DISEASES OF THE RENAL SYSTEM AND MALE GENITALIA

Total credits:	Theory credits:	Practical credits:
13	**2.5**	**10.5**

GENERAL OBJECTIVES

Students must distinguish between normal and pathological situations in relation to the Renal System and Male Genital Apparatus. On the pathological side, students must recognize the signs and symptoms that identify specific diseases or nosological entities, using them to focus the general diagnostic process.

For each entity students must know the corresponding causes (etiology), incidence in the population (epidemiology), production mechanisms (pathogeny), alterations produced in normal functioning (physiopathology), structural lesions (morphopathology), clinical manifestations (signs and symptoms), examinations required for diagnosis (basic and complementary), differential diagnosis, prognosis, prophylaxis (prevention) and treatment. Given that the Renal System is involved in a large number of hydroelectrolytic alterations, changes in the acid-base balance and arterial hypertension, the course will also cover topics related to such alterations and pathologies.

To be able to recognize all of these traits in the patient, students must know how to compile a directed clinical history, decide upon the appropriateness of different tests and prioritize according to profitability, availability, contraindication and cost. In terms of treatment, students must identify urgency, chronicity and terminal or irreversible situations. For the latter two, it is necessary to know the limitations of palliative or symptomatic treatment. Similarly, students must identify procedures that should be referred to specialists and those that display criteria for urgent treatment and/or hospital admission or require an instrumental or surgical approach.

SPECIFIC OBJECTIVES

A. *At the end of the training process, students must be able to identify the principal* ***problems*** *of the Renal System and Male Genital Apparatus, specifically in:*

1. Dehydrations
2. Edema
3. Proteinuria
4. Oliguria-anuria-polyuria, nocturia
5. Renal insufficiency
6. Hematuria
7. Pneumaturia and fecaluria
8. Hematospermia and urethrorrhagia
9. Miction disorders
10. Urinary infection
11. Sepsis of urological origin
12. Nephritic lumbar-renal-colic pain
13. Vesicular-urethral-perineal-tenesmic pain
14. Testicular pain-inflammation-tumor
15. Enuresis and incontinence
16. Acute and chronic urine retention
17. Erection and ejaculation disorders
18. Infertility
19. Genito-urinary lesions and trauma
20. Incidental urogenital masses

21. Arterial hypertension

B. *Students must know the theoretical bases of* ***diagnostic methods*** *used in relation to the Renal System and Male Genital Apparatus, specifically in:*

1. Physical examination: hemodynamic and cardiopulmonary assessment, state of hydration, abdominal palpation and external genitals. Skin. Neurological evaluation
2. Digital rectal examination, prostate examination. Diagnostic ultrasound.
3. Urine analysis: proteinuria, sediment, culture, mineral calculation and cytology
4. Renal function: glomerular filtrate, renal plasma flow, urinary acidification, concentration-dilution of urine
5. General laboratory data: Ionogram and osmolality, calcium, phosphorus and magnesium, acid-base balance. Hematological parameters and proteinogram. Immunological parameters: complement system and markers of systemic disease
6. Hormonal data: Suprarenal, renin-angiotensin-aldosterone axis, thyroidal and parathyroidal, hypophyseal and gonadal
7. Radiological examination: Simple X-ray, pyelography, cystourethrography, angiography
8. Ecography, eco-Doppler, CAT and MR applied to study of the renal system and male genital apparatus
9. Isotopic examination: renogram, renal gammagraphy and angiogammagraphy. Isotopic study of renal function
10. Endourology: cytoscopy and other endoscopic examinations
11. Renal biopsy: methodology, indications and interpretation of results
12. Urogenital biopsy: methodology, indications and interpretation of results
13. Measurement of arterial tension: vascular murmurs, oscillometry
14. The back of the eye: examination and assessment
15. Tumor markers
16. Urodynamic study
17. Penile function
18. Genital laboratory analysis: seminogram, cariotype and cytogenetics

Students will be expected to have acquired basic knowledge of the identification of problems and certain diagnostic methods as prerequisites for this subject, covered in the course on "General Semiology and Clinical Propedeutics".

C. *Students must know the diagnosis and medico-surgical therapeutics of the principal* ***diseases*** *of the Renal System and Male Genital Apparatus, specifically in:*

1. Changes in body hydration
2. Changes in extracellular osmolarity: natremia
3. Changes in kalemia
4. Metabolic changes in the acid-base balance
5. Changes in phospho-calcium metabolism
6. Acute renal insufficiency
7. Immunopathology of glomerulonephritis
8. Nephrotic syndrome
9. Acute and chronic glomerulonephritis
10. Chronic renal insufficiency: physiopathology, clinical aspects, treatment and dialysis
11. Use of drugs in renal insufficiency. Nephrotoxicity
12. Secondary and systemic disease nephropathies
13. Interstitial nephropathies and pyelonephritis
14. Parenchymatous vascular nephropathies
15. Pathology of the large renal vessels
16. Tubulopathies

