nursing: philosophy, purpose, practice, and art.
- Clinical nursing is focused on meeting the patient's perceived need for help in a vision of nursing that indicates considerable importance on the art of nursing.

Lydia E. Hall
-The Care, Cure, Core Theory is also known as the **"Three Cs of Lydia Hall."**
- Hall defined Nursing as the "participation in care, core and cure aspects of patient care, where CARE is the sole function of nurses, whereas the CORE and CURE are shared with other members of the health team."
-The major purpose of care is to achieve an interpersonal relationship with the individual to facilitate the development of the core.
-The **"care"** circle defines a professional nurse's primary role, such as providing bodily care for the patient.
-The **"core"** is the patient receiving nursing care.
-The **"cure"** is the aspect of nursing that involves the administration of medications and treatments.

Joyce Travelbee

- Human-to-Human Relationship Model

- States that the purpose of nursing was to help and support an individual, family, or community to prevent or cope with the struggles of illness and suffering and, if necessary, to find significance in these occurrences, with the ultimate goal being the presence of hope.
- Extended the interpersonal relationship theories of Peplau and Orlando.

Ida Jean Orlando

- Nursing Process Theory

- "Patients have their own meanings and interpretations of situations, and therefore nurses must validate their inferences and analyses with patients before drawing conclusions."
- Allows nurses to formulate an effective nursing care plan that can also be easily adapted when and if any complexity comes up with the patient.

Jean Watson

- Philosophy and Theory of Transpersonal Caring

- Theory of Human Becoming

- "Nursing is concerned with promoting health, preventing illness, caring for the sick, and restoring health."
- Mainly concerned with how nurses care for their patients and how that caring progresses into better plans to promote health and wellness, prevent illness and restore health.

Patricia Benner

- Caring, Clinical Wisdom, and Ethics in Nursing Practice

- "The nurse-patient relationship is not a uniform, professionalized blueprint but rather a kaleidoscope of intimacy and distance in some of the most dramatic, poignant, and mundane moments of life."
- Attempts to assert and reestablish nurses' caring practices when nurses are rewarded more for efficiency, technical skills, and measurable outcomes.

Martha E. Rogers

- Science of Unitary Human Beings

- Nursing as "an art and science that is humanistic and humanitarian.
- The Science of Unitary Human Beings contains two dimensions: the science of nursing, which is the knowledge specific to the field of nursing that comes from scientific research; and the art of nursing, which involves using nursing creatively to help better the lives of the patient.

Dorothea E. Orem

- Self-Care Theory

- "The act of assisting others in the provision and management of self-care to maintain or improve human functioning at the home level of effectiveness."

Composed of three interrelated theories:

(1) the theory of self-care,
(2) the self-care deficit theory, and
(3) the theory of nursing systems

Which is further classified into wholly compensatory, partially compensatory, and supportive-educative.

-**Wholly Compensatory:** When the nurse is expected to accomplish all the patient's therapeutic self care or to compensate for the patient's inability to engage in self care or when the patient needs continuous guidance in self care

-**Partially Compensatory:** when both nurse patient engage in meeting self care needs;

-**Supportive-Educative:** the system that requires assistance decision making, behavior control and acquisition knowledge

Imogene M. King

- Theory of Goal Attainment

- "Nursing is a process of action, reaction and interaction by which nurse and client share information about their perception in a nursing situation" and "a process of human interactions between nurse and client whereby each perceives the other and the situation, and through communication, they set goals, explore means, and agree on means to achieve goals."
- Focuses on this process to guide and direct nurses in the nurse-patient relationship, going hand-in-hand with their patients to meet good health goals.

Betty Neuman
- Neuman's Systems Model
- Nursing as a "unique profession that is concerned with all of the variables affecting an individual's response to stress."
- The focus is on the client as a system (which may be an individual, family, group, or community) and on the client's responses to stressors.
- The client system includes five variables (physiological, psychological, sociocultural, developmental, and spiritual).

Sister Callista Roy
- Adaptation Model of Nursing
- Nursing as a "health care profession that focuses on human life processes and patterns and emphasizes the promotion of health for individuals, families, groups, and society as a whole."

Dorothy E. Johnson
- Behavioral Systems Model
- Nursing as "an external regulatory force that acts to preserve the organization and integrate the patients' behaviors at an optimum level under those conditions in which the behavior constitutes a threat to the physical or social health or in which illness is found."
- Advocates to foster efficient and effective behavioral functioning in the patient to prevent illness and stresses the importance of research-based knowledge about the effect of nursing care on patients.

According to Johnson, each person as a behavioral system is composed of seven subsystems namely:
A. Ingestive - Taking in nourishment in socially and culturally acceptable ways.
B. Eliminated - Riddling the body of waste in socially and culturally acceptable ways.
C. Affiliative - Security seeking behavior.
D. Aggressive - Self - protective behavior.
E. Dependence - Nurturance - seeking behavior.
F. Achievement - Master of oneself and one's environment according to internalized standards of excellence.
G. Sexual role identity behavior

Nola J. Pender
- Health Promotion Model
- Describes the interaction between the nurse and the consumer while considering the role of the health promotion environment.
- It focuses on three areas: individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes.

Madeleine M. Leininger
- Transcultural Nursing Theory
- Culture Care Theory of Diversity and Universality
- Defined transcultural nursing as "a substantive area of study and practice focused on comparative cultural care (caring) values, beliefs, and practices of individuals or groups of similar or different cultures to provide culture-specific and universal nursing care practices in promoting health or well-being or to help people to face unfavorable human conditions, illness, or death in culturally meaningful ways."

Margaret A. Newman
- Health as Expanding Consciousness
- "Nursing is the process of recognizing the patient in relation to the environment, and it is the process of the understanding of consciousness."

Rosemarie Rizzo Parse
- Human Becoming Theory
- "Nursing is a science, and the performing art of nursing is practiced in relationships with persons (individuals, groups, and communities) in their processes of becoming."
- The person is inseparable and that nursing is a human science and art that uses an abstract body of knowledge to help people.

MYRA LEVINE
- Believes nursing intervention is a conservation activity, with conservation of energy as a primary concern, four conservation principles of nursing: conservation of client energy. conservation of structured integrity, conservation of personal integrity, conservation of social Integrity. -
- Described the **Four Conversation Principles**
- She advocated that nursing is a human interaction and proposed four conservation principles of

nursing which are concerned with the unity and integrity of the individual.

The four conservation principles are as follows:

A. Conservation of Energy. The human body functions by utilizing energy. The human body needs energy producing input (food, oxygen, fluids) to allow energy utilization output.

B. Conservation of Structural Integrity. The human body has physical boundaries (skin and mucous membrane) that must be maintained to facilitate health and prevent harmful agents from entering the body.

C. Conservation of Personal Integrity. The nursing Interventions are based on the conservation of the individual client's personality. Every individual has a sense of identity, self worth and self esteem, which must be preserved and enhanced by nurses.

Themes of the definition of nursing:

1. Nursing is caring.
2. Nursing is an art.
3. Nursing is a science.
4. Nursing is client centered.
5. Nursing is holistic.
6. Nursing is adoptive.
7. Nursing is helping profession.
8. Nursing is concerned w/health promotion, health maintenance, & health restoration.

•1973, ANA described nursing practice as "direct, goal oriented, and adaptable to the needs of the individual, the family and community during health and illness."

•1980, ANA changed the definition to: "Nursing is the diagnosis and treatment of human responses to actual or potential health problem".

•2003, "Nursing is the protection, promotion, and optimization of health and abilities, preventions of illness and injury, alleviation of suffering through the diagnosis & treatment of human response, & advocacy in the care of individuals, families, communities, & populations" (.ANA,2010)

Recipients of Nursing

The recipients of Nursing are;

1. **Consumer–** is an individual, a group of people or a community that uses a service or commodity.
2. **Patient–** is a person who is waiting for or undergoing medical treatment and care.

•The word patient comes from a Latin word meaning "to suffer" or "to bear".

3. **Client–** is a person who engages the advice or services of another who is qualified to provide this service.

•The term client presents the receivers of health care as collaboration in the care.

Scope of Nursing

Nurses provide care for 3 types of clients;

1. Individual
2. Families
3. Community

Nursing practice involves 4 areas;

1. Promoting health & well-being
2. Preventing illness
3. Restoring health and
4. Caring for the dying

Nurse Practice Acts- -

•Nurse practice acts, or legal acts for professional nursing practice, regulate the practice of nursing

•They all have a common purpose: to protect the public. Nurses are responsible for knowing their state nurse practice act as it governs their practice.

Standards of Nursing Practice - -

•The purpose of the ANA Standards of Practice is to describe the responsibilities for which nurses are accountable.

•The ANA Standards of Professional Performance describe behaviors expected in the professional nursing role.

ROLES AND FUNCTIONS OF THE NURSE

•Care givers: include those activities that assist the client physically and psychologically while preserving the client dignity.

•Communicator: integrated to all nursing role. In the role of communicator nurse identify nurse identify clients problem and then communicate them verbally or in writing to other member of the health team.

•Teacher: the nurse help client learn about their health and the health care procedure.
•Client advocate: act to protect the client.
•Counselor: counseling is the process of helping a client to recognize and cope with stressful psychological or social problem and to develop and improve the personal relationship.
•Change agent: make modification on their own behavior.
•Leader: influence the other to work together to accomplish to specific goal.
•Manager: manages the nursing care oat individual family and community.
•Research consumer: use research to improve cleat care.
•Expanded Career Role: nurses fulfilling expanded career roles like; clinical nurse specialist, nurse midwife, nurse educator, nurse researcher & nurse anesthetist, all of which allows greater independence & autonomy.

CRITERIA OF A PROFESSION
•Profession is defined as occupation that required extensive education or a calling that required special knowledge, skills and preparation.
•Professionalism refers to professional character, spirit, or methods. It is a set of attributes, away of life that implies responsibility & commitment.
•Professionalization is the process of becoming professional, that is, of acquiring characteristics considered to be professional.

•Criteria Of A Profession
-Prolonged, specialized training
-Orientation toward service
-Ongoing research
-Code of ethics
-Autonomy
-Professional organization

• Specialized Education
-Trend in education for the profession that you studied on.

•Ongoing Research
-Research in nursing is contributing to nursing practice.

•Code of Ethics
-Nurses traditionally placed a high value on the worth & dignity of others.
-Nursing profession requires integrity, nurses are expected to do what is considered right regardless of the personal cost.
-Ethical codes change as the needs and values of society changes.

• Autonomy
-A profession is autonomous if it regulates itself & sets standards for its members.
-Nursing autonomy means independence at work, responsibility for ones actions.
-It is easily achieved and maintained from a position of authority.

Information, Telehealth, & Telenursing
•The internet has already affected health care, more clients becoming well informed about their health concerns.
•The prefix **Tele** means “distance”
•Telehealth is the “use of medical information exchanged from one site to another via electronic communications to improve the patient’s health status”.
•Telemedicine is associated with direct client clinical services.
•Telenursing is the use of telecommunications & information technology to provide nursing practice at a distance.
•Telehealth is used by the multidisciplinary team.

Legislation
•Legislation about nursing practice & health matters affects both the public & nursing.

Demography
•Demography is the study of population, including statistics about distribution by age & place of residence, mortality and morbidity.
LAW is defined as “the sum total of rules and regulations by which a society is governed

SOURCES OF LAW:

1. Constitutional Law:

•It is the supreme law of the country

•Fundamental law written or unwritten, establishes the character of government by defining the basic principle to which a society must conform.

2. Legislation (Statuatory Law):

•Laws enacted by any Legislative body are called Statutory laws

•A written law passed by a legislature on the state or federal level.

•**Legislature**: an officially elected or otherwise selected body of people vested with the responsibility & power to make laws for a political unit, such as a state or unit.

3. Administrative Law:

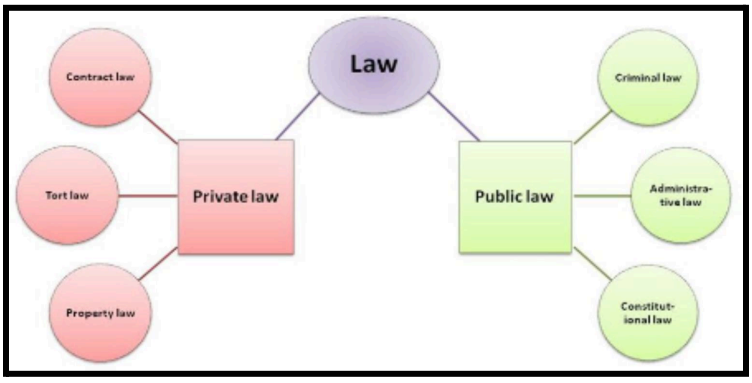
•When a state legislature passes a statute, an administrative agency is given authority to create rules & regulations to enforce the statutory laws.

