COURSE: PHS 309- ENDOCRINOLOGY (3 CREDITS/COMPULSORY)

Course Duration: Two hours of teaching and three hours of practical per week 15 (30 hours (Teaching), 45h (Practical).

As taught in 2010/2011 session

Lecturer: OLAYAKI , Luqman Aribidesi
MBBS (Zaria); M.Sc. (Lagos); Ph.D. (Ilorin)

E-mail: olayaki@unilorin.edu.ng; olayaki@gmail.com

Office Location: Department of Physiology, College of Health Sciences Building.

Consultation Hours: 12:00 noon -1:00pm on Thursdays and Fridays

Course Content:
General features of endocrine glands and classical hormones. Other sources of hormones. Clinical correlates: hyper and hypo functions

Course Description: -Functions of hormones and their regulations
-Chemical signalling-endocrine, paracrine, autocrine and intracrine
Mechanisms,
-chemical classification of hormones and their synthesis
-Transport of hormones in the circulation and their half-lives
-Hormone receptor- cell surface and intracellular
-Hormone and gene transcription
-Hormone receptor regulation
-Hormones, growth and malignancy

Course Objectives:
-Classification of hormones and chemical signalling mechanisms
-Hormone synthesis, secretion and transport
-Hormone receptors and signal transduction processes

Course Requirements:
This is a compulsory course for all students studying physiology. In view of this, students are expected to participate in all the course activities and have minimum of 75% attendance to be
able to write the final examination. Practical sessions for the course must be attended by the students. Students will be expected to attempt the study questions, test(s) and assignments.

Methods of grading:

<table>
<thead>
<tr>
<th>No</th>
<th>Items</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assignment</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Class Test</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Final Exam.</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Course Delivery strategies:

The lecture will be delivered through active participation/problem-based learning method. Students will be required to read ahead of the class. The delivery strategies will be supported by the tutorial sessions and review of study questions and assignments.

Practical Schedule:

The practical sessions will involve experiments in humans and laboratory animals.

Course Justification:

Endocrinology deals with the study of chemicals messengers that travels in the blood and/or extracellular fluid and regulate tissue function, metabolism, growth, sexual development and reproduction.

Lectures:

Week 1: Introduction to Endocrinology.

Objectives: To give the students an overview of different types of endocrine glands and hormones they produce.

Description: Endocrine glands, classical hormones, chemical structures and synthesis of hormones.

Study questions:

1. List ten (10) endocrine glands and two hormones produced by each of them
2. Describe the synthesis of steroid and peptide hormone

Reading List:


Week 2: Functions and Properties of Hormones

Objectives: Understanding the several functions and properties of hormones.

Description: Chemical structure and synthesis of hormones, secretion, transport, clearance, control mechanism of action, measurement in the blood.

Study questions:

1. Discuss the methods of plasma hormone estimation.
2. Write an essay on the mechanism of action of hormones.

Reading List:


Week 3: Hypothalamic Hormones.

Objectives: Understanding the central role of hypothalamic hormones in endocrinology.

Description: Growth Hormone Releasing (and Inhibitory) Hormone (GHRH), Thyrotropin releasing Hormone (TRH), Corticotropin Releasing Hormone (CRH), Prolactin Releasing (and Inhibitory) Hormone (PRH), Gonadotropin Releasing Hormone (GnRH).

Study question:

1. Discuss the functions of hypothalamic hormones.

Reading List:


Week 4: Pituitary Hormones

Objectives: Understanding the role of anterior and posterior pituitary hormones in the control of body functions
**Description:** Anterior Pituitary Hormones such as Growth Hormone, Adrenocorticotropic hormones, Thyroid stimulating hormone, follicle stimulation hormone, Luteinising Hormone, Prolactin; Posterior Pituitary Hormones such as Oxytocin and Prolactin.

1. List five (5) anterior pituitary hormones and their target organ and describe in detail the feedback control of one of them.
2. Write an essay on the synthesis and functions of posterior pituitary hormones.

**Reading List:**


**Week 5: Growth Hormone (GH)**

**Objectives:** The production and Functions of GH.

**Description:** Secretion, Control and Actions of GH. GH excess-gigantism and acromegaly; GH deficiency-dwarfism.

**Study question:**

1. Write an essay on the metabolic functions of growth hormone and briefly discuss its pathophysiology.

**Reading List:**


**Week 6: Thyroid Hormone**

**Objectives:** importance of iodine in thyroid metabolism; Thyroid hormone functions; causes and clinical effects of insufficiency and excess of thyroid hormones.

**Description:** Anatomical features of thyroid gland, Synthesis of thyroid hormones, Actions of thyroid hormones, Control of thyroid hormones, Hypothyroidism and Hyperthyroidism.