17. Renal cystic diseases
18. Hereditary renal diseases
19. Urinary infection
20. Specific infections of the urogenital apparatus: tuberculosis and parasitosis
21. Changes in urination: physiopathology. Neurogenic bladder
22. Cystitis
23. Urinary obstruction
24. Renoureteral anomalies: embryology and congenital anomalies
25. Vesicoureteral reflux
26. Urethral affections
27. Affections of the penis
28. Affections of the testicles, epididymis and scrotum: inflammations and tumors
29. Renal lithiasis
30. Renal tumors
31. Vesicular and urothelial tumors
32. Affections of the prostate: inflammations and tumors
33. Urinary incontinence
34. Genitourinary trauma. Urinary fistulae
35. Urogenital iatrogeny
36. Kidney transplantation
37. Retroperitoneal pathology: inflammatory and tumor
38. Male infertility
39. Impotence, priapism and plastic induration of the cavernous bodies
40. Systemic arterial hypertension: physiopathology
41. Hypertension syndrome
42. Recognizing the causes of AHT: primary and secondary
43. Consequences of AHT. Accelerated AHT
44. Treatment of AHT, pharmacological bases. Hypertensive emergencies
45. AHT and renal disease. AHT and pregnancy

D) Students should have acquired the following ***skills:***

- The ability to obtain a complete, directed **anamnesis** which includes the reason for the consultation and identification of the principal symptoms of the patient's current illness. Students should be able to recognize the illness individually or as part of a clinical syndrome that determines the diagnostic examinations required. Students should also be able to situate the process at hand in the context of family (hereditary conditions) and personal medical history (previous conditions or that coincide with the current disease). Students will know how to question patients about sexual dysfunctions and anomalies.

- The ability to use **physical examination** to recognize the most important signs of pathology of the urinary apparatus and the effects of dysfunction on the rest of the body. Students should be able to recognize the **degree of hydration** of the body (dehydration and edema) and the most common manifestations of changes in the composition of body fluids. Palpation of the abdomen, paying particular attention to masses in contact with the lumbar region and the presence of bladder globus. Lumbar fist percussion. **Digital rectal examination** in order to identify prostate changes. **Assessment of the genital apparatus** paying special attention to testicular changes**. Accurate examination of the inguinal areas.**

- Assessment of the **volume and characteristics of discharged urine**. Recognition of macroscopic hematuria. Inserting a **bladder probe** in male and female patients. Catheterization and calibration of pathways (probes and bougies).

- Correct determination of **arterial pressure**. Using different types of sphygmomanometer. Oscillometry.

- Evaluation of **laboratory data.** Evaluation of urine tests (proteinuria, urinary sediment and urine culture) and data that indicate renal dysfunction (ureic nitrogen in the blood, serum creatinine, ionogram, acid-base balance, calcemia and phosphoremia). Interpretation of the results of renal function tests (endogenous creatinine clearance, concentration-dilution test, urine acidification capacity).

- Interpretation of **simple abdominal radiography** and the ability to recognize renal silhouettes and the presence of stones in the urinary tract.

- Interpretation of an **intravenous urography** and the ability to recognize the principal abnormalities (obstruction, dilation of pathways, extrinsic compressions, functional annulation...)

- Interpretation of **anatomopathological reports** relating to both primary renal illnesses and renal affection in systemic diseases. Students will also know how to assess tumor pathology of the kidney, urinary pathways, prostate and testicle.

- "Essential" interpretation of results and reports of the following specialized examinations:
    a) **Radiology of the genital apparatus:** deferens vesiculography.
    b) **Cystourethrographies** and variations.
    c) **Ecography: renal, bladder, prostate and vesicular.** Abdominal and transrectal ecography, eco-Doppler of renal vessels and testicles.
    d) **Angiography.** Segmental arteriography selective renal arteriography. Renal venography. Cavography. Lymphography. DIVAS procedures.
    e) **Renogram and renal and testicular gammagraphy.**
    f) **Urodynamics.**
    g) **Instrumental endoscopic examination:** endoscopic catheterization.
    h) **Biopsy of the kidney and urogenital apparatus**.
    i) **CAT, MR of the kidney and male genital apparatus**.
    j) **Urological surgery**.
    k) **Seminogram.**
    l) **Nocturnal penile tumescence test.**

PROGRAMME

A) IDENTIFICATION OF PROBLEMS

1. Electrolytic changes

Identify the principal clinical manifestations associated with changes in the volume and composition of the extracellular medium (dehydration and edema) and the significance of variations in the concentration of sodium, potassium and the plasma acid-base balance. Orient the differential diagnosis of the principal etiologies. Identification of emergency situations and procedures to follow.

2. Oliguria, Anuria and Polyuria

Recognize changes in urine volume and the relation with daily liquid intake. Distinguish physiological oliguria from other causes of oliguria. Identify anuria due to obstruction. Differentiate true polyuria from pollakiuria and nocturia.