- E.g. State Board of Nursing writes rules and regulations to enforce & implement Nurse Practice Act, which was created by Statutory Law.

4. Common Law:

•Laws evolving from court decisions are referred to as common law.

•Law developed by judges through decision of courts and similar tribunals.



1. **Public Law** – it refers to the body of law that deals with relationship between individuals and the government and the governmental agencies.

- •Important segment of public law is criminal law which deals with safety and welfare of the public e.g. theft, manslaughter, homicide etc.

2. **Private Law or the Civil Law** – it is the body of the law that deals with relationship among private individuals. It is again classified into **Contract Law and Tort Law**

a•**Contract Law** – is the enforcement of agreements among private individuals.

b•**Tort Law** – it defines and enforces duties and rights among private individuals that are not based on contractual agreement. E.g. invasion of privacy, assault and battery.

Selected Categories Of Law Affecting Nurses:

Category	Examples
Constitutional	▪ Due Process ▪ Equal Protection
Statutory Act (Legislative)	▪ Nurse Practice Act ▪ Sexual Harassment Laws ▪ Theft, Homicide, Sexual assault
Criminal (Public)	▪ Active euthanasia ▪ Illegal Possession of controlled drugs
Contracts (Private/Civil)	▪ Nurse and client ▪ Nurse and employer ▪ Nurse and insurance
Torts (Private/Civil)	▪ Negligence/malpractice ▪ Invasion of privacy ▪ Assault and battery ▪ abandonment

Kinds of Contracts:

1. **Formal Contract-** refers to an agreement among parties involved and is required to be in writing by some special laws.

Examples: *marriage contracts, mortgages, deeds of sale or work contract*

2. **Informal Contract-** is one which is concluded as the result of a written document or correspondence where the law does not required the same to be in writing, or as the result of oral and spoken discussion between the parties or conduct between the parties, evidence and intention to contract.

3. **Express Contract-** is one in which the conditions & terms of the contract are given orally or in writing by the parties concerned.

Example: this is usually found in formal contracts wherein the *kind of services offered, salary, date & time of effectively including fringe benefits*, if any are specified. If a private duty nurse is asked by a physician to go on special duty for his patient and the patient himself and his relatives do not object to the service, it is implied that the private duty nurse will be paid under the doctrine of facio ut des which means “I do that you may give”

4. **Implied Contract**- is one that is concluded as a result of acts of conduct of the parties to which the

law ascribes an objective intention to enter into a contract.To avoid subsequent problems, nurses are advised to clarify the terms and conditions of employment before assumption of work with the prospective employer.

5. **Void Contract**- is one that is inexistent from the very beginning & therefore may not be enforced.

6. **Illegal Contract**- is one that is expressly prohibited by law. Contracts obtained through use of fraud (deception & trickery), undue (unlawful), influence or duress (coercion) in securing such, and those that are expressly prohibited by the law

Delegation – is defined as "transferring a competent individual the authority to perform a selected nursing task in a selected situation".

Neglect is the absence of care necessary to maintain the health & safety of a vulnerable individual such as a child or elder.

EUTHANASIA: Is the act of painlessly putting to death people suffering from incurable or distressing disease.

Crime - is an act committed in violation of public (criminal) law and punishable by a fine or imprisonment.

Felony – is a crime of a serious nature, such as murder, punished by a term in prison.

Misdemeanor – is an offense of a less serious nature and is usually punishable by a fine or a short term jail sentence or both.

Tort – is a civil wrong committed against a person or a person's property.

Negligence is misconduct or practice that is below the standard expected of an ordinary, reasonable, and prudent person. Such conduct places another person at risk for harm.

Malpractice – is "professional negligence", negligence that occurred while the person was performing as a professional.

Assault – it is an attempt or threat to touch another person unjustifiable (-e.g. a nurse who threatens a client with an injection for refusing an oral medicine)

Battery – is the willful touching of a person that may or may not harm

Defamation – it is a communication that is false, or made with a careless disregard for the truth.

-A nurse writes in her nurse's notes that a physician is incompetent or telling a client that her colleague is incompetent.

Libel – is defamation by means of print, writing, or pictures. Writing in the nurses' notes that a primary care provider is incompetent because he did not respond immediately to a call is an example of libel.

Slander – is defamation by the spoken word, stating unprivileged (not legally protected) or false words by which a reputation is damaged.

Ethics: right vs. wrong

Autonomy (respecting patient choices)

Beneficence (acting in the patient's best interest)

Nonmaleficence (avoiding harm).

Justice – Treating all patients fairly and equally without discrimination.

Supervision – Overseeing and guiding others to ensure safe and correct patient care.

Responsibility – The duty to perform assigned nursing tasks correctly.

Authority – The legal power to make decisions and give directions in nursing care.

Accountability – Being answerable for your nursing actions and outcomes.

Fidelity – Keeping promises and being faithful to professional duties and patients.

Veracity – Telling the truth to patients and healthcare team members.

Triage – Prioritizing patients based on the urgency of their condition.

Advocacy – Protecting patients' rights and speaking up for their needs.

Negligence – Failure to provide proper care, resulting in harm to a patient.

Collaboration – Working together with the healthcare team to provide safe care.

Delegation – Assigning tasks to others while remaining responsible for the outcome.

Signs - are objective, measurable, and observable indications of a disease **(e.g., fever, rash, high blood pressure)** identified by a doctor or others.

Symptoms - are subjective, felt experiences reported by the patient **(e.g., pain, dizziness, fatigue)** that cannot be directly measured.

Intrapersonal (Within Self):

Definition: The internal dialogue, self-talk, and reflection a nurse engages in.

Function: Builds self-confidence, reduces negative feelings, manages stress, and aids in decision-making.

Interpersonal (Between People):

Definition: The interaction, exchange of information, and relationship-building between the nurse and others.

Function: Facilitates rapport, collects assessment data, and enables collaboration with the healthcare team.

What is the purpose of the nursing process?

To establish a database about the client's health status, health concerns, response to illness, and the ability to manage health care needs.

Nursing Process Steps

The nursing process consists of five steps: assessment, diagnosis, planning, implementation, and evaluation. The acronym ADPIE.

1. Assessment: "What data is collected?"

- It involves collecting, organizing, validating, and documenting the clients' health status.

Objective data are overt, measurable, tangible data collected via the senses.

Subjective data involve covert information, such as feelings, perceptions, thoughts, sensations, or concerns that are shared by the patient.

Verbal data are spoken or written data such as statements made by the client or by a secondary source.

Nonverbal data are observable behavior transmitting a message without words, such as the patient's body language, general appearance, & facial expressions.

PRIMARY SOURCE - The client is the only primary source of data and the only one who can provide subjective data.

SECONDARY SOURCE - The source is considered secondary data if it is provided from someone else other than the client but within the client's frame of reference.

TERTIARY SOURCE - Sources from outside the client's frame of reference are considered tertiary sources of data. Examples of tertiary data include information from textbooks, medical and nursing journals, drug handbooks, surveys, and policy and procedural manuals.

2. Diagnosis: "What is the problem?"

Diagnosing involves analyzing data, identifying health problems, risks, and strengths, and formulating diagnostic statements about a patient's potential or actual health problem.

Components of PES:

P (Problem): The NANDA-I diagnostic label, which describes the patient's health issue or response (e.g., Acute Pain, Impaired Physical Mobility).

E (Etiology): The cause or contributing factors, often linked to the problem using **"related to"** (r/t).

S (Signs/Symptoms): The defining characteristics, including subjective and objective data, linked using **"as evidenced by"** (aeb).

Example Formula & Statement:

Formula: [Problem] + related to + [Etiology] + as evidenced by + [Signs/Symptoms].

Example: Impaired physical mobility (P) related to decreased muscle control (E) as evidenced by inability to move lower extremities (S).

3. Planning: "How to manage the problem?"

The nurse will plan a course of treatment that takes into account short and long-term goals. Each problem is committed to a clear, measurable goal for the expected beneficial outcome.

- The goals must be **SMART (Systematic, Measurable, Attainable, Realistic, Time-Bound)**

- The planning phase is where goals and outcomes are formulated that directly impact patient care based on **evidence-based practice (EBP)** guidelines.

- A **nursing care plan (NCP)** is a formal process that correctly identifies existing needs and recognizes potential needs or risks.

4. Implementation: "Putting the plan into action!"

It involves action or doing and the actual carrying out of nursing interventions outlined in the plan of care.

Independent Nursing Interventions - A registered nurse can perform independent interventions on their own without the help or assistance from other medical personnel.

Dependent Nursing Interventions - A nurse cannot initiate dependent interventions alone. Some actions require guidance or supervision from a physician or other medical professional.

Interdependent Nursing Interventions - A nurse performs as part of collaborative or interdependent interventions that involve team members across disciplines.

5. Evaluation: "Did the plan work?"

This final phase of the nursing process is vital to a positive patient outcome. Explained under three terms: **the patient's condition improved, the patient's condition stabilized, and the patient's condition worsened**.

- The **goal was met**, when the client response is the same as the desired outcome.

- The **goal was partially met**, when either a short-term outcome was achieved but the long-term goal was not, or the desired goal was incompletely attained.

- The **goal was not met.**

ABG

ACIDOSIS

1. Respiratory Acidosis

Problem: LungsCause: CO_2 retention (hypoventilation)

ABG Pattern:

* ↓ pH
* ↑ $PaCO_2$
* HCO_3^- normal or ↑ (if compensated)

Common Causes:

* COPD
* Asthma attack
* Respiratory depression
* Airway obstruction

Compensation:

➡️ Kidneys compensate

* Kidneys retain HCO_3^-
* Kidneys excrete H^+

Example:

Patient with COPD not breathing well → CO_2 builds up → respiratory acidosis

2. Metabolic Acidosis

Problem: Kidneys or metabolismCause: Loss of HCO_3^- or excess acid

ABG Pattern:

* ↓ pH
* ↓ HCO_3^-
* $PaCO_2$ normal or ↓ (if compensated)

Common Causes (MUDPILES):

* DKA
* Diarrhea
* Kidney failure
* Lactic acidosis

Compensation:

➡️ Lungs compensate

* Hyperventilation
* Blow off CO_2 (↓ $PaCO_2$)

Example:

DKA patient breathing fast (Kussmaul breathing)

🔵 **ALKALOSIS**

3. **Respiratory Alkalosis**

Problem: LungsCause: Excessive CO_2 loss (hyperventilation)

ABG Pattern:

* ↑ pH
* ↓ $PaCO_2$
* HCO_3^- normal or ↓ (if compensated)

Common Causes:

* Anxiety
* Pain
* Fever
* Early hypoxia

Compensation:

➡️ Kidneys compensate

* Kidneys excrete HCO_3^-

Example:

Anxious patient hyperventilating

4. Metabolic Alkalosis

Problem: Kidneys or GICause: Excess HCO_3^- or acid loss

ABG Pattern:

* ↑ pH
* ↑ HCO_3^-
* $PaCO_2$ normal or ↑ (if compensated)

Common Causes:

* Vomiting
* NG suction
* Diuretic use

Compensation:

➡️ Lungs compensate

* Hypoventilation
* Retain CO_2

Example:

Patient vomiting excessively

ANAPHY

Anatomy-The study of the structure and relationship between body parts.
Physiology - The study of the function of body parts and the body as a whole.

Organizations of living systems
-Living systems can be defined from various perspectives, from the broad (looking at the entire earth) to the minute (individual atoms).
-Each perspective provides information about how or why a living system functions: At the chemical level, atoms, molecules (combinations of atoms), and the chemical bonds between atoms provide the framework upon which all living activity is based.

• The **cell** is the smallest unit of life. Organelles within the cell are specialized bodies performing specific cellular functions. Cells themselves may be specialized. Thus, there are nerve cells, bone cells, and muscle cells.
• A **tissue** is a group of similar cells performing a common function. Muscle tissue, for example, consists of muscle cells.
• An **organ** is a group of different kinds of tissues working together to perform a particular activity. The heart is an organ composed of muscle, nervous, connective, and epithelial tissues.
• An **organ system** is two or more organs working together to accomplish a particular task. The digestive system, for example, involves the coordinated activities of many organs, including the mouth, stomach, small and large intestines, pancreas, and liver.
• An **organism** is a system possessing the characteristics of living things-the ability to obtain and process energy, the ability to respond to environmental changes, and the ability to reproduce.

