ENDOCRINE AND NUTRITIONAL DISEASES

Total credits	Theory credits	Practical credits
7	**4**	**3**

GENERAL OBJECTIVES

During the course students must acquire the theoretical knowledge and clinical skills needed to identify the main endocrine and metabolic problems. They must also be able to reach a diagnosis through the logical application of current diagnostic methods and propose treatment of the endocrine, metabolic and nutritional diseases listed below.

SPECIFIC OBJECTIVES

A. At the end of the course students must be able to identify the main problems associated with endocrine and nutritional pathology, specifically:

1. Food-related disorders
2. Lipoprotein metabolism disorders
3. Hyperglycemia
4. Hypoglycemia
5. Hyperthyroidism and hypothyroidism
6. Goiter and thyroid nodule
7. General phenotypic changes
8. Hirsutism and virilization
9. Gynaecomasty
10. Endocrine arterial hypertension
11. Hypercalcemia
12. Hypocalcemia

During the course students must also acquire the knowledge and clinical skills that will be complementary to and complemented by the content of the courses in *Paediatrics*, *Gynaecology* and *Kidney and Excretory System Pathology*, thus enabling them to reach a diagnosis and propose treatment of mixed problems such as:

1. Short stature
2. Pubertal developmental disorders
3. Sexual differentiation disorders
4. Galactorrhea-amenorrhea
5. Infertility and impotence
6. Polyuria/polydypsia syndrome
7. Water and electrolyte disorders

B. Students must be familiar with the theoretical bases of the diagnostic methods used with endocrine, metabolic and nutritional pathology, specifically:

1. General physical examination
2. Cervical examination
3. Hormone determination techniques
4. Basis for interpreting hormonal findings
5. Imaging techniques and isotopic methods in the diagnosis of endocrine disease
6. Other diagnostic methods in endocrinology

C. Students must be familiar with the diagnosis and medical/surgical treatment of the main endocrine, metablic and nutritional diseases, specifically:

1. Food-related disorders
2. Diabetes *mellitus*.
3. Lipoprotein metabolism disorders
4. Hypothalamic-pituitary pathology
5. Thyroid disease
6. Bone and mineral metabolism disorders
7. Diseases of the adrenal cortex and medula
8. Sexual differentiation disorders
9. Gonad diseases
10. Multiple endocrine neoplasias and multigland syndromes
11. Growth anomalies

D. Students must acquire the following skills:

- Take a detailed, correct history in a logical order, including the systematic investigation of apparatus and systems and the interpretation of information obtained.
- To carry out a complete physical examination, including the systematic search for signs and symptoms indicative of organs or systems affected by endocrine and metabolic diseases.
- To carry out a cervical examination, including the characterization of goiter and thyroid nodule. Examination of secondary sexual characteristics, assessing the degree of sexual development. Testicular palpation.
- To be familiar with the indications for determining various hormone parameters, as well as dynamic tests, their application in logical order, their interpretation and their limitations.
- To be familiar with the indications and utility of complementary imaging tests and different isotope techniques, as well as their interpretation in the context of the clinical presentation and other complementary tests.
- To be familiar with simple radiology, including hand x-ray in order to assess the extent of bone diseases and for bone ageing in growth assessment; likewise, the use of head x-rays to assess certain bone and metabolic diseases and for assessment of the sella turcica, always bearing in mind the limitations compared with other imaging techniques.
- Be familiar with the technique of fine needle aspiration (FNA) biopsy in thyroid nodules, evaluating the amount of information, the limitations and assessment in the overall patient context.

SYLLABUS

A. IDENTIFYING PROBLEMS

1. Food-related disorders

Assessment of nutritional state. Dietetic assessment. Body mass index. Anthropometric measurements. Assessment of nutritional biochemical parameters. Identification of the degree of obesity. Exogenous and endogenous obesity. Bases of obesity treatment (medical and surgical). Assessment of the degree of malnutrition. Underlying pathology in order to choose the most suitable therapeutic strategy. Bases of support nutrition.

2. Lipoprotein metabolism disorders

Most common lipoprotein metabolism disorders. Their role in the pathogenesis of arteriosclerosis. Information from clinical examination. Interpretation of laboratory findings. Diagnosis of hyperlipoproteinemia. Identify primary and secondary hyperlipoproteinemia. General treatment approach for hyperlipoproteinemia. Physiopathlogical bases of pharmacological treatment. Identification of other cardiovascular risk factors.