3. Proteinuria and Hematuria

Identify the presence of proteins in the urine and the normal limits (physiological proteinuria). Recognize the intermittent or permanent character of a proteinuria and its quantification in 24-hour urine (discrete, moderate or nephrotic proteinuria). Identify macroscopic hematuria and distinguish it from other causes of abnormal coloration of the urine. Identify the differential diagnosis between hematuria of renal origin and types originating other parts of the urinary system. Recognize microscopic hematuria and the data that support its origin in the nephron (dysmoprhic red blood cells and hematic cylinders). Identify the correct etiological diagnosis of hematuria and distinguish the traumatic, inflammatory, tumor and secondary origin of hemostasis changes.

4. Renal edema. Nephrotic syndrome

Recognize edema of renal origin, establishing the differential diagnosis with other principal causes of generalized edema (cardiac, hepatic). Recognize the difference between renal edema associated with massive proteinuria and renal edema associated with a decrease in glomerular filtration. Identify nephrotic syndrome through its principal signs and symptoms (massive proteinuria, hypoalbuminemia, hyperlipemia and edema). Identify the most frequent complications of nephrotic syndrome (infections, thromboembolism and others). Determine the examinations required for a patient with nephrotic syndrome.

5. Renal insufficiency

Recognize the clinical symptoms of deficient renal function and the laboratory data that confirm the decrease of glomerular filtration. Distinguish between the acute or chronic character of renal insufficiency. Identify the differential diagnosis between acute renal insufficiency and cases of prerenal (functional), renal or postrenal (obstructive) origin. Establish the degree of severity of a chronic renal insufficiency and identify the presence of factors that accelerate its progression. Identify potentially lethal complications (hyperkalemia) and know the immediate procedure to follow. Recognize situations that require substitution treatment with dialysis.

6. Urinary infection

Recognize the signs and symptoms of infection of the urinary apparatus (dysuria, pollakiuria, urgent urination). Identify the symptoms of a specific localization of the infection (cystitis, prostatitis, pyelonephritis) and/or manifestations of systemic repercussion (fever, sepsis of urinary origin). Bacteriological criteria of urinary infection. Identify the risk factors for urinary infections. Distinguish between specific (tuberculosis and others) and non-specific infections.

7. Kidney pain. Nephritic colic

Identify renal pain and identify the differential diagnosis of localized pain in the lumber region. Recognize the specific characteristics of typical and atypical nephrotic colic and its accompanying manifestations. Identify the different types of radiated pain originating in the urinary pathway according to the degree of obstruction.

8. Urination disorders

Recognize changes in the rhythm, quality and control of urination.

9. Acute urine retention and chronic urine retention

Urinary obstruction. Recognize the presence of an acute urine retention and differentiate it from a renal anuria or oliguria. Identify the correct differential diagnosis between the obstructive and non-obstructive causes of oligoanuria. Recognize the existence of a chronic urine retention and differentiate it from oliguria, pollakiuria and incontinence. Recognize the symptoms of an obstruction of the urinary system, both in its upper portion (kidney, ureter) and the lower urinary tract (bladder, urethra). Establish the degree of severity of the obstruction and know the factors that cause more serious consequences: Degree, duration and infection.

10. Urinary lithiasis

Recognize the presence of stones in the urinary pathway through either clinical symptomatology (suspicion) or the appropriate complementary studies: simple abdominal X-ray, ecography, intravenous urography. Identify the circumstances that aggravate lithiasic disease. Lithiasic disease: Obstruction and infection. Know the different types of stones and determine their etiological diagnoses.

11. Prostatism

Recognize the clinical symptoms of a clinical and progressive obstruction of the lower urinary tract. Identify the point at which prostatism develops through clinical procedures and complementary examinations. Notion of the epidemiological importance of prostatism.

12. Testicular pain

Know the importance of testicular pain as a potential medical emergency. Determine the differential diagnosis between pain due to torsion, inflammation and the presence of tumors.

13. Increase in testicular size

Determine the differential diagnosis between an increase in scrotal content without testicular participation (hydrocele, hernia) and an increase in testicular size due to inflammation, trauma or the presence of tumors.

14. Male infertility

Identify infertile patients by obtaining a correct clinical history. Determine the examinations required to identify the cause of infertility.

15. Impotentia coeundi

Use clinical histories to identify patients suffering from impotence and determine the differential diagnosis between cases with psychogenic and organic causes.

16. Traumatic injuries and loss of continuity of the kidney and the urinary pathways
Use clinical histories and physical examination to identify patients suspected of suffering a kidney or urinary tract complaint. Determine the examinations needed in order to narrow the diagnosis and asses its importance. Detect the urgency of treatment.

17. Oncological risk factors in the renal system and male genitalia
Know the principal epidemiological and genetic risk factors of developing a urothelial tumor, bladder tumor, testicular tumor and penile neoplasia.

18. Arterial hypertension
Correctly identify hypertension patients through appropriate physical examination. Distinguish the different grades and types of hypertension and the principal clinical manifestations of its effects on the organs. Recognize the principal cardiovascular risk factors associated with arterial hypertension. Determine the examinations required to identify its etiology. Use of appropriate antihypertensive drugs. Detect the urgency of antihypertensive treatment. Identify hypertensive crisis and know the immediate procedure to follow.