Theories on the Origin of Life
• Divine Creation Theory: based on the book of Genesis in the Bible; life is believed to have been created by the Almighty God
• Cosmozoic or Interplanetary Theory: a protoplasm in the form of a resistant spore originated from outer planets propelled by radiation pressure;the spore reached the earth and started the first form of life
•Philosophical Theory of Eternity: life has a beginning and no end; life has been here right from the very beginning of time
•Big Bang Theory: heavenly bodies, including the earth, originated from the explosion of a hot rotating ball of gas and eventually life was formed from the chemical evolution of different compounds present in the primitive earth.
•Abiogenesis or Spontaneous Generation Theory: life originated spontaneously from non-living things

Characteristics of Living Things
• living things cany on metabolic functions. - Living things have the capacity to perform a series of highly organized activities that take place within a definite These structural framework. These are nutrition, transport, respiration, excretion synthesis, regulation, growth and motion.
• living things reproduce. - Reproduction is the process by which man, animals and plants create more of their own. It is vital for the survival and continuity of life.
• living things respond to their environment. - All living things have the capacity to respond to certain changes in their environment and this is what we call irritability. However, what is environment in terms of the organisms? It is all the living and non-living things around it. These could be air, soil, water, heat, and light or any of the life forms that share with it. What about the changes or stimulus from the environment? A **stimulus** is a factor or environmental change capable of producing activity in an organism. This may be the light, temperature, water, sound, pressure, or the presence of a chemical substance or food source. The way an organism reacts to a stimulus is what we call **response**. We have to take note and consider that different organisms respond in different ways.
• living things need energy. - Chemical activities require the use of energy. In as much as life is a state of constant chemical activity, energy should also be constantly provided.
Photosynthesis carried - on by the plants and the foods consumed by animals are vital sources of energy, so both could grow, sustain and

reproduce.

Historical Background of the Cell

• **Robert Hooke (1665)** observed the mass of tiny cavities from this slices of cork with his self-made microscope.

• **Anton Van Leeuwenhoek (1674)** discoveries concerning protozoa, red blood cells, capillary systems and the life cycle of insects.

• **Robert Brown (1831)** observed plant cells with a distinct central part (nucleus); described the streaming movement of the Cytoplasm (Brownian movement).

• **Dujardin (1835)** observed that cells were not empty but filled with thick, jelly- like fluids (protoplasm).

• **Matthias Schleiden (1838**) concluded that plants are composed of cells and formulated the plant cell theory

•**Theodore Schwann (1839)** concluded that animals are composed of cells and formulated the animal cell theory.

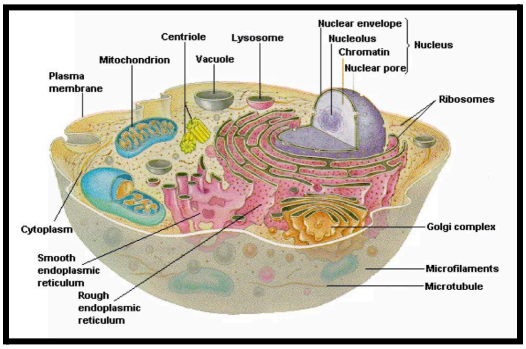
•**Rudolf Virchow (1858)** concluded that all cells must come only from pre existing cells.

•**Max Knoll and Ernst Ruska (1932)** built the first transmission electron Microscope

•**James Watson and Francis Crick** discovered the structure of DNA.

Cell

- Cells are the basic units of life. All living things are made up of cells. Some animals and plants consist of only one cell.
- Other plants and animals are made up of many cells. The body of a man has more than a million of cells (100 trillion cells).
- A cell is composed primarily of four elements - carbon, hydrogen, oxygen, and nitrogen and trace elements.
- Living things are composed of over 60% water.
-The major building substances of cells are proteins.



Parts of a Typical Cell

• **Nucleus** : governs the activities of the cell and is necessary for reproduction. The nucleus contains genetic material called **deoxyribonucleic acid (DNA)**, which carries hereditary instructions and directs the production of proteins. It is the structure, usually found near the center of
the cell that contains the cell's hereditary material.

A nucleus has the following charade characteristic structures:

Nuclear envelope, which is a two - membrane boundary between the inside of the nucleus and that of the cytoplasm.

Nucleoplasm, which is the fluid portion of the nucleus. Chromosomes, which are substances containing DNA, the cell's hereditary materials and package DNA and control gene expression. **Nucleolus**, which is a dense cluster of DNA and materials used to assemble the sub units of ribosome.

Plasma Membrane

•The plasma membrane limits and encloses the cytoplasm and acts as a selective barrier to the movement of substances into and out of the cell. It is composed of a **bilipid layer containing proteins**.

•The water - impermeable lipid portion forms the basic fibers of the membranes. Proteins act as enzymes or carriers in membrane transport, form pores, provide reception sites for hormones and other chemicals or play a role in cellular replication and interactions during development and immune reactions.

Cytoplasm

- The cytoplasm is the part of the cell where most cellular activities occur.
- Its fluid substance called **cytosol** contains inclusions, stoned or inactive such as fat globules, water vacuoles, crystals in the cytoplasm and specialized bodies known as **organelles**.
- The cytoplasm is a site of metabolic reactions, in which the cytoplasmic organelles play specific roles.

The specialized organelles are:

•**Mitochondria**, WHICH ARE THE CELL'S POWER PLANTS, WHICH PRODUCE MOST OF THE ENERGY.

•**Golgi Bodies**, WHICH TRANSPORT PROTEINS AND OTHER MATERIALS.

•**Lysosomes**, WHICH ARE FOR DEGRADATION AND RECYCLING OF MATERIALS.

• **Endoplasmic Reticulum,** WHICH IS A SYSTEM OF DEEP CHANNELS THAT WINDS THROUGHOUT

•**Cytoplasm**. MANUFACTURES PROTEINS, LIPID COMPONENTS OF MEMBRANE AND MODIFIES PROTEINS FOR SECRETION

•**Peroxisomes**, WHICH DISARM DANGEROUS CHEMICAL IN THE CELLS.

•**Ribosomes,** TINY ROUND BODIES THAT BORDER THE ER THAT ARE RESPONSIBLE FOR PROTEIN SYNTHESIS

Cell Division/somatic cell division

- Mitosis is the division of a cell nucleus, which results in the formation of two daughter nuclei with exactly the same genes as the mother nucleus.
- When the nucleus divides, each daughter cell ends up with exactly the same genetic information as the original mother and the original fertilized egg from which it came.
- It lasts only for a few minutes or an hour or more. Typically, it takes for 2 hours.
- Mitosis provides the new cells for body growth in youth and vital to repair body tissues all through life.
- Disorganized mitosis is the basis for tumors and cancers.

Stages of Mitosis

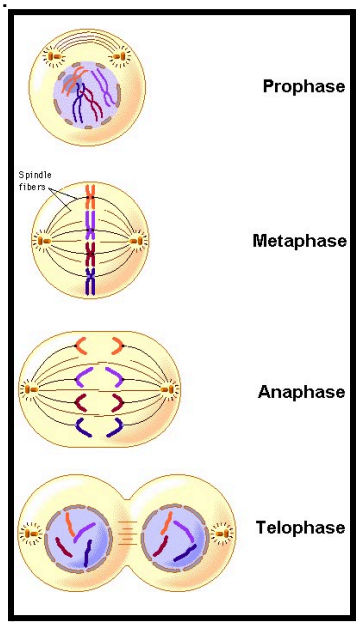
Interphase: The chromosomes are in an extended form and seen as chromatin in the electron microscope and the nucleus is visible.

Prophase: The chromosomes are seen to consist of two chromatids joined by a centromere. The centrioles move apart toward opposite poles of the cell. Spindle fibers are produced and extend from each centrosome. The nuclear membrane starts to disappear and the nucleolus is no longer visible.

Metaphase: The chromosomes are lined up at the equator of the cell. The spindle fibers from each centriole are attached to the centromeres of the chromosomes and the nuclear membrane has disappeared.

Anaphase: During anaphase, sister chromatids of each chromosome are separated. Microtubule-based mechanisms move the two chromatids of each pair to opposite poles.

Telophase: Telophase is essentially prophase in reverse. Microfilaments begin to constrict at the equatorial plane. Nuclear membranes start forming. The nucleus reappears. Cell division is nearly complete.



Meiosis / Sex cell division

• A process the produces four daughter cell with haploid number of chromosomes as the parent cell
• Also called reduction division
• Involves two successive divisions-meiosis I and II

1. Epithelial Tissue

Definition: Covers body surfaces and lines organs; protects and absorbs.
Examples: Skin, lining of mouth, stomach lining
Types & examples:
Squamous: thin, flat cells – lungs
Cuboidal: cube-shaped cells – kidney tubules
Columnar: tall cells – intestine
Glandular: makes secretions – sweat glands

2. Connective Tissue

Definition: Supports, connects, and protects body parts.
Examples: Bone, blood, fat

Types & examples:
Bone: hard support – skeleton
Cartilage: flexible support – nose, ear
Blood: transports materials – blood vessels
Adipose: stores fat – under skin
Areolar: binds tissues – between organs

3. Muscle Tissue

Definition: Contracts to cause movement.
Examples: Muscles of arms, heart
Types & examples:
Skeletal: voluntary movement – arm muscles
Smooth: involuntary movement – stomach
Cardiac: heart muscle – heart

4. Nervous Tissue

Definition: Carries messages and controls body activities.
Examples: Brain, spinal cord, nerves
Types & examples:
Neurons: send messages – nerve cells
Neuroglia: support neurons – brain cells

Integumentary System (Skin)

- Also known as **CUTANEOUS MEMBRANE**

•Human Skin is the largest organ of the integumentary system made up of multiple layers of epithelial tissues that guard underlying muscles and organs.

- As the skin interfaces with the surroundings, it plays the most important role in protecting (the body) against pathogens.
- Its other main functions are insulation and temperature regulation, sensation and vitamin D and B synthesis. Skin is considered one of the most important parts of the body.

Layers of the Skin

1. Epidermis

•made up of stratified squamous layer of epithelial tissue
•10 to 30 cells thick, about as thick as this page.

Layers of the Epidermis (outer → inner)

1. Stratum corneum
- Dead, flat cells; protects the skin.

2. Stratum lucidum (only in thick skin like palms & soles)
- Clear layer; extra protection.

3. Stratum granulosum
- Cells start dying; makes skin waterproof.

4. Stratum spinosum
- Gives strength and flexibility to skin.

5. Stratum basale (germinativum)
- New skin cells are formed here.

2. Dermis

• made up of fibrous connective tissue containing collagen and elastic fibers.
• also contains muscle fibers, glands, pigment cells, blood vessels and sensory nerves.
• 1 to 40 times thicker than the epidermis.
• provides structural support for all the epidermis and as matrix for any nerve endings, muscles and specialized cells in skin

Layers of the Dermis:

Papillary layer: Has blood vessels and nerves; feeds skin
Reticular layer: Thick layer with sweat glands, hair, and nerves

3. Hypodermis (subcutaneous layer)

Connects skin to muscles and stores fat.
Contents:
- Fat tissue (insulation and energy)
- Blood vessels
- Nerves

Keratinization - The cells become filled with the protein keratin, which makes them hard.

Jaundice: Yellowing of the skin and eyes due to liver problems.
Vitiligo: Loss of skin color in patches due to pigment loss.
Pallor: Unusually pale skin, often from low blood or illness.
Cyanosis: Bluish color of skin or lips caused by low oxygen.

Skeletal System

Functions:

1. Support the body.
2. Attachment of muscles.
3. Protection of internal organs.
4. Act as levers for movement.
5. Production of blood cells.
6. Gives stability and shape to the body.

Collagen: A strong protein that gives bones and tissues strength and flexibility.

Proteoglycans: Molecules that help bones and cartilage resist pressure and stay firm.

Ligaments: Strong bands that connect bone to bone.

Tendons: Tough cords that connect muscle to bone.

Types of Skeleton • Referring to the framework of the animal body is composed of cartilage, bone or a combination of both.

Long bones: Bones longer than wide; help movement (e.g., femur).

Parts of a Long Bone

Epiphysis: The rounded ends of a long bone.

Diaphysis: The long shaft of a bone.

Epiphyseal plate: Growth plate where bones grow in length.

Short bones: Cube-shaped bones; give stability (e.g., wrist bones).

Flat bones: Thin bones that protect organs (e.g., skull).

Irregular bones: Bones with complex shapes (e.g., vertebrae).

As to kinds of bone tissue:

Spongy bone tissue

* located at the ends and interiors of long bones.
* Also called bone marrow.
* Composed of an open lattice of bone.
* within this lattice framework, RBC are reproduced.

Compact bone tissue

* Surrounds the spongy bone tissue
* Also found at the core of bones

* Gives strength to withstand mechanical stress.