3. Hyperglycemia

Diagnostic criteria, classification and presentation of diabetes *mellitus*. Recognize diabetes *mellitus* as a particularly important disease in the context of public health. Identify acute decompensation of the disease. Physiopathological bases of its pathogeny and treatment. Chronic control of diabetes *mellitus*. Chronic complications of this disease. Treatment of type I diabetes *mellitus* and the most common therapeutic strategies. Managing the different therapeutic options and the most appropriate order in which to apply them in the case of type II diabetes *mellitus*. Most important therapeutic perspectives.

4. Hypoglycemia

Establish the diagnostic criteria for hypoglycemia. Identify the symptomatology of hypoglycemia and distinguish it from non-hypoglycemic conditions. Distinction between fasting and postprandial hypoglycemia. Most important causes of the two types and the tests required to make a diagnosis, as well as the order in which they should be performed and the corresponding treatment.

5. Hyperthyroidism and hypothyroidism

Identify the symptoms of thyroid hyperfunction and hypofunction. Most frequent causes of hyperthyroidism and hypothyroidism. Tests required to make a diagnosis. Thyroid physiopathology in order to interpret correctly the hormone parameters. Therapeutic options and their indications.

6. Goiter and thyroid nodule

Identify the most common causes of goiter. Distinguish between normal functioning and that associated with thyroid dysfunction. Tests required to characterize goiter and its functioning. Prevalence of thyroid nodule among the general population. Identify when tests are required, the order in which they should be carried out and the value and limitations of each one. Recognize a suspected solitary thyroid nodule. Types of thyroid cancer and their behaviour, as well as the most appropriate treatment.

7. General phenotypic changes

Recognize changes in general morphology caused by endocrine diseases. Identify the most notable morphological features of acromegaly. Recognize phenotypic changes caused by hypercorticism, both endogenous and as a result of chronic steroid use.

8. Hirsutism and virilization

Identify androgen-dependent and non-androgen-dependent hair growth and terminal hair patterns. Physiology of endocrine control of hair growth. Clinical assessment of hirsutism. Identify the degree of hirsutism and the presence of other signs of virilization. Main causes of hirsutism and their identification through clinical intervention, the appropriate hormonal data and other diagnostic methods. Most common therapeutic strategies.

9. Gynaecomasty

Identify the appearance of gynaecomasty and distinguish the presence of fat. Identify those situations in which gynaecomasty is physiological in origin, including its onset in puberty, and recognize the most important pathological causes. Perform appropriate hormone tests and consider treatment options.

10. Endocrine arterial hypertension

Identify those situations in which endocrine disease, especially suprarenal disorders, must be investigated as the possible cause of secondary hypertension. Be familiar with the hormonal analyses required to identify the causes, the most appropriate morphological tests and specific treatment options.

11. Hypercalcemia

Identify the presence of hypercalcemia, whether asymptomatic or accompanied by clinical manifestations. Establish the differential diagnosis of hypercalcemia, and recognize primary hyperparathyroidism (PHPT) and the forms associated with neoplasias and drugs as the most important examples. Be familiar with the clinical data required to reach a specific aetiological diagnosis. Be familiar with the most important biochemical and hormonal parameters of phosphorus-calcium metabolism, as well as their value in reaching a specific diagnosis. Most appropriate medical treatment in each case and the most important indications for surgery in PHPT.

12. Hypocalcemia

Identify hypocalcemia and its associated clinical manifestations. Recognize other causes of tetanus and the urgency of treatment. Be familiar with the most important causes of hypocalcemia, as well as the clinical features of other associated endocrine pathology. Be familiar with the therapeutic options for long-term control of hypocalcemia.

A1. IDENTIFYING MIXED PROBLEMS

1. Short stature
Identify children who need to be followed up and studied. Be familiar with the most common cause of short stature and identify those situations in which more detailed studies are required. Most important auxological parameters. Interpret the most widely used dynamic tests. Be familiar with those situations in which a specific treatment is proposed.

2. Pubertal developmental disorders
Normal stages of puberty and identification of related disorders in both males and females, and with respect to both early and later development.