B) DIAGNOSTIC METHODS

1. Physical examination
Physical examination of the patient, paying particular attention to signs that clearly indicate the systemic consequences of renal insufficiency, arterial hypertension and massive proteinuria. Palpation of the abdomen and renal masses. Auscultation of murmurs in the renal arteries. Painful fist percussion. Evaluation of the external genitals. Neurological examination.

2. Urine analysis
Detection of proteins in urine using reactive strips or quantitative methods. False positives and false negatives. Electrophoresis and immunoelectrophoresis of urinary proteins. Diagnosis of glomerular, tubular and protein-overload proteinuria Examination and interpretation of urine sediment (hematuria, leukocyturia and cylinduria). Presence of crystals in urinary sediment. Urine culture and cultures in specific media. Interpretation of quantitative urine culture. Value of urine tests (glycosuria, ketonuria, urine pH, urine density and osmolarity, urine ionogram).

3. Renal function tests
Value of blood ureic nitrogen (BUN) and serum creatinine concentrations as indices of renal function. Unrelated variations. Basis of renal clearance tests. Value of creatinine clearance and/or inulin clearance as measures of glomerular filtration. Basis of tests to measure renal concentration and dilution capacity. Tests to measure renal acidification capacity. Indications.

4. Ionogram, acid-base balance and osmolarity
Value of the conventional ionogram (sodium, potassium and chlorine in plasma). Bases and interpretation of the acid-base balance (pH, pCO_2 and bicarbonate; concept of anion gap). Measurement of plasma osmolarity.

5. Hormonal determinations
Interpretation of hormonal determinations related to both hydro-electric disorders and arterial hypertension (ADH, aldosterone, suprarenal hormones, renin). Male hormones.

6. Tumor markers
Specific (PSA) and non-specific markers. Diagnostic markers and evolution markers.

7. Seminogram
Indication of the seminogram. Normality criteria. Diagnostic aid.

8. Urine cytology
Bases of the cytological study of urinary sediment. Indications. Diagnostic precision.

9. Ecography and eco-Doppler
Indications and diagnostic possibilities of ecographs in diseases of the kidney, urinary pathways, urinary bladder and prostate. Examination of blood perfusion using eco-Doppler. Therapeutic possibilities under ecographic control.

10. Radiology of the genital apparatus
Simple abdominal radiology and tomography without contrast injection. Current indications for intravenous urography and variants (IVU. Indications for renal arteriography and digital substraction angiography (DIVAS). Cavography. Indications for computerized axial tomography (CAT) in renal conditions. Risks of using contrast me-

dia in cases of renal insufficiency. Indications for nuclear magnetic resonance (NMR) in conditions of the renal system and male genital apparatus.

11. Ureterocystography and micturition cystourethrography
Methodology for contrast study of the common urinary tract. Indication and evaluation of results.

12. Translumbar percutaneous puncture and anterograde pyelography
Methodology of translumbar renal puncture. Indications and use as a procedure for study of the urinary tract in special cases.

13. Isotopic examinations
Bases of isotopic examinations for the study of changes in the renal system and male genital apparatus. Indications and interpretation of renograms, gammagraphy and renal angiogammagraphy. Measurement of glomerular filtration and renal blood flow using renal elimination radioisotopes. Bone gammagraphy to determine the staging of tumors of the renal system and male genital apparatus.

14. Telethermography
Bases of telethermographic study. Indications for study of varicocele. Evaluation of results.

15. Endoscopic diagnostic procedures
Methodology for endoscopic study of the urinary tract. Types of endoscopy. Indications and contraindications in the lower urinary tract and upper urinary tract. Introduction of the concept of therapeutic endoscopy

16. Chevassu: Retrograde ureteropyelography
Concept of study of the upper urinary tract using retrograde contrast injection into the urinary pathway. Indications and interpretation of results.

17. Biopsy of the urogenital apparatus. Prostate biopsy
Indications and methodology for urogenital biopsy. Indications for cutaneous biopsy. Types, risk and sensitivity. Usefulness of biopsy.

18. Renal biopsy
Obtaining renal tissue through puncture biopsy. Indications and contraindications for renal biopsy. Elementary lesions in optical microscopy. Bases of immunofluorescence study of renal biopsy. Diagnostic possibilities of electron microscopy.

19. Fine needle puncture-aspiration
Puncture-aspiration of masses in the renal system and male genital apparatus. Indications, risks and diagnostic possibilities.

20. Nocturnal penile tumescence test
Methodology for the study of the nocturnal penile tumescence test. Indications and interpretation of results.

21. Laparoscopy
Methodology for laparoscopic study. Indications for laparoscopic study in the diagnosis of undescended testicle. Introduction of the concept of therapeutic laparoscopy.

C) DIAGNOSIS AND TREATMENT OF RENAL DISEASES

1. Changes in hydrosaline metabolism
Changes in hydrosaline metabolism and relation with plasma osmolality. Dehydration and hyperhydration, types, diagnosis and treatment. Pseudohyponatremia. Hyponatremia, types, diagnosis and treatment. IADHS. Edemas. Osmolality and glycemia. Hypernatremia, types, diagnosis and treatment. Diabetes insipidus.