Distribution of Bones in Human Adult

• there are total of **206 bones** in an adult human. distributed as follows:

skull (cranium + face) = 22 (8 + 14)	
Ears	= 6
hyoid	= 1
vertebral column	= 26
sternum	= 1
ribs	= 24
pectoral girdle and forelimbs	= 64
pelvic girdle and hindlimbs	= 62

Bone Marrow

Bone marrow: Soft tissue inside bones that makes blood cells.

Red marrow: Produces red and white blood cells.

Yellow marrow: Stores fat and energy.

Skeleton Divisions

Axial skeleton: Bones of the head, spine, and chest; support and protect organs.

Appendicular skeleton: Bones of the arms, legs, and girdles; help movement.

Vertebrae

7 cervical vertebrae: Neck bones that support the head.

12 thoracic vertebrae: Upper back bones that attach to ribs.

5 lumbar vertebrae: Lower back bones that bear body weight.

1 sacral bone: Fused bones forming the back of the pelvis.

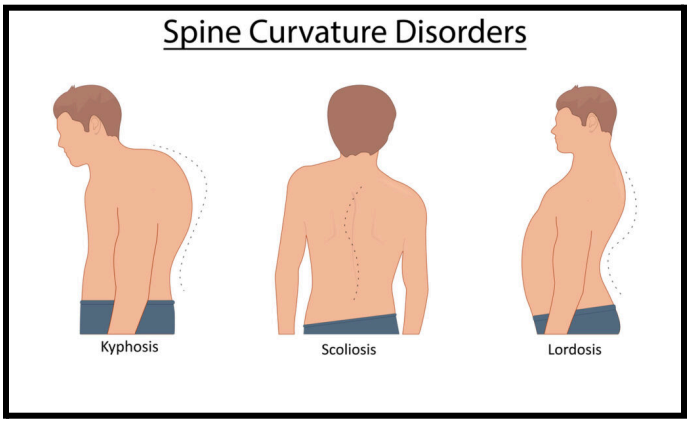
1 coccyx bone: Tailbone; supports sitting balance.

Joints: Places where two bones meet to allow movement or stability.

Common disorders associated with the skeletal system

• **Osteoporosis,** bone condition characterized by a decrease in mass,resulting in bones that are more porous and more easily fractured than normal bones.

• **Scoliosis**, also known as curvature of the spine, a progressive lateral curvature of backbone.



MUSCULAR SYSTEM

FUNCTIONS:

- Movement of the body.
- Maintenance of the posture.
- Respiration
- Production of heat
- Communication
- Constriction of organs and vessels
- Contraction of heart

Types of Muscles

Skeletal muscle: Muscles attached to bones that help in body movement.
Example: Biceps, leg muscles

Smooth muscle: Muscles found in organs; control automatic movements.
Example: Stomach, intestines, blood vessels

Cardiac muscle: Muscle of the heart that pumps blood.
Example: Heart

Types of Muscle Movement

Flexion: Bending
Extension: Straightening
Abduction: Moving away from body
Adduction: Moving toward body
Rotation: Circular movement

Important Points to Remember

- Skeletal muscles are voluntary
- Smooth and cardiac muscles are involuntary
- Tendons attach muscle to bone
- Muscles work in pairs (one contracts, one relaxes)

Digestive System

Functions:

1. Ingestion of food
2. Breaking down ot complex substance (food) into simple forms (nutrients)
3. Absorption of digested food Egestion of excretion of undigested food
4.Egestion as to excretion by the teeth.

Types of Digestion

1. **Mechanical digestion:** food is converted into small pieces by physical means such as mastication by the teeth.
2. **Chemical digestion:** food is converted into simpler forms by the action of enzyme.

Common digestive diseases and disorders

• **Peptic ulcers** are ulcers of the stomach (gastric) or small intestine (duodena)
• **Appendicitis**, an acute inflammation of the vermiform appendix.
• **Diarrhea**, a frequent passage of abnormally loose, water stool.
•**Constipation**, difficulty in eliminating bowel movements from the body.

Lips – muscular structures formed by the orbicularis oris muscle
Cheeks – buccinators muscles flatten the cheeks against teeth
Mastification – begins the process of mechanical digestion
Tongue – plays a major role in the process of swallowing; major sensory organ for taste; one of the major organs of speech
Frenulum – thin fold of tissue inferior to the tongue
32 teeth in normal adult mouth

ROUTE OF DIGESTION (WITH FUNCTIONS)

1. Mouth

Function: Chews food and mixes it with saliva.
Digestion: Starts carbohydrate digestion (salivary amylase).

2. Pharynx (Throat)

Function: Passage that moves food from mouth to esophagus.
Digestion: None (swallowing only).

3. Esophagus

Function: Transports food to the stomach by peristalsis.
Digestion: None.

4. Stomach

Function: Stores and churns food.
Digestion: Begins protein digestion using acid and enzymes.
Produces: Chyme (semi-liquid food).

5. Small Intestine

Main site of digestion and absorption.

a. Duodenum

Function: Receives bile and pancreatic juices.
Digestion: Digests carbohydrates, proteins, and fats.

b. Jejunum

Function: Absorbs most nutrients into blood.

c. Ileum

Function: Absorbs vitamin B_{12}, bile salts, and remaining nutrients.

6. Large Intestine

Function: Absorbs water and minerals.
Forms: Feces.
Bacteria: Produce some vitamins (e.g., vitamin K).

7. Rectum

Function: Stores feces before elimination.

8. Anus

Function: Expels feces from the body.

ACCESSORY ORGANS (HELP DIGESTION)

Salivary glands: Produce saliva for starch digestion.
- Produce saliva → moistens food
- Contains salivary amylase → starts starch digestion

Liver: Produces bile to digest fats.
- Detoxifies harmful substances
- Stores some nutrients (e.g., glycogen, vitamins)

Gallbladder: Stores bile.

- Stores and releases bile when needed
- Helps emulsify fats in the small intestine

Pancreas: Produces digestive enzymes and bicarbonate.
-Produces digestive enzymes → carbs, proteins, fats
- Secretes bicarbonate → neutralizes stomach acid in the duodenum
- The endocrine part of the pancreas consists of pancreatic islets, or **islet of Langerhans**.
- The islet cells produce **insulin and glucagon**.
- These hormones control blood sugar levels.

Circulatory System

Functions

1. Transport the oxygen and carbon dioxide, soluble food materials, organic wastes, and hormones
2. Regulation of the pH of tissue
3. Protection of the body against invading microbes
4. Regulation of body temperature in warm-blooded animals

• A specialized connective tissue The main transporting medium of the body 8% of total body weight **(4 to 6 liters in average adult)**

- Considered to be the ' essence of life'

Composition of Blood

Plasma - fluid portion of the blood

Albumin (58%): The most abundant protein, maintains osmotic pressure & transport substances.

Globulins (38%): Includes antibodies that are essential for immune defense.

Fibrinogen (4%): Involved in blood clotting.

Hematopoiesis

‣ A process of forming blood cells, which takes place primarily in the bone marrow in adults.

‣ Including the production of RBC, WBC, and platelets.

Formed Elements : include the cells (erythrocytes and leukocytes) and cell fragments (thrombocytes)

•Erythrocytes or red blood corpuscles (RBC)

Small, biconcave disks with polysaccharides on the outer membrane

‣ Disk-shaped and biconcave.

‣ RBCs are flexible.

‣ They are unable to divide due to the absence of nuclei and most of their organelles.

‣ **Lifespan: 120 days (male) 110 days (female)**

‣**Hemoglobin:** responsible for transporting O2 from the lungs to the tissues and organs and returning CO2 from the tissues back to the lungs for exhalation.

- The hormone **erythropoietin (EPO)**, produced by the kidneys, stimulates this process, especially in response to low oxygen levels in the blood.

• Leukocytes or white blood cells (WBC) less than 1% of the cells in human blood

‣Lifespan: Varying, from a few hours to several years, depending on the type.

‣WBCs are produced in the bone marrow from hematopoietic stem cells.

‣WBCs have a nucleus and other organelles.

‣WBCs can move out of the bloodstream into tissues to fight infections or respond to injury, a process called **diapedesis**.

Granulocytes: Contains large cytoplasmic granules

• Neutrophils

⊙ The most abundant type of WBC,

⊙ The first responders to bacterial infections and engage in phagocytosis,

• Eosinophils

⊙Combats parasitic infections and allergic reactions,

⊙Releases enzyme that attack parasites and help modulate the immune response to allergens.

• Basophils

⊙ The least common WBC.

⊙ They release histamine during allergic reactions, contributing to inflammation and increased blood flow to affected tissues.

⊙ Basophils release heparin, an anticoagulant, which helps prevent blood clotting.

Agranulocytes - Contains very small granules that cant be easily seen with light microscope

• Lymphocytes

⊙ Plays a central role in the adaptive immune response.

⊙ There are three main types:

‣ **B cells:** Produce antibodies

‣ **T cells:** Directly attack infected or cancerous cells

‣ **Natural Killer (NK) cells:** Provide rapid responses to virus-infected and cancerous cells without the need for prior sensitization.

• Monocytes

⊙ The largest WBCs.

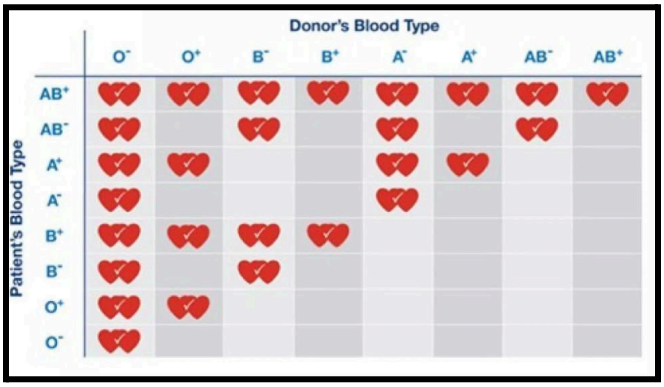
⊙ Can migrate to tissues where they differentiate into macrophages or dendritic cells.

⊙ Perform phagocytosis, engulfing pathogens, dead cells, and debris. Dendritic cells present antigens to T cells, initiating immune responses.

• **Thrombocytes or blood platelets** in humans. Involved in blood clotting or coagulation

‣ **Megakaryocytes** extend parts of their cytoplasm into blood vessels, where fragments break off and form platelets.

‣ The hormone **thrombopoietin**, primarily produced by the liver and kidneys, regulates platelet production.



ABO Blood Classification

- The most common blood grouping is the ABO classification
- Based on the types of protein present in the blood cells (antigen A and antigen B) and in the plasma (anti-a and anti-b)
- Agglutination clumping of blood cells. Each blood types contains the following:

•Blood type A contains antigen A and anti-b
•Blood type B contains antigen B and anti-a
•Blood type AB contains antigen A and B and no antibodies
• Blood type O contains anti-a anti-b and no antigen

The Heart

Main pumping organ of the body highly muscular organ located in the mid-ventral region of the thoracic cavity enclosed by a tough connective, tissue, the pericardium.

- The **Base** is the broader, flatter part, located at the upper region of the heart.
- The **Apex** is the tip or pointed end of the heart, formed by the left ventricle.

The Heart Wall

Epicardium: The superficial layer of the heart wall.
- A thin serous membrane that constitutes the outer surface of the heart.

Myocardium: The thick, middle layer composed of cardiac muscle tissue, responsible for the heart's ability to contract.

Endocardium: The deepest layer consists of simple squamous epithelium. Forms the smooth, inner surface of the heart chambers.

Chambers of the Heart

1. Atria or Auricles - have thin walls, receive blood from the veins and pump it into the ventricle

2. Ventricles - with much thicker walls, pump the blood out of the heart to all parts of the body

RIGHT ATRIUM

Right atrium has 3 major openings:
1. Opening from superior vena cava,
2. Opening from inferior vena cava, &
3. Opening from coronary sinus.

⊙**Function:** Right Atrium receives deoxygenated blood from the Superior and Inferior vena cava.

⊙**Right atrium** then pumps the blood into the **right ventricle** passing through the **tricuspid valve**.

Right Ventricle

⊙**Function:** Right Ventricle receives deoxygenated blood from the Right Atrium.

⊙The wall of the **right ventricle is thinner** than the left ventricle because it only needs to pump blood a short distance to the lungs.

⊙**Right ventricle** pumps the blood to the lungs via the **pulmonary valve** into the **pulmonary artery**.

Left Atrium

⊙**Function:** Left Atrium receives oxygenated blood from the lungs through the four pulmonary veins.

⊙Left atrium is separated from the right atrium by a partition called the **interatrial septum**.

