

# Organization of the human body essay sample



**ASSIGN  
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Human anatomy and physiology – study of the structure and function of the human body. Anatomy- the scientific discipline that investigates the structure of the human body. Physiology – The scientific discipline that investigates the process of functions of living things. 6 Structural levels

1. Chemical level – atoms combine to form molecules
2. Cell level – Molecule form organelles
3. Tissue level – similar and surrounding material make up tissues
4. Organ level –diff tissue combine to form organs
5. Organ system level –Organs make up an organ system
6. Organism – organs sytem make up an organism

#### Characteristics of Life

1. Organization – Specific interrelationships among the parts of an organism and how those parts interact to perform specific functions.
2. Metabolism- To use energy to perform vital functions
3. Responsiveness- To sense changes in the environment and make adjustment that help maintain life.
4. Growth- Increase in size of all part of the organism.
5. Development- The changes an oranism undergoes through time. Fertilization to death.
6. Reproduction – Formation of new cells or new organism. Homeostasis – Maintenance of a relatively stable condition within the internal environment. \*Nervous system and \*endocrine system

#### Components of Homeostasis

- > Receptor- Monitors the value of a variable
- > Control Center- (\*brain) establishes the set point around w/c the variable is

maintained. > Effector-(\*heart) change the value of the variable

\*stimulus- changed variable. Initiates a homeostatic mechanism

### Feedback Mechanism

1. Negative Feed – works to restore homeostasis by correcting a deficit within the system. 2. Positive Feedback- Deviation from a normal value occurs, the response of the system is to make the deviation even greater.

\*Visceral Membrane – inside

\*Parietal Membrane- outside

### TERMINOLOGY OF THE BODY PLAN

\*anatomical Position

\*Supine – face upward

\*Prone – face downward

### Directional Terms

\* Inferior – Below

\* Superior- Above

\* Anterior – Toward front of body

\* (ventral) – Toward the belly

\* Posterior- Toward back of body

\* (Dorsal) – Toward tthe back

\* Proximal – Closer to point of attachment

\* Distal – Farther from point of attachment

\* Lateral – Away from midline of body

\* Medial- Toward o within the middle of body

\* Superficial – Toward or on the surface

\* Deep – away from the surface

### Body Parts and Regions

Head , neck, trunk, upper limbs and lower limbs

a. 4 regions – Right upper quadrant, left upper quadrant, Right lower

quadrant, left lower quadrant b. 9 regions – Right Hypochondriac region,

Epigastric region. Left hypochondriac region, Left lumbar region, Umbilical

region, Left lumbar region, Right iliac region, Hypogastric region, Left iliac

region. PLANES

\* Sagittal Plane – I

\* Transverse – —

\* Frontal – dwrrer

### Body Cavities

1. Thoracic Cavity – ribs and diaphragm

2. Abdominal Cavity- Diaphragm and abdomine

3. Pelvic Cavity- Pelvic bones

### Serous Membranes

1. Trunk Cavities – lines the walls of the cavity

2. Serous membranes – secrete fluid that fills the space between the parietal and visceral membranes. Protect organs from friction 3. Pericardial cavity –

surrounds (heart), Pleural cavities surrounds (lungs) & Peritoneal Cavity

surrounds (abdominal and pelvic). 4. Mesenteries – hold abdominal organs in

place , provide passageway for blood vessels and nerve to organs. 5.

Retroperitoneal Organs – behind the parietal peritoneum. \*kidney, adrenal glands, pancreas, intestines, urinary bladder. ORGAN SYSTEMS OF THE BODY

Integumentary – protection, regulate temp, prevent water loss Skeletal- protection & support, allows body movements, store minerals and fat.

Muscular-Provides body movements, posture and body heats.

Lymphatic- removes foreign substances from blood, combats disease, maintain tissue fluid bal, absorb fats. Respiratory – blood pH, exchange O<sub>2</sub>, CO<sub>2</sub>

Digestive- digestion, absorb nutrient, eliminate waste

Nervous – detect sensation, control movement, physiological processes & intellectual functions. Endocrine- metablosim, growth, reproduction

Cardiovascular- transport nutrients, wastes, gases and hormones. Immune response and regulate body temp. Urinary-remove waste from blood and regulate blood pH, ion balance and water balance. Reproductive (female)- site of fertilization, fetal development, produce milk, hormones that influence sexual function and behavior. Reproductive (male) – Produces and transfer sperm cells to female reproductive and produce hormones that influence sexual function and behavior.