3. Sexual differentiation disorders
Be familiar with normal sexual differentiation. Distinction between chromosomal sex, gonadal sex and phenotypic sex. Be familiar with the most common chromosomal sex disorders in both males and females. Identify intersex states and the series of steps to be taken in making a diagnosis.

4. Galactorrhea-amenorrhea
Identify the presence of galactorrhea. Most important causes of hyperprolactinemia. Recognize prolactin-secreting pituitary adenomas and their clinical characteristics and know how to study them, including the most appropriate imaging diagnosis methods; therapeutic options and long-term clinical control.

Distinction between primary and secondary amenorrhea. Recognize the compartments involved in the onset of amenorrhea. Be familiar with the steps to be followed in diagnosing amenorrhea and the order in which they should be performed. Understand the basis of hormone replacement therapy.

5. Infertility and impotence
Understand the physiopathological bases of reproduction in both men and women. Identify the causes of infertility with a hormonal basis, the tests required to make a diagnosis and the treatment options. Ovulation induction. In vitro fertilization. Recognize the mechanisms involved in erection and the large physiopathological groups responsible for impotence. Distinction between psychogenic and organic impotence and, within the latter category, between vascular, neurological, drug-induced and endocrine (mainly diabetes mellitus) impotence. Diagnostic tests and therapeutic options.

6. Polyuria/polydypsia syndrome
Identify when tests for polyuria should be conducted. Understand the physiopathological bases of water metabolism and the role of the kidney in water management. Distinguish between central diabetes insipidus and nephrogenic diabetes and be familiar with the most common causes of both kinds. Identify the presence of primary polydypsia. Be familiar with the relevant diagnostic tests and their utility in studying a specific aetiology. Be familiar with the bases of treatment.

7. Water and electrolyte disorders
Understand the physiopathological bases of water and sodium metabolism disorders. Assess the clinical hydration status and its importance in diagnosing hypernatremia and hyponatremia. Identify changes in potassium balance, both in isolation and in association with other disorders. Be familiar with the appropriate treatment in each case.

B. THEORETICAL BASES OF DIAGNOSTIC METHODS

1. General physical examination
Assessing the patient's general appearance, nutritional status, presence of obesity and distribution. Identify somatic malformations. Skin characteristics. Presence or not of hirsutism and its degree. Examine the secondary sexual characteristics and the degree of sexual development. Identify galactorrhea.

2. Cervical examination
Cervical inspection and palpation. Examination and characterization of cervical mass, goiter or isolated thyroid nodule.

3. Hormone determination techniques
Methodology, indications, interpretation and contraindications of hormone tests. Indications for baseline determinations and an understanding of the indications for dynamic tests.

4. Imaging techniques and isotopic methods in the diagnosis of endocrine diseases

Theoretical basis of ultrasound. Cervical ultrasound and its indications. Advantages and limitations of this technique. Theoretical basis of computed axial tomography (CAT) and nuclear magnetic resonance (NMR). Indications for each one. Use of abdominal CAT in adrenal and pancreatic pathology. Advantages of NMR in studying the hypothalamic-pituitary region.

Theoretical basis of isotopic diagnostic methods. Thyroid gammagraphy, types, indications, interpretation and limitations.

5. Other diagnostic methods in endocrinology

Simple hand x-ray in the interpretation of bone age and in phosphorus-calcium metabolism pathology. Cranial x-ray, its indications and limitations. Advantages of other imaging techniques.

Fine needle aspiration (FNA) biopsy of the thyroid nodule. Indications, interpretation and limitations. Indications for arteriography in studying pancreatic tumour pathology. Catheterization of the petrous sinus and determining hormone parameters in Cushing's disease. Indications and interpretation.

C. DIAGNOSIS AND TREATMENT OF THE MAIN ENDOCRINE, METABOLIC AND NUTRITIONAL DISEASES

NUTRITION AND METABOLISM

1. Food-related disorders

Physiopathology of nutrition. Nutritional requirements. Malnutrition. Diagnosis, causes, degree of malnutrition, consequences. Short bowel syndrome. Malabsorption syndrome. Bases of support nutrition. Enteral nutrition. Parenteral nutrition. Obesity: diagnosis, classification. Risks associated with obesity. Pathogeny of obesity. Treatment of the obese patient.