⊙**Left atrium** then pumps the oxygenated blood into the **left ventricle** through the **bicuspid (mitral) valve.**

Left Ventricle

⊙**Function:** Left Ventricle receives oxygenated blood from left atrium.

⊙It has the **thickest wall** since it needs enough force to pump blood throughout the body, including the limbs.
⊙**Left ventricle** then pumps the oxygenated blood passing through the **aortic valve** to the **aorta and into the entire body**.

Heart Sounds

First heart sound: S1

‣ A low-pitched **"lub"** sound.
‣ Produced by the closure of the Atrioventricular Valves Valves: the tricuspid valve and the mitral valve.
‣ Best heard at the apex (Left 5th ICS, MCL)

Second heart sound: S2

‣ A high-pitched **"dub"** sound.
‣ Produced by the closure of the semilunar valves: the aortic valve and the pulmonary valve.
‣ Best heard at the base (2nd ICS)

Functions of The Blood Vessels

• Carries blood.
• Exchanges nutrients, waste products, and gases with tissues.
• Transports substances.
• Helps regulate blood pressure.
• Directs blood flow to tissues.

3 MAIN TYPES OF BLOOD VESSELS

ARTERIES

Function: Arteries carry oxygenated blood away from the heart to the body's tissues (except for the pulmonary arteries, which carry deoxygenated blood to the lungs).
Structure: They have thick, elastic walls that can withstand the high pressure of blood being pumped by the heart.

VEINS

Function: Veins carry deoxygenated blood back to the heart (except for the pulmonary veins, which carry oxygenated blood from the lungs to the heart).
Structure: They have thinner walls than arteries and often have valves to prevent back ow of blood, as the pressure in veins is lower.

CAPILLARIES

Function: Capillaries are tiny vessels that connect arteries and veins. They facilitate the exchange of oxygen, nutrients, and waste products between the blood and tissues.
Structure: Capillaries have very thin walls (one cell thick) to allow easy diffusion of substances between the blood and surrounding cells.

Common Hood related Disorder

• **Hypertension or High Blood Pressure**, medical condition in which constricted arterial blood vessels increase the resistance to blood flow.
•**Thrombosis**, formulation of blood clot, or thrombus, inside a blood vessel.
• **Leukemia**, any of several types of cancers that affects blood cells. Arteriosclerosis, a group of disorders of the arteries.

Lymphatic and Immune System

• The lymphatic system consists of transport tubes and lymphoid organs. The tubes constitute the Lymph vascular system, which supplements pulmonary and systemic circulation. When the tissue fluid has moved into these tubes, it is called the **lymph**.
- The lymphoid organs, which take part in defense responses, are structurally and functionally connected with both the blood and lymph vascular system.

Lymphatic Vascular System

•The lymph vascular system includes lymph capillaries, lymph vessels, and ducts that drain the processed fluid back into the circulation system, it serves these functions:
•Return the excess filtered fluid to the blood.
•Return of small amounts of proteins that leave the capillaries.
•Transport fats absorbed from the digestive tract.
•Transport of foreign particles and cellular debris to disposal centers (Lymph nodes).

Diseases of the Lymphatic System and Lymphoid Tissue

•lymphangitis is an inflammation of lymphatic vessels
•Elephantiasis is the blockage of lymphatic vessels by parasitic worms
•Lymphandenitis is an inflammation of lymph nodes that occurs during infection
•lymphadenopathy is a disease of lymph nodes
•**Splenomegaly** is the enlargement of the spleen
•Hodgkin's disease is a malignant disease with enlargement of lymph nodes
•Lymphosaroma is a malignant tumor of lymphoid tissue

1. Definition - A network of vessels and organs that carry lymph and help fight infections.
2. Functions
- Drains excess fluid from tissues → prevents swelling
- Transports fats from the digestive system
- Defends the body → produces white blood cells, fights infections

ORGANS INVOLVED
Lymph nodes - Filter lymph, trap bacteria and viruses, produce lymphocytes
Spleen - Filters blood, destroys old red blood cells, stores white blood cells
Thymus - Produces T-lymphocytes (important for immunity)
Tonsils - Trap germs from mouth and throat, help fight infections
Lymph vessels - Carry lymph fluid throughout the body
Bone marrow - Produces lymphocytes (B-cells and some T-cells)

4. Quick Memory Tips 🧠
Lymph nodes = filters
Spleen = blood filter
Thymus = T-cells
Tonsils = throat guard

Respiratory Organs

•Direct Surfaces (skin and pharyngeal regions) some amphibians and fishes like mudhoppers and eels use their skin, salamanders use their pharyngeal regions.

• Gills — most aquatic animals use external and internal gill filaments.

• Lungs - terrestrial animals

Common Diseases Associated with Respiratory System

•Common Colds, acute infectious disease of the upper respiratory tract, caused by more than 100 kinds of
viruses.

•Asthma, disorder of the respiratory system in which the passages that enable air to pass in and out of the lungs periodically narrow, causing coughing.

•Bronchitis, acute or chronic inflammation of any part of the bronchi and bronchial tubes.

•Pneumonia, term applied to any of about 50 distinct inflammatory diseases of the lungs characterized by the build up of fluid in the lungs.

•Tuberculosis, chronic or acute bacterial infection that primarily attacks the lungs but which may also affect the kidneys, bones, lymph nodes and brain.

Excretion

• Excretion is the process of throwing waste and harmful substances from the body. The skin, lungs, kidneys and lower intestinal tract carry out this function. The kidneys eliminate most of the excess water and salt. Perspiration withdraws from the body about one-fourth (1/4) of all the heat produced.

- When a person breathes, he eliminates carbon dioxide and some water. An adult eliminates a volume of about **6 4/5 ounces (200ml) of carbon dioxide per minute.**

- They eliminate about 9 liters of urine, made up of water and certain solids. Urine contains the solid urea, a waste product of the used protein by the body.

1. Definition - A system that brings oxygen into the body and removes carbon dioxide.

2. Functions

Breathing (ventilation) – inhale oxygen, exhale carbon dioxide

Gas exchange – oxygen into blood, carbon dioxide out

Filters and warms air – protects lungs from dust and germs

Voice production – through vocal cords

3. Organs Involved

Nose/Nasal cavity - Filters, warms, and moistens air

Pharynx (throat) - Passageway for air from nose to larynx

- **Nasopharynx** = nose → air
- **Oropharynx** = mouth → air & food
- **Laryngopharynx** = larynx → directs air & food

Larynx (voice box) - Produces sound, protects airway during swallowing

- **Thyroid Cartilage -** The largest cartilage of the larynx, often visible as the “Adam’s apple.”, which provides structure and support to the larynx.
- **Epiglottis -** A leaf-shaped cartilage that acts as a flap. During swallowing, it covers the entrance to the larynx, preventing food or liquids from entering the trachea.

Trachea (windpipe) - Carries air to bronchi

Bronchi - Branches air into each lung

Bronchioles - Smaller branches carrying air to alveoli

Alveoli - Tiny sacs where gas exchange occurs

Lungs - Main organs of respiration

Diaphragm - Muscle that helps breathe in and out

4. Quick Memory Tips 🧠

Air path: Nose → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli

- **Alveoli** = gas exchange
- **Diaphragm** = breathing muscle

RENAL SYSTEM

1. Definition - The system that removes waste, balances fluids, and maintains electrolytes in the body.

2. Functions

- Filters blood → removes waste (urea, toxins)
- Maintains water & salt balance
- Controls blood pressure
- Produces urine
- Helps produce red blood cells (via hormone erythropoietin)

3. Main Organs and Their Functions

Kidneys - Filter blood, remove waste, maintain water/electrolyte balance, produce urine

Ureters - Tubes that carry urine from kidneys to bladder

Urinary bladder - Stores urine until excretion

Urethra - Tube that carries urine out of the body

Structure of Nephron

•Bowman's capsule: A cup-shaped structure at one end of a nephron.

•Glomerulus: A cluster of capillaries surrounded by the bowman's capsule

•Proximal tubule: Segment of nephron between Bowman's capsule and loop of Henle.

•Distal tubule: Segment of nephron between the loop of Henle and the collecting tubule

•Loop of Henle: Descending and ascending parts

•Collecting tubule: Consist of a series of tubules and ducts.

4. Quick Memory Tips 🧠

Kidneys = filter blood

Ureters = carry urine

Bladder = store urine

Urethra = pee out

Metabolic Wastes

Functions

1. Collection and elimination of metabolic waste products.
2. Maintain homeostasis.

Metabolic Wastes

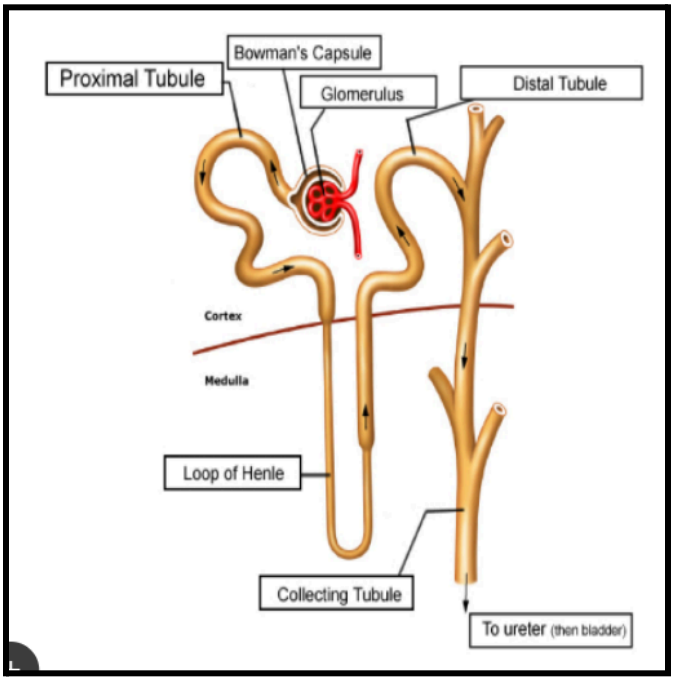
* heat
*carbon dioxide from respiration
*water derived from the oxidation of carbohydrates and fats.
*bile salts and pigments from the destruction of RBC
*mineral salt from the breakdown of water worn out tissue from excess dietary intake
*urea from protein metabolism

Common Kidney Disorders

• **Acute renal failure**, which occurs suddenly, may be caused by bacterial infection, injury, shock, congestive heart failure, drug poisoning or severe bleeding following surgery.

•**Chronic renal failure** is a progressive deterioration of kidney function over a long period of time.

•**Urinal calculi,** commonly known as **kidney stones**, result from the gradual buildup of crystallized salts minerals in the urine.



Nervous System: Control Center

Functions:

- Coordination and integration of many activities of the body through the conduction of impulses from the receptors to the effectors.

The nervous system has three overlapping functions:

- to monitor changes (stimuli) occurring inside and outside the body and to gather information (sensory input);
- to process and interpret the sensory input in order to make decisions (integration);
- and to activate the muscles or glands (motor input).

Organization of the Nervous System

Origin - develops from an embryonic dorsal hollow nerve cord.

Composition

- brain, spinal cord, nerve cells, neuroglial cells - consists of vast increase in the number of neurons compared to invertebrates

Division

-Central Nervous System - includes the brain and spinal cord.

-Peripheral Nervous System - includes all the nerve cells outside the CNS, both the cranial nerves and nerves

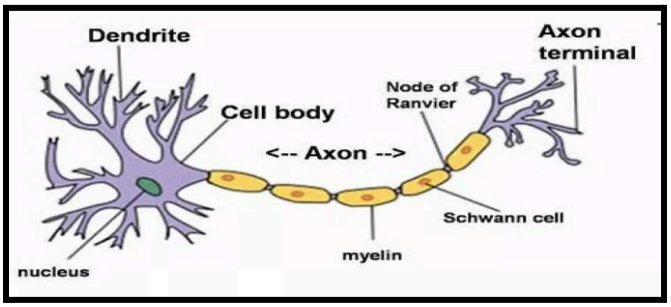
Neurons

• Nerve Cells.

• For reception of stimuli and transmission of reactions.

• Responsible for the integration of impulses

• Composition of the brain.



Common Diseases Associated with Nervous System

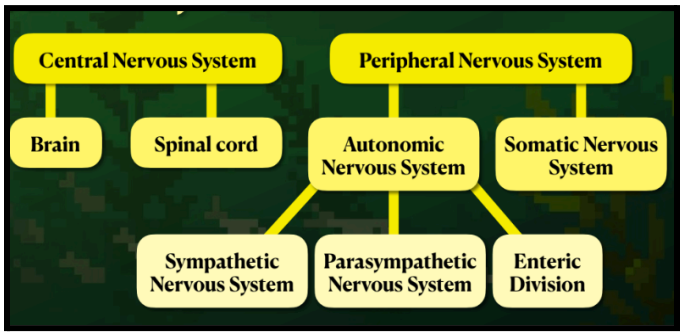
Multiple Sclerosis (MS): A disease where the immune system damages nerves, causing problems with movement, vision, and balance.