## INTEGUMENTARY SYSTEM

– Consist of hair, glands and nails

Functions:

- \* Protection – from microorganism and uv light
- \* Sensation- sensory receptors
- \* Vitamin D production –regulator of homeostasis

\* Temperative regulation – blood flow & activity of sweat glands \* Excretion – via sweat pores

Subcutaneous Tissue (Hypodermis)

– contains about half of body's stored fat

– padding and insulation and responsible for different appearances LAYERS

OF THE SKIN

1. Epidermis- Most superficial layer of skin.

– Stratified squamous epithelium

– Keratinazation

\* Stratum basale – Deepest stratum

\*Stratum Corneum – most superficial stratum of epidermis. Surrounded by lipids which prevent fluid loss. \*callus

2. Dermis – composed of dense collagenous connective tissue containing fibroblast, adipocytes, & microphages.

\*Collagen and elastic fibers – responsible for structural strength of the dermis.

\*cleavage lines or tension lines – most resistant to stretch along these lines.

\*Dermal Papillae – upper part of dermis

\*palm, soles and digits of fingers

\*Melanin – Responsible for skin, eyes and hair color.

\*Albinism – Deficiency or absence of melanin.

ACCESSORY SKIN STRUCTURES

## Hair

- > Hair Follicles - Where the hair arises from
- > Hair Shaft - Protrudes above the surface of the skin
- > Hair Bulb - Where hair is produced
- > Cortex - hard covering of hair
- > Medulla - soft center of hair
- > Cuticle - covers the cortex that holds the hair in the follicle
- \*Arrector Pili - goose bumps

## GLANDS

\*Sebaceous Glands - Simple , branched

- Produces sebum

\*Sweat Glands -

Apocrine Eccrine

- > Opens thru hair follicles > Opens thru sweat pores
- > Genitalia & armpits > palms & soles
- > changes upon exposure > Mainly water and salt  
to bacteria

Nails - dead stratum corneum contain hard keratin

- > Nail Body - visible nail
- > Nail Root - nail covered by skin
- > Cuticle -(epithonychium)stratum corneum extend to nail
- > Nail Matrix - extends distantly to nail root
- > Nail Bed - Where the nail is attached.
- > Lunula -seen through the nail body \*whitish -crescent shaped area

## BURNS

1st Degree - Damage only the epidermis

2nd Degree - Damage the epidermis and dermis

3rd Degree - full thickness burns

## SKIN CANCER

Basal cell carcinoma - Readily treatable

Squamous cell carcinoma - Can metastasize

Malignant Melanoma - Often Fatal

## AGING EFFECT ON THE INTEGUMENTARY SYSTEM

> Blood flow is reduced , skin thinner and no elasticity

> Sweat and Sebaceous gland are less active, decrease in melanocytes.

## NERVOUS SYSTEM

### FUNCTIONS:

1. Sensory input - Monitor external and internal factors  
2. Integrating - processing sensory input and initiating responses  
3. Homeostasis - maintains homeostasis

4. Mental activity - include consciousness, memory and thinking

5. Information -

### DIVISIONS:

> Central Nervous System - Consist of the Brain and the Spinal Cord

> Peripheral Nervous System - consists of nerves and ganglia. \* Sensory

Division - Afferent (Toward ) division. From sensory receptors to CNS. \* Motor

Division - Efferent (Away) Division. From CNS to effector organs.