2. Changes in potassium metabolism
Hyperkalemia, etiology, clinical manifestations and treatment. Emergency treatment of hyperkalemia. Hyperkalemia, etiology, clinical manifestations and treatment. Relation of hyperkalemia with the acid-base balance, acidemia and alkalemia. Differential diagnosis of metabolic alkalosis, hyperkalemia and arterial hypertension.

3. Metabolic changes in the acid-base balance
Metabolic acidosis, types: with increased anion gap or hyperchloremia, etiology and differential diagnosis, treatment. Metabolic alkalosis, generating and maintenance factors. Etiology and differential diagnosis of its causes. Treatment.

4. Changes in phospho-calcium metabolism

Syndromic approach to hypercalcemia. Etiological diagnosis and directed examinations. Endocrine changes, neoplasia and hypercalcemiant drugs. Therapeutic procedures. Hypercalcemic crisis, diagnosis and emergency treatment. Hypocalcemia, etiology and treatment. Phospho-calcium metabolism and renal insufficiency. Changes in phosphatemia and magnesemia.

5. Acute renal insufficiency

Concept of acute renal insufficiency (ARI). Etiological classification (prerenal ARI, postrenal ARI, renal ARI). Acute tubular necrosis. Physiopathological mechanisms: decreased renal blood flow, decreased permeability of the glomerular basement membrane, tubular obstruction, transtubular diffusion. Macroscopic and microscopic pathological anatomy. Clinical and analytical manifestations of ARI. Differential diagnosis of different types. Clinical evolution (phases or periods). Prognosis. Treatment of ARI. Preventive measures. Medical and pharmacological treatment: Role of diuretics and extracellular volume expansion. Indications for dialysis techniques.

6. Glomerular nephropathies

Pathogenetic mechanisms of glomerular diseases. Immunological mechanisms (anti-glomerular basement membrane antibodies, immune complexes, complement activation). Non-immunological mechanisms of glomerular injury.

Classification of glomerular nephropathies. Primary and secondary glomerular nephropathies. Description of the principal anatomopathological patterns of glomerular injury. Acute glomerulonephritis (AGN). Acute poststreptococcal glomerulonephritis. Epidemiological aspects. Clinical manifestations. Evolution and treatment. Non-streptococcal acute glomerulonephritis. Rapidly progressive glomerulonephritis (RPGN). Concept and classification of RPGN according to etiology and pathogenetic mechanism. Clinical manifestations. Evolution and treatment of RPGN.

Chronic or recurrent primary and glomerular nephropathies. Minimal change disease. Focal glomerular sclerosis. Membranous nephropathy. Mesangial IgA nephropathy. Mesangiocapillary glomerulonephritis. Principal aspects related to the etiology, pathogeny, histology, clinical and laboratory aspects, evolution and treatment of each of the above types. Secondary glomerular nephropathies. Diabetic nephropathy (glomerular sclerosis and other renal manifestations of diabetes). Lupus nephropathy and its different types. Systemic vasculitis nephropathy (polyarteritis nodosa, Wegener's syndrome and hypersensitivity vasculitis). Schölein-Henoch purpura nephritis. Renal amyloidosis. Multiple myeloma nephropathy and light chain disease nephropathy. Cryoglobulinemia nephropathy. Alport syndrome.

7. Urinary and genital infection

Infection of the urinary pathway (UI). Epidemiology. Pathogenetic mechanisms and risk factors. Etiological agents. UI diagnosis. Asymptomatic bacteriuria. Clinical manifestations of cystitis, prostatitis and urethritis. Infection of the upper urinary tract. Concept of acute and chronic pyelonephritis. Etiology, pathogeny and risk factors. clinical manifestations, bacteriological diagnosis and image diagnosis. Special forms of pyelonephritis: intrarenal and perirenal abscesses, xanthogranulomatous pyelonephritis. Nephropathy associated with obstruction of the urinary pathway. Vesicoureteral reflux nephropathy. Pharmacological treatment of low UI and acute and chronic pyelonephritis. Prevention regulations. Epididymitis, orchitis and vesiculitis: pathogenetic mechanism, etiology, clinical aspects, diagnosis and treatment. Urogenital tuberculosis. Urogenital parasitosis.

8. Interstitial nephropathies

Concept of interstitial nephropathy. Acute hypersensitivity interstitial nephritis. Most common etiologies. Clinical and laboratory manifestations. Treatment. Chronic interstitial nephropathy. Mechanisms of nephrotoxicity. Description of the principal types, in particular nephropathies due to analgesics and non-steroidal anti-inflammatories (NSAI). Nephrotoxicity of antibiotics, antineoplastic agents, heavy metals, radiological contrast agents and organic solvents.

9. Tubulopathies

Physiological bases of the reabsorption and secretion of solutes in the renal tubule. Concept of isolated tubular dysfunction or one associated with other tubular changes. Hereditary characteristics. Diagnostic tests. Description of the principal tubulopathies. Renal glycosuria. Renal phosphaturia. Hyperaminoaciduria (cystinuria and Hartnup disease). Fanconi's syndrome. Bartter's syndrome. Renal tubular acidosis and its different types. Nephrogenic diabetes insipidus. Therapeutic bases of the principal tubular dysfunctions.