Meningitis: An infection that causes swelling of the protective layers around the brain and spinal cord.

Mental illness: Conditions that affect a person's thinking, emotions, or behavior and make daily life harder.

Epilepsy: A brain disorder that causes repeated seizures.

Stroke: A sudden brain injury caused by blocked or broken blood vessels, cutting off blood to the brain.



Nervous System Basics

Central Nervous System (CNS) → Brain & spinal cord; control center.

Peripheral Nervous System (PNS) → All nerves outside CNS; connects body to CNS.

PNS Divisions:

Somatic Nervous System → Voluntary movements (skeletal muscles).

Autonomic Nervous System → Involuntary actions (organs, glands).

Autonomic Divisions:

Sympathetic → "Fight or flight" (activates body).

Parasympathetic → "Rest & digest" (calms body).

PNS Functions:

Sensory (afferent) division → Brings info to CNS.

Motor (efferent) division → Sends commands from CNS to body.

Endocrine System / Ductless Glands

Functions:

• Coordinates, together with the nervous system, the activities of the body.

• Involved in the synthesis and secretion of hormones.

Hormonal function includes:

• Control of energy production and utilization

• Control of the composition of extracellular water and electrolytes

• Maintains normal growth and development

Exocrine Glands

• These glands secrete their products into the ducts, and ducts carry the secretions into the body cavities, into lumen of organs or to the outer surface of the body.

Insulin: The Insulin's primary role is to help regulate blood glucose levels by facilitating the uptake of glucose into cells.

Glucagon: The Glucagon's primary role is to increase blood glucose levels, especially at times when the body needs extra energy, such as between meals, during fasting, or intense physical activity.

1. Definition - A system of glands that produce hormones to regulate growth, metabolism, and body functions.

2. Functions

- Controls growth and development
- Regulates metabolism
- Maintains homeostasis (balance of water, sugar, salt)
- Controls reproduction
- Responds to stress

3. Main Endocrine Organs and Hormones

1. Pituitary

Hormone: Growth hormone (GH), TSH, ACTH, LH, FSH, Prolactin

Function: "Master gland" – controls other glands, growth, reproduction

2. Thyroid

Hormone: Thyroxine (T4), Triiodothyronine (T3), Calcitonin

Function: Controls metabolism, calcium levels

3. Parathyroid

Hormone: Parathormone (PTH)

Function: Raises blood calcium

4. Adrenal glands

Hormone: Adrenaline, Cortisol, Aldosterone

Function: Stress response, blood pressure, salt balance

5. Pancreas

Hormone: Insulin, Glucagon

Function: Controls blood sugar

6. Ovaries (female)

Hormone: Estrogen, Progesterone

Function: Female reproduction, menstrual cycle

7. Testes (male)

Hormone: Testosterone

Function: Male reproduction, muscle & bone development

8. Pineal gland

Hormone: Melatonin

Function: Controls sleep-wake cycle

9. Thymus

Hormone: Thymosin

Function: Develops immune system (T-cells)

4. Quick Memory Tips 🧠

Pituitary = master gland

Thyroid = metabolism

Adrenal = stress

Pancreas = sugar control

Ovaries/Testes = reproduction

Aldosterone = salt & water

Cortisol = stress & metabolism

Androgens = male traits & growth

Reproductive System

• Life begins as a single cell and grows to be an individual composed of trillions of cells. In that first cell, every subsequent one is the DNA, the material that lays down the blueprint of what an individual will be like from the color of his eyes to the size of his feet.

- The reproductive system functions to ensure the continuity of the species by producing offspring.

Common Sexual Diseases and Dysfunction

• **Erectile dysfunction (impotence)** refers to the ability of a man to have or maintain an erection.

•**Female orgasmic dysfunction (anorgasmia or inhibited female)** refers to the inability of a woman to have an orgasm.

• **Vaginismus** refers to a spastic contraction of the outer third of the vagina, a condition that can close the entrance of the vagina, preventing intercourse. • **Breast cancer,** malignant tumor in the glandular tissue of the breast. Such tumors are called carcinoma.

• **Infertility,** permanent inability to conceive or carry a child to term.

• **Sterility**, permanent inability to produce offspring.

•**Gonorrhea**, caused by the bacteria Neisseria gonorrhea, infects the membranes lining certain genita organs.

•**Syphilis**, a potential life threatening STD, is caused by the bacteria Treponema pallidum.

•**Genital Herpes** is caused by infection with the herpes simplex virus (HSV)

•**AIDS**, the result of infection with human immunodeficiency.

•**Trichomoniasis**, caused by infection with the protozoan, trichomonas vaginalis causes vaginitis, inflammation of the vagina causing burning, itching and discomfort.

REPRODUCTIVE SYSTEM

1. Definition - System responsible for producing offspring and sex hormones.

2. Functions

- Produces gametes (sperm or eggs)
- Produces sex hormones (testosterone, estrogen, progesterone)
- Supports fertilization and development of offspring

Male Reproductive System

Testes - Produce sperm and testosterone

Epididymis - Stores and matures sperm

Vas deferens - Carries sperm from testes to urethra

Seminal vesicles & Prostate - Produce fluids to nourish and transport sperm

Penis - Delivers sperm into female reproductive tract

Female Reproductive System

Ovaries - Produce eggs (ova) and hormones estrogen & progesterone

Fallopian tubes - Carry egg from ovary to uterus; site of fertilization

Uterus - Supports fetal development during pregnancy

Cervix - Lower part of uterus; opens into vagina

Vagina - Receives sperm; birth canal

3. Quick Memory Tips 🧠

Male = sperm & testosterone

Female = eggs & estrogen/progesterone

Fertilization = fallopian tube, pregnancy = uterus

Proper Hygiene

•Hygiene refers to the practice of cleanliness, but also refers to the preservation of health. Proper hygiene requires a range of behaviors that promote cleanliness, health, disease prevention and the social etiquette of personal hygiene

•Proper hygiene requires age and gender-appropriate tools, including soap, water and deodorant and oral hygiene items, hair care tools and cleaners, nail care implements and detergents for laundering clothes and housecleaning.

•You might also need razors, shaving gels or creams and antibacterial liquids for cleaning hands when on the move.

•Depending on your individual needs, proper hygiene might require additional tools, such as lotions to prevent dry skin or special facial cleansers.

Regular Exercise and balanced diet

• Regular exercise will keep the performance of the heart and lungs to effectively melt away excess calories and keep your weight in check.

•Exercise will even enhance strength of muscle, boost joint flexibility and boost endurance, while eating healthily provides you with the various tools to attain your primary goal.

•The primary purpose of getting both together would be to enhance your lifestyle or your quality of life.

Wellness

• Charles B. Corbin of Arizona State University, defines wellness: "as a multidimensional state of being describing the existence of positive health in an individual as exemplified by quality of life and a sense of well-being."

• Wellness is an active process of becoming aware of and making choices toward a more successful existence.

ADDED INFOS:

PLEURAL CAVITY - A pleural cavity surrounds each lung, which is covered by visceral pleura. The parietal pleura lines the inner surface of the thoracic wall, the lateral surfaces of the mediastinum, and the superior surface of the diaphragm. The pleural cavity is located between the visceral pleura and the parietal pleura and contains pleural fluid.

PERICARDIAL CAVITY - The pericardial cavity surrounds the heart. The visceral pericardium covers the heart, which is contained within a connective tissue sac lined with the parietal pericardium. The pericardial cavity, which contains pericardial fluid, is located between the visceral pericardium and the parietal pericardium.

ABDOMINOPELVIC CAVITY - The abdominopelvic cavity contains a serous membrane-lined cavity called the peritoneal cavity. Visceral peritoneum covers many of the organs of the abdominopelvic cavity. Parietal peritoneum lines the wall of the abdominopelvic cavity and the inferior surface of the diaphragm.

PERITONEAL CAVITY - The peritoneal cavity is located between the visceral peritoneum and the parietal peritoneum and contains peritoneal fluid.

DNA (GCAT): Contains the bases Guanine, Cytosine, Adenine, and Thymine. It acts as the primary information storage molecule in a double-helix structure.

RNA (GCAU): Contains Guanine, Cytosine, Adenine, and Uracil, substituting Thymine for Uracil. RNA is synthesized from a DNA template (transcription) to direct protein production.

PATHOPHYSIOLOGY

CHAPTER 1: ALTERATIONS IN CELL FUNCTION AND GROWTH

Cell Injury

Definition: Damage to cells caused by stress, toxins, lack of oxygen, or infection.

What happens: Cells may swell or shrink, function poorly, or die (necrosis or apoptosis).

- Can be reversible (if mild) or irreversible (if severe).

Causes:

- Lack of oxygen (ischemia)
- Physical agents (heat, cold, trauma)
- Chemical toxins or drugs
- Infection
- Nutritional deficiencies

When cells are confronted with one of the following stimulus, they may undergo adaptive changes. The common stimuli are:

a) Physical agents

- Trauma, Burn, pressure, irradiation, etc.

b) Chemical agents

- Poisons, drugs, simple compounds, etc.

c) Micro organisms

- Bacteria, Virus, Fungus, Parasites

d) Hypoxia

- Is the most common stimuli (cause)
- Is because of inadequate oxygen in the blood or decreased tissue
- Perfusion

e) Genetic defects

- Can affect cellular metabolism through inborn errors of metabolism or gross malformation

f) Nutritional imbalances - Under nutrition or over nutrition causes cellular injury or changes.

g) Immunologic reaction - Hypersensitivity reaction.

Cellular Adaptive Changes

Definition: Changes cells make to cope with stress and survive without dying.

What happens: Cells adapt by changing size, number, or type depending on stress.

Abnormal and normal accumulation of intracellular substances

As a result common changes include:

- **Cellular swelling**
- **Lipid accumulation** (Fatty change process in the cytoplasm of cells).
- **Glycogen depositions** (Excess deposition of glycogen in organs).
- **Calcification** (precipitation of calcium in dead or Chronic inflammation area)
- **Hyaline infiltration**(characteristic alteration within cells or in the Extra-cellular spaces that appear as inclusion on stained histology).

I) Atrophy - Atrophy refers to a decrease in cell size.

Causes:

- Decreased work load (Disuse atrophy)
- Loss of nerve supply
- Decreased blood supply
- Inadequate nutrition
- Loss of hormonal stimulation

Eg. - Uterine atrophy after menopause.

-Physiologic Atrophy

Eg. - Loss of muscle bulk with ageing.

II) Dysplasia: Dysplasia refers to the appearance of cells that have undergone some atypical changes in response to chronic irritation.

- It is not a true adaptive process in that it serves no specific functions.
- Epithelial cells are common sites for dysplastic changes.

Eg: -Bronchial epithelium,Cervical epithelium, etc.

III) Hyperplasia:- It is defined as an increase of tissue mass due to an increase in the number of cells.

Types of Hyperplasia

a) Physiologic Hyperplasia: occurs when there hormonal stimulation

- Occurs in puberty and pregnancy

b) Compensatory-Hyperplasia - Occurs in organs that are capable of regenerating lost tissues.

(Eg. When part of the liver is destroyed.)

c) Pathologic Hyperplasia - Is seen in abnormal stimulation of organs with cells that are capable of regeneration.