## CELLS OF NS

Neurons – Receive Stimuli, Conduct action potentials and transmit signals. 3

Parts of Neuron:

- \* Cell body: Source of information for gene expression.
  - \* Dendrites: Short, highly branching cytoplasmic extension. Receive or transmit info from or toward the neuron cell body.
  - \* Axon: long cell process extending from neuron cell body.
- Type of Neurons:

Multipolar – Many dendrites, 1 axon

- Most motor and CNS neurons

Bipolar – 1 Dendrite, 1 Axon

- found in special organs, eyes & nose

Pseudo-unipolar – 1 axon, no dendrites

- Most sensory Neurons

Neuroglia (or glial cells) – nonneuronal cells of CNS and PNS. Has an ability to divide. More numerous. 5 Types:

- \* Astrocytes – Highly branched
  - help neural tissue repair
- \* Ependymal Cells – Epithelial-Like
  - circulate cerebrospinal fluid
- \* Microglia – Small, Mobile Cells
  - Protect CNS from infection
- \* Oligodendrocytes – surround several axon
  - enclose unmyelinated axons in CNS
- \* Schwann Cells – Single cells surrounding axons

- enclose unmyelinated axons in PNS

### Myelin Sheaths

\* Unmyelinated Axons - Rest in indentions of oligodendrocytes in CNS, schwann cell in PNS.

\* Myelinated Axons - Have sheaths myelin sheaths wrapped around. \*Nodes of Ranvier - gaps in the myelin sheath

### Organization of Nervous Tissue

> White Matter - Form nevre track in CNS & PNS

> Gray Matter - Forms the cortex and nuclei in the brain

### Electrical Signals and Neural Pathways

Resting Membrane Potential - uneven charge distribution. The cell is polarized. Leak channels are always open. Gated channels are closed until opened by specific signals. 1. Resting Membrane Potential - some Na<sup>+</sup>

2. Depolarization - Na<sup>+</sup> channels open

3. Repolarization - K<sup>+</sup> channels open

The Synapse - Point of Contact between 2 neurons.

Reflex - Functional unit of the nervous system. A Complex Reflex Arc consist of a sensory receptor, a sensory neuron, interneuron, motor neuron and effector organ. Simplest reflex arc do not involve interneurons. SPINAL CORD

Foramen magnum 2nd Lumbar vertebra Cauda Equina

Knee jerk - Quadriceps femoris muscle is stretched.

### Spinal Nervers

\* Cervical, thoracic, lumbar, sacral - they are grouped into Plexus BRAIN

Brainstem - Consist of several Nuclei Medulla Oblangata -

control activities such as heart rate, breathing, swallowing and balance. Pons - contain relay nuclei between cerebellum and cerebrum. Midbrain - Hearing and Visual reflexes. Cerebellum - Attached to the brainstem.

Diencephalon > Thalamus - main sensory relay center > Epithalamus - the pineal gland may play a role in sexual maturation > Hypothalamus - maintaining homeostasis. Cerebrum - consist of Frontal, parital, occipital, temporal lobes. SENSORY FUNCTIONS

Ascending tracts - from periphery to brain

#### MOTOR FUNCTIONS

- Include Voluntary & Involuntary movements

Motor Areas of the Cerebral Cortex

Upper motor neuron located in the primary motor cortex. Premotor & prefrontal areas regulate movements. Basal nuclei - help, plan, organize & coordinate movements and posture. Cerebellum - balance, muscle tone, muscle coordination.

#### OTHER BRAIN FUNCTIONS

> Communication between right and left hemispheres

> Speech

> Brain waves and Consciousness

> Memory

> Limbic System

#### MENINGES, VENTRICLES, CEREBROSPINAL FLUID

#### CRANIAL NERVES | |

I - Olfactory | S| Smell|

II - Optics | S| Vision|

\*III - Oculomotor | M, P| M: 4 OF 6 EXTRINSIC EYE MUSCLE P: Constricts pupils , thicken lens| \*IV - Trochlear | M| One extrinsic eye muscle|

V - Trigeminal | S, M| S: face and teeth M: muscle of chewing| \*VI - Abducens | M| One extrinsic eye muscle|

VII - Facial | S, M, P| S: Taste M: Facial expressions P: Salivary and tear glands| VIII - Vestibulochlear| S| Hearing and balance|

IX -Glossopharyngeal | S, M, P| S: Taste and touch back of tongue M: Pharyngeal muscles P: Salivary Glands| X - Vagus | S, M, P| S: Pharynx, Larynx, Viscera M: Palate, Pharynx, Larynx P: Thorax and abdomen| XI - Accessory | M| Neck and back muscle|