2. Diabetes *mellitus*

Diagnosis, classification. Diabetes *mellitus* as a model of autoimmune disease. Pathogeny of type II diabetes *mellitus*. Insulin resistance. Syndrome X. Acute complications of diabetes *mellitus*. Chronic complications: microangiopathy, neuropathy, macroangiopathy. Treatment of diabetes *mellitus*. Diet. Insulin. Oral antidiabetic drugs. Management of patients with type I diabetes mellitus. Optimization. Management of patients with type II diabetes mellitus. Therapeutic approaches to patients with syndrome X.

3. Hypoglycemia

Physiology of glucose metabolism and the glucose regulation system. Diagnosis of hypoglycemia. Clinical manifestations of hypoglycemia. Clinical classification of hypoglycemia. Fasting hypoglycemia. Endogenous hyperinsulinism. Non-B cell pancreatic tumours. Counter-regulation hormone deficiencies. Postprandial hypoglycemia, its differential diagnosis and treatment.

4. Lipoprotein metabolism disorders

Lipoprotein metabolism. Exogenous and endogenous lipid transport pathways. Patterns of hyperlipoproteinemia. Diagnosis of hyperlipoproteinemia. Primary and secondary hyperlipoproteinemia. Hyperlipemia and atherosclerosis. Hypolipidemia. Treatment of hyperlipoproteinemia. Overall assessment of cardiovascular risk factors. Diet, drug treatment and other therapeutic procedures.

ENDOCRINOLOGY

5. Introduction to hypothalamic-pituitary pathology

Hypothalamic regulation. Corticotropin and related peptides. Glycoprotein hormone family. Prolactin and somatotropin hormone family. Classification of pituitary tumours. Clinical features of hormone deficiencies of the anterior pituitary. Clinical manifestations due to the effect of a pituitary tumour mass. Functional examination of the pituitary.

Hypersecretory pituitary disorders: acromegaly and gigantism. Prolactinoma. Differential diagnosis between forms of hyperprolactinemia. Cushing's disease and Nelson's syndrome. Glycoprotein-secreting adenomas.

Non-functioning pituitary tumours. Empty sella turcica syndrome. Hypothalamic syndromes. Differential diagnosis of masses in the sellar-parasellar region. Assessment of the hypothalamic-pituitary region by imaging techniques. Treatment: pituitary surgery, radiotherapy, drug therapy. Hormone replacement therapy.

Posterior pituitary and water metabolism. Physiology of the antidiuretic hormone. Control of vasopressin secretion: osmotics and non-osmotic factors. Mechanisms of vasopressin action. Mechanism and regulation of thirst. Vasopressin deficiency: diabetes insipidus. Aetiology. Clinical features. Hypertonic encephalopathy. Diagnostic tests. Differential diagnosis: primary polydypsia and nephrogenic diabetes insipidus. Treatment. Syndromes

associated with an excess of vasopressin. Physiopathology of inappropriate secretion of antidiuretic hormone. Aetiology. Diagnosis. Hyponatremia. Incidence and differential diagnosis. Treatment.

6. Thyroid diseases

Review of thyroid physiology. Iodine metabolism. Regulation of thyroid function. Effects of thyroid hormones. Tests of thyroid function. Conditions linked to raised levels of thyroid hormones. Hyperthyroidism and euthyroid hyperthyroxinemia. Hypothyroidism euthyroid hyperthyroxinemia. Imaging techniques and the thyroid gland. Thyroid biopsy.

Hyperthyroidism: aetiology. Clinical manifestations. Graves-Basedow disease. incidence and pathogeny. Graves' ophthalmopathy. Toxic adenoma. Toxic multinodular goiter. Other aetiologies. Hyperthyroidism and pregnancy. Diagnosis and hyperthyroidism. Therapeutic options: antithyroid drugs, surgery, iodine 131, limitations of each treatment.

Hypothyroidism. Aetiology. Classification. Clinical manifestations. Myxedematous coma. Primary hypothyroidism. Aetiology. Endemic and sporadic cretinism. Secondary and tertiary hypothyroidism. Diagnosis and treatment.

Endemic goiter. Epidemiology. Goiter genesis. Sporadic goiter. Enzyme disorders of the thyroid. Non-toxic nodular goiter: physiopathology and pathogeny. Clinical manifestations. Laboratory tests. Differential diagnosis. Treatment.