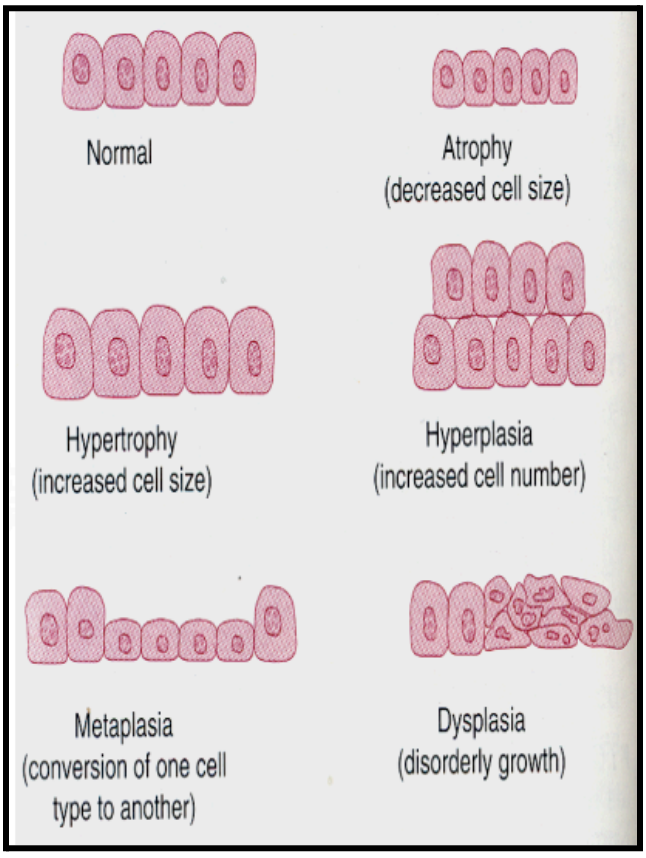
(E.g. Enlargement of Thyroid gland due to TSH from pituitary gland)

IV) Hypertrophy

- Is an increase in the size of individual cells, resulting in increased tissue mass with out an increase in the number of cells.
- It is usually the response of a specific organ to an increased demand for work.
Example: - Enlargement of muscles in Athletes

V) Metaplasia

- Metaplasia is a reversible change in which one type of adult cell is replaced by another type.
- It is an adaptive substitution of one cell type more suitable to the hostile environment for another.
Eg. - Replacement of the normal columnar, ciliated goblet cells of the bronchial mucosa by Stratified squamous epithelial cells in chronic smokers.



CELLULAR INJURY

Definition: Damage to cells that alters function.
Types:
Sub-lethal injury: Cells are stressed but can recover if cause is removed → **reversible.**
Example: Ischemia (lack of blood/oxygen) → tissue can recover if blood supply is restored.

Lethal injury: Cells cannot recover → irreversible → leads to cell death.

Causes: Same as causes of cellular adaptive changes: ischemia, toxins, infections, trauma, nutritional issues.

REVERSIBLE CELL INJURY

Definition: Cell changes that can be reversed if stimulus is removed.
Example: Early ischemia → function returns after oxygen supply is restored.

IRREVERSIBLE CELL INJURY (LETHAL CHANGES)

Definition: Cell cannot recover; death occurs.
Examples and Types:
Infarction (Ischemic Necrosis): Local tissue death due to blocked blood supply
Persistent ischemia → irreversible death
Example: Acute myocardial infarction (heart attack)

Necrosis (Cell/Tissue Death): Structural evidence of death
Types of Necrosis:
Coagulative Necrosis: Caused by lack of blood supply
- Cell structure preserved but nucleus lost
Example: Caseous necrosis (common in tuberculosis, soft "cheesy" tissue)

Liquefactive (Colliquative) Necrosis: Cells digested by enzymes → tissue becomes liquid with cysts/debris
- Common in brain tissue, wet gangrene

Quick Memory Tip 🧠
Sub-lethal injury = reversible
Lethal injury = irreversible → cell death
Infarction = ischemic death
Coagulative = structure preserved
Liquefactive = tissue liquefied

Neoplasm (Tumor)

Neoplasm: New abnormal growth due to uncontrolled cell division (synonym: tumor).
Aberrant cellular growth: Change in normal cell growth.
Tumor: Mass formed by clustered neoplastic cells.

Types of Tumors

1. Benign Tumor

- Abnormal cells divide but do not invade or spread.

- Does not metastasize.

2. Malignant Tumor (Cancer)
- Abnormal cells invade nearby tissues, spread (metastasize), and can recur.
Includes:
Carcinoma: Cancer from epithelial tissues
Sarcoma: Cancer from connective tissues or mesodermal origin
Carcinogenesis: Formation of cancer cells
Metastasis: Spread of cancer to secondary sites away from primary tumor

Benign and Malignant Neoplasia
- All cells can divide (mitosis), but normal cells are controlled.
- Cancer cells lose control → divide uncontrollably ("crazy cells").
- Neoplasms are classified based on cell origin and behavior (benign or malignant)

Comparison: Benign vs Malignant Neoplasms

Feature	Benign	Malignant (Cancer)
Cell similarity	Similar to origin	Dissimilar to origin
Growth edges	Smooth, outward	Irregular, invasive
Local effect	Compresses nearby tissue	Invades local tissue
Growth rate	Slow	Rapid to very rapid
Recurrence	Rare after removal	Frequent recurrence
Necrosis/ulceration	Uncommon	Common
Systemic effect	Rare	Common

Benign = gentle, slow, stays local
Malignant = aggressive, fast, spreads, harmful

Nomenclature of Neoplasms
1. Based on Behavior of Growth
Benign tumors:
Connective tissue → add "-oma" (e.g., Fibroma)
Epithelial → add "Papilloma"
Glandular → add "Adenoma"

Malignant tumors:
Connective tissue → add "-sarcoma" (e.g., Fibrosarcoma)
Epithelial → add "Carcinoma"
Glandular → add "Adenocarcinoma"

2. Based on Cells of Origin
Prefix = cell of origin; suffix = benign/malignant
Examples:
Fat cells → Benign: Lipoma, Malignant: Liposarcoma
Bone cells → Benign: Osteoma, Malignant: Osteosarcoma
Blood vessels → Benign: Hemangioma, Malignant: Hemangiosarcoma
Fibrous tissue → Benign: Fibroma, Malignant: Fibrosarcoma

3. Exceptional Naming (Malignant Misnomers)
Some cancers do not follow standard rules:
Hepatoma → malignant liver cells (Hepatocellular carcinoma)
Hodgkin's disease → malignant lymphoid tumor
Multiple myeloma → malignant plasma cells
Others: Leukemia, Ewing's sarcoma

Mechanisms of Carcinogenesis
Carcinogenesis = process by which normal cells transform into cancer cells.
- Multiple theories exist; no single theory fully explains cancer.

1. Genetic Instability
- Mutations in somatic cells + hereditary susceptibility → genetic abnormalities → cancer.

2.Carcinogens (Cancer-Causing Agents / Oncogenes)
- Carcinogens: Substances that induce neoplastic growth.

Types:
Chemical Carcinogens:
1. Polycyclic aromatic hydrocarbons: Tobacco, exhaust → lung, lip, oral cancers
2. Aromatic amines: Insecticides, foods → bladder cancer
3. Alkylating agents: High-dose therapeutic drugs (e.g., nitrogen mustard) → cancer
4. Others: Aflatoxins, nitrosamides, drugs

Physical Carcinogens
1. Ionizing radiation → DNA damage, long latent period
Example: Leukemia, skin cancer after Hiroshima/Nagasaki

2. Viral Carcinogens - Viruses alter host DNA → cancer

Examples:

EBV → Burkitt's lymphoma

HPV → Cervical cancer, skin papilloma

3. Other Factors

- Lifestyle and environment also contribute:
- Diet, smoking, alcohol, sexual habits

Quick Memory Tip 🧠

Genetic mutation + carcinogens = cancer

Chemical, Physical, Viral → main carcinogens

Lifestyle factors → increase risk

CHAPTER 2: ALTERATIONS IN BODY DEFENSE

Body Defense Mechanisms

- The body has multiple defense mechanisms to protect against injury and infection.

1. Skin and Mucous Membranes (First Line of Defense)

Function: Mechanical barrier to block injurious agents.

Key Point: Breaks in these barriers allow entry of harmful agents.

2. Mononuclear Phagocyte System (MPS)

Components: Monocytes (blood) and macrophages (tissues)

Fixed macrophages: Liver, spleen, bone marrow, lungs, lymph nodes, microglial cells (brain)

Mobile macrophages: Connective tissue (histolytic)

Origin: Bone marrow → monocytes → tissues → macrophages

Functions:

- Recognize and phagocytose foreign material (microbes, debris)
- Remove old/damaged cells
- Assist the immune system

3. Inflammatory Response

- Triggered by injury or infection

Functions: Redness, swelling, heat, pain → helps isolate and repair damage

4. Immune System

- Provides specific defense against pathogens
- Involves antibodies and immune cells to destroy invaders

Location and Name of Macrophages

Connective Tissue	Histiocytes
Liver	Kupffer Cells
Lung	Alveolar Macrophages
Spleen	Free and Fixed macrophages
Bone Marrow	Fixed Macrophages
Lymph Nodes	Free and Fixed macrophages
Bone Tissue	Osteoclasts
Central Nervous System	Microglial Cells
Peritoneal Cavity	Peritoneal Macrophages
Pleural Cavity	Pleural Macrophages
Skin	Histiocyte, Langerhans' Cells
Synoviom	Type A Cells

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Inflammatory Response

Definition: Sequential reaction to cell injury.

Purpose: Neutralize/dilute harmful agents, remove debris, and allow healing.

-**Inflammation ≠ infection:** Inflammation can happen without infection (heat, trauma, allergens).

- Infection always triggers inflammation.

Steps of Inflammatory Response

(Vascular response → Cellular response → Exudate → Healing)

1. Vascular Response

Brief vasoconstriction → then vasodilation (histamine release)

Increased blood flow → hyperemia

Capillaries become leaky → fluid & proteins move into tissue → edema

2. Cellular Response

Leukocytes leave vessels and move to injury site:

Margination: Leukocytes stick to vessel walls

Transmigration (Diapedesis): Leukocytes move through vessel walls

Chemotaxis: Leukocytes move toward injury or bacteria

Phagocytosis: Leukocytes engulf and destroy harmful agents

Steps: Recognition → Engulfment → Killing/degradation

Killing methods:

Oxygen-independent (lysosomal enzymes)

Oxygen-dependent (reactive oxygen species)

3. Exudate Formation

- **Fluid, proteins, and immune cells accumulate at injury** → helps dilute toxins and remove debris

4. Healing

- **Tissue repair** occurs once injurious agents are removed

Chemical Mediators

- From plasma and cells (neutrophils, macrophages, mast cells, platelets)

Examples: Histamine, serotonin, prostaglandins, leukotrienes, cytokines, nitric oxide

Function: Increase vascular permeability, attract leukocytes, regulate inflammation

Mediators of Inflammation

1. Histamine

Source: Mast cells, basophils, platelets

Action: Causes vasodilation and increases capillary permeability → redness and edema

2. Serotonin

Source: Platelets

Action: Increases vascular permeability; helps maintain inflammation

3. Kinins (Bradykinin)

Source: Plasma proteins (kinin system)

Action: Causes pain, vasodilation, and increased permeability

4. Complement Components

C3a & C4a

Source: Plasma (complement system)

Action: Increase vascular permeability, trigger histamine release

C5a

Source: Plasma

Action: Strong chemotactic factor → attracts neutrophils; activates leukocytes

5. Fibrinopeptides

Source: Plasma (clotting system)

Action: Increase vascular permeability and attract leukocytes

6. Prostaglandins

Source: Leukocytes, mast cells, platelets

Action: Cause pain, fever, vasodilation, and prolong inflammation

Quick Memory Tip 🧠

Histamine & serotonin = early permeability

Bradykinin = pain

C5a = chemotaxis

Prostaglandins = pain + fever

Exudate Formation

- Exudates are fluid and leukocytes that move from blood vessels to the site of injury.
- Formed due to increased vascular permeability during inflammation.
- Help dilute harmful agents and bring immune cells to the injured area.

The type and amount of exudate depend on:

-Severity of injury

-Type of injuring agent

- Tissue involved

Quick Memory Tip 🧠

Exudate = fluid + leukocytes at injury site

More severe injury → more exudate

Types of Inflammatory Exudates

1. Serous Exudate

Definition/Function: Clear, watery fluid with few proteins and cells; helps dilute irritants.

Example: Blister from a burn, fluid in early inflammation.(Skin blisters, pleural effusion)

2. Catarrhal Exudate

Definition/Function: Thick mucus-rich exudate from mucous membranes; traps microbes.

Example: Common cold (runny nose).

3. Fibrinous Exudate

Definition/Function: Protein-rich exudate containing fibrin; helps wall off infection.
Example: Fibrin on serous membranes in pneumonia or pericarditis. (Furuncle(boil),abscess cellulites (diffuse inflammation in connective tissue)

4. Hemorrhagic Exudate
Definition/Function: Exudate containing red blood cells due to severe vessel damage.
Example: Severe infections like viral hemorrhagic fevers. (Hematoma)

Quick Memory Tip 🧠
Serous = clear fluid
Catarrhal = mucus
Fibrinous = fibrin/protein
Hemorrhagic = blood

Clinical Manifestations of Inflammation
1. Local Response (At the site of injury)
These are the 5 classic signs of inflammation, with easy examples:
1. Redness (Rubor): Increased blood flow
Example: Red skin around a cut
- Hyperemia from vasodilatation
2. Heat (Calor): Warmth due to increased circulation
Example: Warm skin over an infected wound
- Increased metabolism at inflammatory site
3. Pain (Dolor): Caused by chemical mediators and pressure
Example: Pain when touching a swollen finger
- Change in PH
4. Swelling (Tumor): Fluid leakage into tissues (edema)
Example: Swollen ankle after injury
- Fluid exudates accumulation
5. Loss of Function (Functio laesa): Reduced movement or use
Example: Unable to bend a painful, swollen knee
- Swelling and pain

2. Systemic Response (Whole-body effects)
- Occurs when inflammation is severe or widespread:
1.Fever
Example: High temperature during infection
2.Increased white blood cells (Leukocytosis)
Example: High WBC count in blood tests
3.Malaise and fatigue
Example: Feeling weak and tired during illness
4. Increased heart rate
Example: Fast pulse during severe infection
5. Leukoctosis results from the increased release of leukoytes form the bone marrow.