XII - Hypoglossal | M| Tongue muscle|

Meninges - surround and protect the brain and spinal cord. 3 connective tissue membranes:

Dura matter- adheres tightly in dural bones. Arachnoid matter - very thin, spiderlike, cobwebs Pia matter - very tightly bound to the surface of brain and spinal cord. Ventricles - fluid cavities in the CNS

Cerebrospinal Fluid (CSF) - bathes the brain and spinal cord, provides cushion around the CNS. - produced by choroids and plexuses made by ependymal cells. \*Hydrocephalus - too much accumulation of CSF.

EFFECTS OF ANS ON VARIOUS TISSUE |

TARGET| SYMPATHETIC EFFECT| PARASYMPATHETIC EFFECT|

Heart| Increase rate| decrease rate|

Blood Vessel| constricts and dilates| none|

Lungs| dilate bronchioles| constrict bronchioles|

Eyes| dilate pupils| constrict pupil, contracts muscle lens| Intestine And

Stomach Walls| decrease motility, contracts spincters| increase motility,

relaxes spincters| Liver| breaks glycogen, produce glucose| synthesizes

glycogen| Adipose Tissue| breaks down fat| none|

Adrenal Gland| secrete epinephrine, norepinephrine| none| Sweat Glands|

secrete sweat| none|

Salivary Gland| secrete thick saliva| secrete thick saliva| Urinary Bladder|

relaxes muscles, constrict spincters| contracts muscles, relaxes pincters|

Pancreas| Decrease secretion of digestive enzymes and insulin| Increase

secretion of digestive enzymes and insulin| AUTONOMIC NERVOUS SYSTEM

- Has sympathetic and Parasympathetic Divisions

Sympathetic Division - “ fight or flight”

> Preganglionic - Lie in the thoracic and upper lumbar region of spinal cord.

> Postganglionic - in the sympathetic chain ganglia or in collateral ganglia.

Parasympathetic Division

> Preganglionic - associated with some cranial and sacral nerves. >

Postganglionic - Located in terminal ganglia, near or target organs.

## AUTONOMIC NEUROTRANSMITTERS

- all secrete acetylcholine

-Most sympathetic postganglionic region secrete Norepinephrine. Functions of neurotransmitters:

1. Sympathetic division - Prepare a person by increase heart rate, blood pressure, respiration, release glucose energy. 2. Parasympathetic division -

involuntary activity at rest \*digestion, defecation, urination  
ENDOCRINE SYSTEM

Classes of Chemical Messenger|

Chemical Msgr.| Description|

Autocrine| secreted by cells, influence the activity from which it was

secreted| Paracrine| Produced by wide variety of tissues and secreted into

extracellular fluid| Neurotransmitter| Produced by neurons; secreted into

synaptic cleft, influence post synaptic cells| endocrine| secreted into the

blood by specialized cells; regulation of cell function |

FUNCTIONS of ENDOCRINE SYSTEM

1. Metabolism
2. Control Food intake and digestion
3. Tissue Development
4. Ion regulation
5. Water balance
6. Heart rate and blood pressure regulation
7. Control of blood glucose and other nutrient
8. Control reproductive function
9. Uterine contraction and milk release
10. Immune system regulation

CHARACTERISTICS OF ENDO SYSTEM

- Include glands and specialized endocrine cells that secrete hormones into blood stream.

HORMONE – Travels to a distant target tissue, binds to specific receptors set of events. Chemical nature of Hormones: 1. Lipid –soluble – Include steroids, thyroid hormones and some fatty acid derivatives. 2. water-soluble – Include proteins, peptides and amino acids. Circulate freely in the blood. CONTROL OF HORMONE SECRETION

Stimulation of Hormone release: 1. Humoral Stimulation– Sensitive to circulating blood level of certain molecules. \*glucose or calcium 2. Neural Stimuli– Cause hormone secretion in direct response to action potentials in neurons, occurs during stress or exercise. 3. Hormonal Stimulation– Hormones from anterior pituitary that stimulate tropic hormones. Inhibition of Hormone:

1. Humoral Stimulation- inhibit secretion of hormones
2. Neural Stimuli- prevent hormone secretion
3. Inhibiting hormone prevent hormone release

Regulation of Hormone Level 1. Negative feedback- prevents hormone secretion once a set of point is achieved. 2. Positive feedback- Self promoting system whereby stimulation of hormone secretion increases over time.