Thyroiditis. Classification: acute, sub-acute and chronic. Suppurative thyroiditis. Sub-acute thyroiditis: clinical features, diagnosis and treatment. Chronic thyroiditis: Hashimoto's thyroiditis. Physiopathology. Hashitoxicosis. Diagnosis and treatment. Riedel's thyroiditis. Other types of thyroiditis.

Thyroid neoplasias. Classification. Benign neoplasias. malignant neoplasias: differentiated and undifferentiated. Diagnosis and management of the solitary thyroid nodule. Treatment of thyroid cancer.

7. Bone and mineral metabolism disorders

Calcium, phosphorus and magnesium metabolism. Hormonal regulation: parathyroid hormone, calcitonin and vitamin D.

Hypercalcemia: frequency, differential diagnosis. Primary hyperparathyroidism: prevalence, pathology, clinical manifestations, tests of phosphorus-calcium metabolism function. Treatment. Secondary hyperparathyroidism. Hypercalcemia associated with cancer: prevalence, pathogeny and classification. Diagnosis and differential diagnosis. Treatment. Other causes of hypercalcemia. Treatment of hypercalcemia.

Hypoparathyroidism. Aetiology. Clinical manifestations. Specific forms of hypoparathyroidism. Treatment of hypoparathyroidism. Pseudohypoparathyroidism. Other causes of hypocalcemia.

8. Diseases of the adrenal cortex and medula

Steroid biochemistry. Steroidogenesis. Regulation of glucocorticoid secretion. Control of mineralocorticoid secretion. Regulation of adrenal androgens and oestrogen secretion. Steroid metabolism. Mechanisms of action of adrenal steroids. Effects of glucocorticoids and mineralocorticoids. Laboratory assessment of adrenocortical function: stimulation and suppression tests.

Adrenocortical hyperfunction: Cushing's syndrome. Aetiology. ACTH-dependent and non-ACTH-dependent Cushing's syndrome. Clinical manifestations. Diagnostic approach to Cushing's syndrome. Differential diagnosis. Use of imaging techniques with Cushing's syndrome. Treatment: surgery, radiotherapy and drug treatment.

Pharmacological use of glucocorticoids. Biological potential and duration of action. Complications of chronic administration. Glucocorticoid withdrawal syndrome.

Adrenocortical hypofunction: Addison's disease. Types. Aetiology and pathogeny. Clinical manifestations. Laboratory tests. Diagnosis. Radiology. Acute suprarenal insufficiency: aetiology and clinical features. Treatment of acute and chronic suprarenal insufficiency.

Hypermineralocorticism. Classification. Primary hyperaldosteronism. Clinical features. Laboratory tests. Dynamic tests. Radiology. Treatment. Secondary hyperaldosteronism: aetiology, pathogeny and clinical features. Total and selective hypoaldosteronism. Hypo- and hyper-renenemic hypoaldosteronism.

Congenital adrenal hyperplasia. Concept. Physiopathology. 21-hydroxylase deficiency. Classical forms: with salt loss and virilization. Non-classical forms. Genetics. Clinical manifestations. Diagnosis and treatment. Other suprarenal enzymatic deficiencies. Frequency, clinical features, diagnosis and treatment.

Hirsutism. Clinical assessment. Aetiology. Differential diagnosis. Approaches to the patient with hirsutism.

Adrenal medulla tumours. Pheochromocytoma. Incidence. Clinical manifestations. Associated diseases. Laboratory diagnosis. Imaging techniques. Preoperative and perioperative management. Prognostic.

Non-functioning suprarenal tumours. Incidentaloma. Frequency. Aetiology. Diagnosis and management.

9. Sexual differentiation disorders

Normal sexual differentiation. Chromosomal sex disorders. True hermaphroditism. Gonadal sex disorders. Phenotypic sex disorders: male and female pseudohermaphroditism.

10. Gonad diseases

Physiology and regulation of testicular function. Assessment of testicular function. Testicular function disorders. Classification. Cryptorchidia. Primary hypogonadism. Secondary hypogonadism. Testicular tumours. Pubertal disorders. Impotence. Male infertility.