Quick Memory Tip 🧠
Local = R-H-P-S-L
(Redness, Heat, Pain, Swelling, Loss of function)
Systemic = fever + tiredness + ↑ WBC

STAGES OF THE FEBRILE RESPONSES

STAGE	CHARACTERSTICS
• **Prodromal**	• Nonspecific complaints such as mild headache, fatigue, general malaise, and muscle aches
• **Chill**	• Cutaneous vasoconstriction, " goose pimples," pale skin; feeling of being cold; generalized shaking chill; shivering causing body to reach new temperature set by control center in hypothalamus
• **Flush**	• Sensation of warmth throughout body; cutaneous vasodilatation; warming and flushing of the skin
• **Defervescence**	• Sweating; decrease in body temperature

Types of Inflammation
Acute inflammation:
Short-term (days to ~3 weeks), heals quickly with little or no damage.
Main cells: neutrophils.

Sub-acute inflammation: Similar to acute but lasts longer (weeks to months).
Example: infective endocarditis.

Chronic inflammation: Long-term (months to years) due to persistent injury.
Main cells: lymphocytes and macrophages. Can be severe and debilitating, often linked to immune system changes.

Healing Process
Healing is the final stage of inflammation and happens by regeneration or repair.

Regeneration: Lost cells are replaced by the same type of cells.
- **Labile cells** (skin, bone marrow, GI lining) regenerate quickly.
- **Stable cells** (liver, kidney, bone) regenerate only when injured.
- **Permanent cells** (CNS neurons, heart muscle) do not regenerate.

Repair: Lost tissue is replaced by connective tissue, leading to scar formation (most common type of healing).
Examples of Healing:
- Wound healing
- Fracture healing
- Repair can occur by primary, secondary, or tertiary intention.

Primary Intention Healing
- Occurs when wound edges are close together, such as in surgical incisions or small cuts.
- Healing happens smoothly with minimal tissue loss and scarring.
- It follows three main phases of the healing process.

Phases In Primary Intention Healing

PHASE	ACTIVITY
• Initial (3 to 5 days)	Approximation of incision edges; migration of epithelial cells; clot serving as meshwork for starting capillary growth
• Granulation (5 days to 4 weeks)	Migration of fibroblasts; secretion of collagen; abundance of capillary buds; fragility of wound
• Maturation Phase & Scar Contraction (7 days to several months)	Remodeling of collagen; strengthening of scar

Secondary Intention Healing
- Occurs in large, open wounds from trauma, ulcers, or infection with wide, irregular edges and tissue loss.
- Causes more inflammation, debris, and exudate; the wound often needs cleaning (debridement).
- Healing happens from the bottom upward and edges inward.
- Produces more granulation tissue and a larger scar than primary intention.

Tertiary Intention Healing (Delayed Primary)
- Used for contaminated or infected wounds.
- The wound is left open first, then sutured later after infection is controlled.
- Results in a larger and deeper scar than primary or secondary healing.

Bone Healing
- Similar to soft tissue healing but more complex and slower.
Occurs in five stages:
1. Hematoma formation (48–72 hrs): Blood clot forms, creating a framework for healing.
2. Cellular proliferation: Osteoblasts multiply and form a soft fibrocartilaginous callus.
3. Callus formation: Callus hardens as minerals deposit (about 3–4 weeks).
4. Ossification: Mature bone replaces callus; fracture becomes firmly united (cast removable).
5. Remodeling & consolidation: Excess bone is removed and normal shape restored.

- Function usually returns after **~6 months**, with full recovery taking longer.

Factors Affecting Fracture Healing
1) Local (Around the bone)
Injury type → swelling, displacement
Bone type → spongy (fast) vs. hard (slow)
Bone loss & alignment → affects bridging
Immobilization → more stable = better healing
Problems at site → infection, cancer, dead bone

2) Individual (Person)
Age → young heal faster, old slower
Nutrition → poor = slower healing
Diseases → diabetes, arthritis, blood/clot problems
Circulation → poor blood flow slows healing

Pneumonia (Acute Inflammation)
Definition: Lung infection → consolidation
Causes (Mnemonic: "B-V-F-P-C")
B = Bacteria (pneumococcus, staph, mycoplasma)
V = Virus (influenza, RSV)

F = Fungi (histoplasma, aspergillus)
P = Parasite (Pneumocystis)
C = Chemicals (gastric aspirate)

Types:
Lobar – whole lobe
Broncho – patches
Defense Mechanisms (Mnemonic: "NAT")
N = Nasal (sneeze/blow)
A = Airway/trachea (mucociliary)
T = Tissue/alveolar (macrophages)

Risk Factors:
Weak host: chronic disease, immunosuppressed
Defense blocked: loss of cough, smoking, alcohol, anoxia

Stages of Lobar Pneumonia
(Mnemonic: "C-R-G-R" → Congested Red Grey Resolved)
C = Congestion (1–2 days) – fluid & neutrophils
R = Red hepatization (2–4 days) – firm, RBCs & fibrin
G = Grey hepatization (4–8 days) – dead cells & neutrophils
R = Resolution (after 8 days) – macrophages clean up, lung heals in 1–3 weeks
Key Point: Modern antibiotics prevent full-stage lobar consolidation.

Tuberculosis (TB)
Granulomatous disease kills ~3M/year.
Cause: M. tuberculosis (airborne), M. bovis (milk).
Primary infection: Inhaled → macrophages → **T-cells** → caseating granuloma (Ghon focus).

Outcomes:
Fibrosis & calcification (latent TB)
Progressive TB (kids/immunocompromised)
Pleural effusion → possible miliary TB
Affects almost all body parts except tooth enamel.

Leprosy
Cause: M. leprae (prefers cooler skin, intracellular).
Transmission: Respiratory droplets.
Forms:
Tuberculoid: Strong T-cell → few bacteria, granulomas, positive lepromin (paucibacillary)
Lepromatous: Weak T-cell → many bacteria, diffuse lesions, negative lepromin (multibacillary)
Complications: Immune complexes → vasculitis, kidney issues.
Infectivity: Lepromatous > Tuberculoid

Hypersensitivity (Immune Overreaction)
Type I – IgE / Immediate: Allergies, asthma, mast cells → histamine
Type II – Cytotoxic: Antibodies destroy cells (e.g., hemolytic anemia)
Type III – Immune Complex: Antigen-antibody deposits → inflammation
Type IV – T-cell / Delayed: Macrophage activation (e.g., TB test, contact dermatitis, graft rejection)

Immunodeficiency Diseases:
Primary (genetic): B-cell, T-cell, combined (SCID), complement deficiency
Secondary (acquired): Due to illness, malnutrition, steroids, cancer, HIV

HIV / AIDS:
Retrovirus → CD4+ T-cells & macrophages
Entry: gp120 + CD4 + co-receptor → fusion → reverse transcription → integration → budding
Effects: CD4 loss → weak immunity → opportunistic infections
Mechanisms: direct killing, syncytia, apoptosis, autoimmunity

Types:
HIV-1 (worldwide, fast)
HIV-2 (West Africa, slow)

CD4 Depletion / HIV Consequences
Effect: Weak immunity → opportunistic infections & cancers
Common OIs: Bacteria (Mycobacteria, Salmonella), Parasites (Toxoplasma, Cryptosporidium), Viruses (HSV, VZV, JC, EBV)

HIV Stages:
Primary: High virus, CD4 drop, flu-like symptoms
Latency: Virus hidden, patient symptom-free, still infectious
AIDS: Severe CD4 loss → OIs & malignancies

CHAPTER 3: ALTERATIONS IN OXYGENATION OF TISSUES

Heart Failure (CHF) – Simple Version
What it is: Heart can't pump enough blood → low oxygen to tissues.

Causes:
Heart problems:
Heart muscle (MI, cardiomyopathy)
valves (RHD, endocarditis)
pericardium (pericarditis)

Triggers (HEART FAILS):
Hypertension, Endocarditis, Anemia, Rheumatic fever, Thyroid, Fetus/pregnancy, Arrhythmias, Infections, Lung disease, Stress/salt

Body tries to compensate:
Heart:
Dilates → pumps more short-term
Hypertrophy → stronger long-term

Body:
SNS → ↑ heart rate & BP
RAAS → ↑ fluid → ↑ workload
Anaerobic metabolism → ATP but lactic acid → weak heart
Tissues extract more oxygen from blood

Main point: Compensations help at first, but later make the heart work harder and worsen failure.

Heart Failure (HF)
1. Types:
Left-sided HF: Heart can't push blood to body → blood backs up into lungs
Signs: Shortness of breath, trouble lying flat, nighttime breathlessness, pulmonary edema
Causes: Heart attack, high blood pressure, valve problems, weak heart muscle

Right-sided HF: Heart can't push blood to lungs → blood backs up into body
Signs: Swelling in legs/body, enlarged liver/spleen, neck vein swelling
Causes: Left-sided HF, lung disease, pulmonary embolism, right heart attack

Key: Both sides affect each other.

2. Compensation:
Heart tries to help: faster heartbeat, fluid retention, heart muscle enlargement
- Short-term helps, long-term makes heart weaker
- Vascular Obstruction (Blood Clots)

Venous thrombosis: Clot in veins → swelling, can travel to lungs (pulmonary embolism)
Arterial thrombosis: Clot in arteries → can cause stroke or heart attack
Mural thrombosis: Clot in heart → can travel to organs like brain or kidneys
Clot outcome: Move (embolize), block vessel, or partially dissolve

Lung Diseases
1. Restrictive (hard to breathe in)
Problem: Lungs can't expand → less air in
Causes: Brain/nerve, chest wall, muscles, pleura (fluid/air), lung tissue, newborns (HMD)

Examples:
Atelectasis: collapsed lung → cough, shortness of breath
Pulmonary edema: fluid in lungs → wheezing, frothy sputum
Pulmonary fibrosis: stiff lungs → chronic breathlessness
Pneumonia: inflamed lungs → hard to breathe

2. Obstructive (hard to breathe out)
Problem: Airways blocked → can't push air out
Types:
Acute: reversible (bronchitis, asthma) → cough, wheeze
Chronic: COPD → long-term trouble breathing

Memory Tip:
Restrictive = lungs "tight" → hard to breathe in
Obstructive = lungs "blocked" → hard to breathe out

Asthma (Acute, Reversible Obstruction)
What: Airways narrow suddenly → hard to breathe out
Who: Kids (allergic) or adults (non-allergic)

Why: Allergens or triggers → mast cells release chemicals → airway tight + mucus + inflammation
Symptoms: Wheezing, cough, shortness of breath, tiredness
Key: Reversible

COPD (Chronic, Irreversible Obstruction)
What: Airways always narrowed → lungs slowly damaged
Main Types:
Chronic Bronchitis: Mucus + cough → "Blue bloater" → sometimes right heart failure
Emphysema: Alveoli destroyed → air trapped → "Pink puffer" → barrel chest
Bronchiectasis: Dilated bronchi → lots of infected sputum
Cystic Fibrosis: Genetic → thick mucus in lungs & pancreas
Key: Not fully reversible

Quick Memory Tip:
Asthma = sudden, reversible → wheeze
COPD = long-term, irreversible → cough & air trapping
Restrictive = can't breathe in
Obstructive = can't breathe out

Edema (Extra Body Fluid)
What it is:
- Extra fluid in tissues.
- Happens when fluid moves wrong or can't return to blood.

4 Main Reasons:
Hydrostatic pressure ↑ → fluid pushed out (heart failure, kidney/liver problems, veins, standing too long)
Protein ↓ → fluid not pulled back (low albumin)
Capillaries leaky → fluid leaks (inflammation, toxins)
Lymph blocked → fluid stuck (lymph problems)

Memory Tip: "HELP" → Hydrostatic ↑, Edema from leaks, Lymph blocked, Proteins ↓