10. Congenital anomalies and cystic renal diseases

Concepts of agenesis, hypoplasia and renal dysplasia. Anomalies in the position and form of the kidneys. Polycystic kidney disease. Child and adult forms. Incidence. Clinical aspects. Diagnostic value of ecography and CAT Evolution and treatment. Nephronoptisis-medullary cystic kidney disease complex. Sporadic and hereditary forms. Simple renal cyst. Medullary sponge kidney. Acquired renal cystic disease.

11. Urinary lithiasis

Epidemiological aspects of renal lithiasis in industrialized countries. Composition and pathogeny of kidney stones. Clinical manifestations associated with renal lithiasis. Metabolic study of renal lithiasis patients. Application criteria and examination method. Normal and abnormal values for excretion of solutes related to the formation of stones. Calcium lithiasis (hypercalciuria, associated with hypercosuria or hyperoxaluria, idiopathic). Uric lithiasis Cystic lithiasis. Lithiasis associated with infection (struvite stones). General rules for the treatment of renal lithiasis patients. Specific treatment of the different varieties of lithiasis.

12. Vascular nephropathies

Most frequent causes of pathology of large renal vessels. Renal artery stenosis, types and clinical significance. Diagnosis and treatment of renal vein thrombosis. Chronic obstruction of the renal veins. Diseases of the renal microcirculation. Benign and malignant nephroangiosclerosis. Relation to systemic arterial hypertension. Pathological anatomy. Clinical manifestations. Prevention and treatment. Thrombotic microangiopathy (hemolytic-uremic syndrome and thrombotic thrombocytopenic purpura). Atheroembolic disease. Sclerodermic nephropathy. Renal cortical necrosis.

13. Chronic renal insufficiency

Concept of chronic renal insufficiency (CRI). Principal causes of CRI requiring substitution treatment. Physiopathology of CRI. Reduction in nephron number and function of the residual nephrons. Factors affecting the natural progression of CRI that are independent of primary renal disease. Phases in CRI. Clinical manifestations of advanced or terminal CRI (uremic syndrome) related to the different organs and systems. General procedures when treating CRI patients. Dietetic aspects. Prevention of factors that cause or aggravate renal lesions. Pharmacological treatment of the specific complications of renal insufficiency. Indications for diuretics, antihypertensive drugs, vitamin D metabolites, phosphorus chelants, calcium salts. Indications for substitution treatment in terminal CRI. Bases of treatment using dialysis techniques (hemodialysis and peritoneal dialysis). Kidney transplantation and transplant tolerance. Diagnosis of transplant rejection. Immunosuppressant treatment and associated complications.

14. Use of drugs in Renal Insufficiency

Variations in the bioavailability, distribution and elimination of different drugs in the presence of defective renal function. Guidelines for modifying dose or dose intervals in the presence of chronic renal insufficiency. Changes associated with the use of dialysis. Practical use of the principal drugs in CRI treatment (antibiotics, analgesics, antihypertensive drugs and other cardiovascular, analgesic and anti-inflammatory drugs and psycho-drugs). Nephrotoxicity.

15. Arterial hypertension

Physiopathology of arterial hypertension (AHT), hemodynamic, hormonal, neurogenic and renal factors. Etiological types of AHT. "Essential" AHT, epidemiology and risk factors. Clinical aspects and natural history of AHT, anatomopathological substratum. Clinical forms of AHT, malignant AHT (or accelerated) and benign AHT. Complications of AHT: renal (nephroangiosclerosis), cardiac (hypertensive cardiopathy and left ventricular hypertrophy) and of the central nervous system. General examinations and monitoring of hypertension patients. "Secondary" AHT, examinations for differential diagnosis: AHT and nephropathies, renovascular hypertension, endocrine hypertension (suprarenal hyperfunction), HTA and pregnancy, other secondary arterial hypertensions. Treatment of AHT, general measurements and control of risk factors and complications. Antihypertensive drugs: specific indications, associations and side effects. Hypertensive crisis, emergency treatment. Etiological treatment of some secondary forms.

16. Renal tumors

Incidence of kidney tumors. Examination of patients with suspected tumor or renal mass. Value of the different types of examination. Benign kidney tumors. Angiomyolipoma. Clinical aspects of renal cell carcinoma (hypernephroma), nephroblastoma (Wilms tumor) and transitional cell carcinoma. Renal sarcoma. Therapeutic bases of renal tumors.

17. Urothelial tumors: Upper urothelium, bladder and urethra

Epidemiology, etiology and carcinogenesis of urothelial tumors. Pathological anatomy: Epithelial tumors, non-epithelial tumors and secondary tumors. Natural history of urothelial tumors**.** Diagnostic methodology for tumors of the upper urothelium, bladder and urethra. Clinical aspects of urothelial tumors with particular focus on bladder tumors. Staging and prognosis factors. Treatment of urothelial tumors. Treatment of disseminated disease.