Classes of Receptors: 1. Lipid-soluble hormones – bind nuclear receptors located inside the nucleus of the target cell. 2. Water-soluble hormones – bind to membrane-bound receptors, which are integral membrane proteins.

Action of Nuclear Receptors > Nuclear Receptors have portions that allow them to bind to the DNA in the nucleus once the hormone is bound. > cannot respond immediately it takes time to make DNA to mRNA and protein.

Membrane Bound Receptors and Signal Amplification > Activate a cascade of events once the

hormone binds. > are associated G Proteins.

Endocrine Glands, Hormones, and Their Target Tissues|

Gland| Hormone| Target Tissue| Response|

Pituitary gland Anterior | Growth hormone| Most Tissue| Increase gene expression, release fatty acids from cells| | Thyroid-Stimulating Hormone (TSH)| Adrenal Cortex| Increase Thyroid Hormone secretion| |

Adrenocorticotrophic Hormone(ACTH| Adrenal Gland| Increase secretion of glucocorticoid hormone| | Melanocyte-Stimulating Hormone (MSH)|

Melanocytes in Skin| Increase melanin production in melanocytes to make skin darker| | Luteinizing Hormone (LH) / Interstitial cell-stimulating hormone (ICSH)| Ovary in Females, Testis in males| Promotes Ovulation and

progesterone production ; testosterone synthesis and prod. Of sperm cells| |

Follicle-Stimulating Hormone (FSH)| Follicles in ovary in females,

Seminiferous tubules in males| Promote follicle maturation and estrogen secretion; promote sperm cell production| | Prolactin| Ovary and mammary

gland in females , and testis in males| Stimulate milk production and

prolongs progesterone| Posterior| Anti diuretic Hormone (ADH)| Kidney|

conserves water; Constrict blood vessels| | Oxytocin| Uterus| Increase uterine contractions |

| | Mammary Gland| Increase milk letdown from mammary glands| Thyroid

Gland| Thyroid Hormones| Most cells of the body| Increase metabolic rates, normal process of maturation and growth| | Calcitonin| Primarily Bone|

Decrease rate of bone breakdown; prevents large increase in blood Ca+ |

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Parathyroid Gland| Parathyroid Hormone| Bone, Kidney| Increase rate of bone breakdown by osteoclasts| Adrenal Medulla | Epinephrine mostly, some norepinephrine| Heart, Blood Vessels, Liver, Fat cells| Increase cardiac output; Increase blood flow to skeletal muscles and heart| Adrenal Cortex| Mineralocorticoids (aldosterone)| Kidneys; To lesser degree, Intestine and sweat glands| Increase rate of sodium transport into body; increase rate of K<sup>+</sup> excretion| |

Glucocorticoids (Cortisol)| Most Tissue| Increase in fat and protein breakdown; increase | | Adrenal Androgens | Most Tissue| Insignificant in males; Increase female sexual drive| Pancreas| Insulin| Especially Liver, skeletal muscle, Adipose tissue| Increase uptake and use of glucose and amino acids| | Glucagon| Primarily Liver| Increase breakdown of glycogen and release of glucose into circulatory system| Reproductive Organs Testes| Testosterone| Most Tissue| Aid sperm cell production, Maintenance of functional reproductive organs| Ovaries| Estrogen, Progesterone| Most Tissue| aid uterine and mammary gland development and function| Uterus, ovaries, inflamed tissues| Prostaglandins| Most Tissue| Increase uterine contractions and ovulation| Thymus| Thymosin| Thymosin| Immune system development

Pineal gland| Melatonin| Among others, Hypothalamus| Secretion of gonadotropin-releasing hormone, Thereby inhibiting reproduction|