**Study question:**
1. Describe the synthesis and metabolism of thyroid hormones.
2. Write an essay and pathophysiology of thyroid hormones.

**Reading List:**


**Week 7: Adrenal Hormones (Glucocorticoids)**

**Objectives:** Synthesis of adrenal gland hormones and regulation; Metabolism of glucocorticoids; Physiological roles of glucocorticoids; Clinical sequelae of disorders of glucocorticoids secretion.

**Description:** Cholesterol and steroid synthesis in the adrenal cortex; Anatomical and functional zonation in the adrenal cortex; steroid receptors; hypothalamic-Pituitary-adrenal axis; Feedback control; Aldosterone and control of salt and water balance; Cushing’s syndrome; Addison’s disease; Adrenal medulla and pheochromocytoma; Catecholamines synthesis.

**Study questions:**

1. Discuss the mechanism of action of steroid hormones.
2. Write an essay on the functions and pathophysiology of glucocorticoids.
3. Discuss the functions and pathophysiology of aldosterone.

**Reading List:**


**Week 8: Adrenal Hormones (Mineralocorticoids and Androgens)**

**Objectives:** Synthesis of aldosterone and regulation; Metabolism of aldosterone; Physiological roles of aldosterone; Clinical sequelae of disorders of aldosterone secretion.

**Description:** Cholesterol and steroid synthesis in the adrenal cortex; Anatomical and functional zonation in the adrenal cortex; steroid receptors; hypothalamic-Pituitary-adrenal axis; Feedback control; Aldosterone and control of salt and water balance; Addison’s disease; Adrenal medulla and pheochromocytoma; Catecholamines synthesis.
Study questions:

1. Discuss the mechanism of action of steroid hormones.
2. Write an essay on the functions and pathophysiology of glucocorticoids.
3. Discuss the functions and pathophysiology of aldosterone.

Reading List:


Week 9: Endocrine pancreas (Insulin and Glucagon)

Objectives: Regulation of blood glucose concentrations; Physiological roles of insulin and glucagon.

Description: Structure, synthesis and metabolism of insulin and glucagon; Physiologic anatomy of pancreas; Mechanism of action of insulin and glucagon; Metabolic effects of insulin and glucagon; Other pancreatic hormones; Summary of blood glucose regulation; Control of insulin and glucagon secretion.

Study questions:

1. Discuss the mechanism of action and functions of insulin.
2. Write an essay on the control of blood glucose and hormones that are involved.

Reading List:


Week 10: Diabetes mellitus (DM) and Hypoglycaemia

Objectives: Definition, classification, causes and complications of DM.

Description: Definition and diagnosis of DM; Type 1 DM-aetiology and prevention; Type 2 DM-aetiology and prevention. Counter-regulatory hormones and DM; Complications of DM- Diabetic retinopathy, nephropathy and neuropathy; Hypoglycaemia-Physiological response and insulinoma.
Study questions:

1. Discuss the types, physiology of diagnosis and complications of diabetes mellitus.

Reading List:


Week 11: Parathyroid gland and Vitamin D

Objectives: Physiology of the regulation of serum calcium and phosphate concentrations; causes and clinical features of hypo- and hypercalcaemia; Investigation and treatment of hypocalcaemia; Causes and clinical features of vitamin D deficiency; Investigation and treatment of vitamin D deficiency; Physiology of bone formation and remodelling; causes of osteoporosis, investigation and treatment; paget’s disease and its treatment.

Description: Calcium and phosphate in serum and its measurement; intracellular calcium concentration; Calcium and phosphate balance; Hormonal control of calcium and phosphate concentrations; Sources, metabolism and transport of vitamin D; Actions of vitamin D on intestine and bone; Parathyroid glands and parathyroid hormone synthesis; Control of parathyroid hormone secretion; Actions of parathyroid hormone; hypercalcaemia and vitamin D excess; hypercalcaemia and hyperparathyroidism; Hypocalcaemia and hypoparathyroidism; Vitamin D deficiency; Rickets; Osteoprosis; Paget’s disease; Calcitonin.

Study questions:

1. Write an essay on calcium homeostasis.

Reading List:


Week 12: Endocrine functions of the Kidneys, Heart and Pineal Gland

Objectives: The hormones secreted by the kidneys, heart and pineal gland;
Description: Secretion and functions of atrial natriuretic peptide (ANP) (Heart), Renin, prostaglandins, Erythropoietin, Vitamin D and prekallikreins (Kidney) and Melatonin (Pineal gland).

Study questions:
1. Write an essay on the endocrine functions of the kidneys.
2. Discuss the physiological functions of hormones of the heart and pineal gland.

Reading List:


Week 13: Class test

Week 14: Revision/Tutorials

Week 15: Revision