Physiology of the ovary. Assessment of ovarian function. Alterations to ovarian function. Classification. Pubertal disorders. Amenorrhea. Classification and assessment. Polycystic ovary syndrome. Female infertility. Hormonal contraception. Menopause. Hormone treatment. Endocrinology and pregnancy.

11. Multiple endocrine neoplasia and multigland syndrome

Classification. Type I. Clinical manifestations. Type II. Clinical manifestations. Type IIB and others. Genetics of multiple endocrine neoplasias. Family screening.

Multigland syndromes. Classification and characteristics. Pathogeny. Other immunoendocrine disorders.

Gastroenteropancreatic endocrine tumours. Carcinoid syndrome.

TEACHING PLAN

1. Assessing hypothalamic-pituitary function (Dr. Vilardell)
2. Pathology of the adenohypophysis and neurohypophysis (Dr. Palacín)
3. Diagnosis and treatment of hypopituitarism (Dr. Vilardell)
4. Pituitary tumours I (Dr. Vilardell)
5. Pituitary tumours II (Dr.Vilardell)
6. Growth disorders (Dr. Vilardell)
7. Neurohypophysis (Dr. Halperin)
8. Imaging diagnosis in endocrine pathology (Dr. Mercader)
9. Thyroid pathology (Dr. Palacín)
10. Assessing the patient with goiter (Dr. Vilardell)
11. Hyperthyroidism I (Dr.Vilardell)
12. Hyperthyroidism II (Dr. Vilardell)
13. Hypothyroidism (Dr. Vilardell)
14. Thyroiditis (Dr. Vilardell)
15. Thyroid nodule and cancer (Dr.Fernández-Cruz)
16. Multiple endocrine neoplasias (Dr.Fernàndez-Cruz)
17. Parathyroid pathology (Dr. Palacín)
18. Surgical treatment of hyperparathyroidism (Dr. Fernàndez-Cruz)
19. Phosphorus-calcium metabolism disorders (Dr. Ferrer)
20. Assessing the hypothalamic-adrenal axis (Dr. Halperin)
21. Adrenal pathology (Dr. Palacín)
22. Adrenal insufficiency (Dr. Halperin)
23. Diagnosis and treatment of hypercorticism I (Dr. Halperin)
24. Diagnosis and treatment of hypercorticism II (Dr. Halperin)
25. Gynaecomasty. Hypogonadism I (Dr. Halperin)
26. Hypogonadism II (Dr. Halperin)
27. Food-related disorders (Dr. Gomis)
28. Diabetes mellitus. Aetiopathogeny I (Dr. Gomis)
29. Diabetes mellitus. Aetiopathogeny II (Dr. Gomis)
30. Diet in a diabetic patient (Dr. Gomis)
31. Insulin treatment for diabetes (Dr. Esmatjes)
32. Oral agents in the treatment of diabetes (Dr. Gomis)
33. Acute complications of diabetes (Dr. Esmatjes)
34. Chronic complications of diabetes (Dr. Esmatjes)
35. Chronic complications of diabetes (Dr. Esmatjes)
36. Dealing with hyperlipoproteinemia (Dr. Conget)
37. Insulinoma (Dr. Astudillo)
38. Pheochromocytoma (Dr. Astudillo)
39. Imaging diagnosis in endocrine pathology (Dr. Lomeña)
40. Endocrine hypertension (Dr. Astudillo)

Seminars: (2 hours)

1. Seminar. Case studies in pituitary pathology (Dr. Vilardell)
2. Seminar. Case studies in thyroid pathology (Dr. Vilardell)
3. Seminar. Case studies in diabetes mellitus (Dr. Esmatjes)
4. Seminar. Case studies in diabetes mellitus (Dr.Esmatjes)
5. Seminar. Case studies in diabetes mellitus (Dr. Gomis)
6. Seminar. Case studies in diabetes mellitus (Dr. Gomis)
7. Seminar. Case studies (Dr. Halperin)

8. Seminar. Case studies (Dr. Halperin)
9. Seminar. Surgical case studies (Dr. Fernández- Cruz)
10. Seminar. Surgical case studies.(Dr. Astudillo)
11. Seminar. Dr. Palacín
12. Seminar. Dr. Lomeña
13. Seminar. Case studies (Dr. Conget)
14. Seminar. Case studies (Dr. Ferrer)