**Mid-Term Assignment**

**Course Title: Human Physiology Instructor: Dr Sara Naeem Total Marks: 30**

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1. Explain homeostatic mechanism regarding the control of calcium in the body with reference to parathyroid hormone and calcitonin.
2. Give clinical differentiation between hypothyroidism and hyperthyroidism.
3. Classify enzymes and their function in digestion.

**Answer no 1:**

**Mechanism of homeostasis in control of calcium:**

Calcium homeostasis refers to the regulation of the calcium concentration in the extracellular fluid. Normal serum calcium concentration varies between laboratories, but is usually 8.5 to 10.5 mg/dL (2.1 to 2.6 mmol/L) and it represents the sum of the three circulating fractions: 45% protein bound (albumin ∼80%, globulins ∼20%), 15% complexed to anions (citrate, bicarbonate, lactate, phosphate), and 40% free, or ionized. The ionized calcium is the physiologically active form, which is recognized by the calcium-sensing receptor (CaSR). The main hormonal regulators of ionized calcium are parathyroid hormone (PTH) and 1,25 dihydroxyvitamin D (1,25D).

**Hypercalcemia** is a condition in which the calcium level in your blood is above normal. Too much calcium in your blood can weaken your bones, create kidney stones, and interfere with how your heart and brain work. **Hypercalcemia** is usually a result of overactive parathyroid glands.

**Hypocalcemia** is a condition in which there are lower-than-average levels of calcium in the liquid part of the blood, or the plasma. Calcium has many important roles in your body: Calcium is key to the conduction of electricity in your body.

**Parathyroid hormone regulates calcium** levels in the blood, largely by increasing the levels when they are too low. ... Bones – **parathyroid hormone** stimulates the release of **calcium** from large **calcium** stores in the bones into the bloodstream. This increases bone destruction and decreases the formation of new bone

**Calcitonin** is involved in helping to regulate levels of **calcium** and phosphate in the blood, opposing the action of parathyroid hormone. ... **Calcitonin** reduces **calcium** levels in the blood by two main mechanisms: It inhibits the activity of osteoclasts, which are the cells responsible for breaking down bone

**Answer no 2:**

**Answer no 3:**

**Function of enzymes in digestion:**

**Digestive enzymes** are a group of [enzyme](https://en.wikipedia.org/wiki/Enzyme) that breaks down polymeric [macromolecules](https://en.wikipedia.org/wiki/Macromolecule) into their smaller building blocks, in order to facilitate their absorption by the body. Digestive enzymes are found in the [digestive tracts](https://en.wikipedia.org/wiki/Digestive_tract) of animals (including humans) and in the tracts of [carnivorous plants](https://en.wikipedia.org/wiki/Carnivorous_plant), where they aid in the [digestion](https://en.wikipedia.org/wiki/Digestion) of [food](https://en.wikipedia.org/wiki/Food), as well as inside [cells](https://en.wikipedia.org/wiki/Cell_(biology)), especially in their [lysosomes](https://en.wikipedia.org/wiki/Lysosome), where they function to maintain cellular survival. Digestive enzymes of diverse specificities are found in the [saliva](https://en.wikipedia.org/wiki/Saliva) secreted by the [salivary glands](https://en.wikipedia.org/wiki/Salivary_glands), in the secretions of cells lining the stomach, in the [pancreatic juice](https://en.wikipedia.org/wiki/Pancreatic_juice) secreted by pancreatic exocrine cells, and in the secretions of cells lining the small and large intestines.

**Digestive enzymes are classified based on their target**[**substrates**](https://en.wikipedia.org/wiki/Enzyme_substrate)**:**

* [Lipases](https://en.wikipedia.org/wiki/Lipase) split [fatty acids](https://en.wikipedia.org/wiki/Fatty_acid) off of [fats](https://en.wikipedia.org/wiki/Fat) and [oils](https://en.wikipedia.org/wiki/Oil).
* [Proteases](https://en.wikipedia.org/wiki/Protease) and [peptidases](https://en.wikipedia.org/wiki/Peptidase) split [proteins](https://en.wikipedia.org/wiki/Protein) into small [peptides](https://en.wikipedia.org/wiki/Peptides) and [amino acids](https://en.wikipedia.org/wiki/Amino_acid).
* [Amylases](https://en.wikipedia.org/wiki/Amylase) split [carbohydrates](https://en.wikipedia.org/wiki/Carbohydrate) such as [starch](https://en.wikipedia.org/wiki/Starch) and [sugars](https://en.wikipedia.org/wiki/Sugar) into [simple sugars](https://en.wikipedia.org/wiki/Monosaccharide) such as [glucose](https://en.wikipedia.org/wiki/Glucose).
* [Nucleases](https://en.wikipedia.org/wiki/Nuclease) split [nucleic acids](https://en.wikipedia.org/wiki/Nucleic_acid) into [nucleotides](https://en.wikipedia.org/wiki/Nucleotides).

In the human digestive system, the main sites of digestion are the [oral cavity](https://en.wikipedia.org/wiki/Oral_cavity), the [stomach](https://en.wikipedia.org/wiki/Stomach), and the [small intestine](https://en.wikipedia.org/wiki/Small_intestine). Digestive enzymes are secreted by different [exocrine](https://en.wikipedia.org/wiki/Exocrine) glands including:

* Salivary glands
* Gastric glands in the stomach
* Secretary cells(islets) in the [pancreas](https://en.wikipedia.org/wiki/Pancreas)
* Secretor glands in the [small intestine](https://en.wikipedia.org/wiki/Small_intestine)