18. Prostate tumors

Benign prostatic hyperplasia: epidemiology, clinical aspects, diagnosis and treatment. Adenocarcinoma and types, other malignant prostate tumors: epidemiology, etiology and histology. Atypical prostatic hyperplasia. Concept of prostatic intraepithelial neoplasia (PIN). Origin and spread of prostate cancer. Natural history. Staging. Clinical aspects and diagnosis. Concepts and "screening" and "early diagnosis". Tumor markers in prostate

cancer. Treatment of prostate cancer: Assessment of the patient and tumor stage. Diagnosis and treatment of disseminated disease.

19. Testicular tumors

Epidemiology and incidence. Histological classification and anatomopathological characteristics. Clinical characteristics. Diagnosis. Surgical treatment of testicular tumors. Staging study: surgical staging, metastatic dissemination and classification by stages. Treatment of seminomatous tumors and treatment of non-seminomatous tumors. Secondary testicular neoplasia.

20. Physiopathology of urination

Neuroanatomy of urination. Neurophysiology of urination. Normal urination. Pollakiuria: Etiological classification, pathogeny, clinical study, diagnosis and treatment. Differential diagnosis between incontinence, stress and overflow

21. Urinary obstruction

Concept, physiopathology and forms of urinary obstruction. Clinical aspects of obstructive processes in the urinary tract. Evolution. Functional disorders caused by obstruction of the upper urinary tract. Complications. Diagnostic methodology. Treatment. Pathological anatomy. Viability of the obstructed kidney.

22. Prostatism

Pathology of the bladder neck. Anatomy of the prostate. Prostatic congestion. Bacterial prostatitis: Acute and chronic. Prostatic tuberculosis. The prostate as a septic focus. Prostatic lithiasis. Benign prostatic hyperplasia: Incidence, anatomical substratum, etiology, pathogeny, clinical aspects. Clinical, radiological, ecographic and urodynamic diagnosis. Evolution. Treatment. Diagnostic modalities and indications. Anatomy of the bladder neck. Etiopathogeny of bladder neck diseases. Diagnosis. Treatment.

23. Urological trauma

Anatomical factors. Production mechanisms of histological trauma. Renal trauma: classification, clinical aspects, diagnosis, treatment complications and prognosis. Bladder trauma: Classification, diagnosis and treatment. Urethral trauma: etiology and breaking mechanisms. Clinical aspects. Diagnosis. Treatment of posterior and anterior urethral injuries. Complications. Trauma of the scrotum and testicle: Clinical aspects, diagnosis and treatment. Spontaneous testicular injuries (torsion).

24. Renovascular pathology. Renovascular hypertension

Arterial injuries of the small and medium vessels: Nephroangiosclerosis and atheroembolic renal disease. Arterial injuries of large vessels: Acute (embolism and thrombosis) and chronic conditions (atheromatosis and fibrodysplasia). Renal vein thrombosis, special cases in children and in kidney transplants. Renovascular hypertension: Pathogenic factors, diagnosis, prognosis and treatment.

25. Kidney transplantation

Indication. Selection of recipient and donor. Transplant immunology. Renal preservation. Technical considerations in kidney transplantation. Basic rejection mechanism. Immunosuppression. Complications: urinary, vascular and infectious. Results obtained in kidney transplantation.

26. Male infertility and erection changes.

Anatomopathological bases of male infertility. Testicular function. Hormonal regulation of gonadal secretion. Ductus epididymis and ductus deferens, seminal vesicles and prostate. Study of ejaculation. Etiopathogeny of male reproductive disorders. Diagnosis. Treatment. Anatomopathological bases of sexual function. Etiopathogeny of impotence. Study of impotence. Impotence of vascular origin. Priapism: etiology, clinical aspects, diagnosis and treatment. Plastic induration of the cavernous bodies.

TEACHING STRUCTURE

UNIT RESPONSIBLE for teaching unit: Nephrology (N), Urology (U), Pathological Anatomy (PA), Radiology and Physical Medicine (RPM), Microbiology (M), Pharmacology (F).

Theory classes (80 students)

1. **Changes in sodium metabolism**: Physiopathology of the body compartments. Hyponatremia: etiological diagnosis, clinical manifestations and therapeutic schemes. Hypernatremia: etiological diagnosis, clinical manifestations and therapeutic schemes. (N)

2. **Changes in kalemia**: Hypo- and hyperkalemia. Etiological diagnosis. Relation with the acid-base balance. Hypokalemia and arterial hypertension. (N)
3. **Acid-base balance**: Role of the kidney. Metabolic acidosis: classification, etiology and treatment. Metabolic alkalosis: classification, etiology and treatment. (N)
4. **Changes in calcium metabolism**: Hypercalcemia: differential etiological diagnosis and treatment. Hypocalcemia: differential etiological diagnosis and treatment. (N)
5. **Acute renal insufficiency**: Classification, physiopathology, differential diagnosis. Clinical manifestations and therapeutic procedures. (N)
6. **Glomerulonephritis**: Basic pathogeny and classification. Acute glomerulonephritis: types, diagnostic and therapeutic scheme. (N)
7. **Primary chronic glomerulonephritis**: clinical and histological classification, diagnostic scheme and therapeutic bases. SnoN, MCGN, IgA Nephropathy, MGN. (N)
8. **Secondary Nephropathies**: SLE, Goodpasture Syndrome, Schönlein Henoch Syndrome, systemic cryoglobulinemia and vasculitis, renal manifestations, diagnostic criteria and therapeutic bases, (N).
9. **Interstitial and cystic nephropathies**: Polycystic kidney disease. (N)
10. **Chronic renal insufficiency**: Concept and physiopathology. Epidemiology. Clinical characteristics and analytical data. Therapeutic procedures.
11. **Arterial hypertension**: Epidemiology and classification. Basic physiopathology and visceral effects. Nephroangiosclerosis. (N)
12. **Arterial hypertension**: Diagnosis of secondary forms. Malignant AHT and hypertensive crisis. Therapeutic schemes. (N)
13. **Urological semiology**. (U)
14. **Urinary infection**: Acute pyelonephritis. (U)
15. **Urinary obstruction**: Hydronephrosis. (U)
16. **Urinary lithiasis**. (U)
17. **Benign prostate pathology**. (U)
18. **Prostate cancer**. (U)
19. **Epididymal and testicular pathology**: Testicular tumors. (U)
20. **Renal tumors**. (U)
21. **Urinary bladder tumors**. (U)
22. **Urological trauma**. (U)
23. **Kidney transplantation**. (U)
24. **Male infertility**. (U)
25. **Impotentia coeundi**. (U)

Clinical seminars (25 students. From 8 am to 9 am.)

1.- a) Clinical case: hyponatremia. Focus: diagnostic and treatment algorithm.
b) Clinical case: hypernatremia. Focus: diagnostic and treatment algorithm. (N)

2.- a) Clinical case: metabolic acidosis. Focus: diagnostic algorithm and treatment determination exercise.
b) Clinical case: metabolic alkalosis. Focus: diagnostic algorithm and treatment determination exercise. (N)

3.- a) Clinical case: "ischemic" ARI. Focus: Identification of clinical context, injury markers and evolution.
b) Clinical case: ARI due to toxicity. Focus: diagnosis and extrarenal involvement, other possibilities, ... (N)

4.- a) Clinical case: minimal change nephrotic syndrome. Focus: Differential etiological diagnosis, interpretation of "comparative" renal biopsy.
b) Clinical case: IgA GN. Focus: Differential diagnosis of proteinuria and hematuria. Indications for renal biopsy. (N)

5.- a) Clinical case: chronic renal insufficiency. Focus: examinations, osteodystrophy and anemia. Medical treatment exercise. Substitution treatment.
b) Clinical case: kidney transplantation. Focus: conditions for kidney transplantation, basic surgical and pharmacological procedures. Possible medical complication. (N)

6.- a) Clinical case: systemic vasculitis. Focus: secondary nephropathies, SLE, Goodpasture Syndrome, Schönlein Henoch Syndrome, cryoglobulinemia and systemic vasculitis: renal manifestations, diagnostic criteria and therapeutic bases.
b) Clinical case: diabetic nephropathy. Focus: diabetes and renal conditions, amyloidosis, multiple myeloma. (N)

7.- a) Clinical case: essential AHT. Focus: Examination, risk factors and pharmacological treatment exercise.
b) Clinical case: secondary, renovascular AHT. Focus: Differential diagnosis of hypokalemia and AHT, primary hyperaldosteronism and hypercorticism. Treatment of renovascular AHT. (N)

8.- a) Closed clinical case I.
b) Closed clinical case II. (N)

9.- Neurogenic bladder dysfunctions. (U)

10.- Renal, ureteral and bladder anomalies. (U)

11.- Urological ecography. Prostate biopsy. (U)

12.- Urinary incontinence. (U)

13.- Urological emergencies. (U)

14.- Pathology of the urethra and penis. (U)

15.- Inflammatory and tumor retroperitoneal pathology. (U)

16.- Vesicoureteral reflux. (U)

Seminars on related topics (40 students)

1.- Pathological Anatomy: Basic lesions in renal biopsy, interpretation and clinical correlations. (PA)

2.- Pharmacology: Clinical use of diuretics. Mechanism of action, specific indications. Refractory edema. Diuretic associations. (F)

3.- Radiology: Pyelography, ecography, indications and basic interpretation. (RPM)

4.- CAT, MR and AngioMR: indications and basic interpretation. (RPM)

5.- Functional examinations: Renogram, renal gammagraphy, function and renal blood perfusion. Testicular examination. (RPM)

6.- Angiography, revascularization of the renal arteries. Angioplasty, stent and fibrinolysis. (RPM)

7.- Microbiology: Bacteriology of the urinary tract. Therapeutic guidelines. (RPM)

8.- Pharmacology: Drug management in renal Insufficiency. Nephrotoxicity. (F)

9.- Pathological Anatomy: Pathological anatomy of renal tumors, urinary pathways, prostate and testicle. (PA)

LEARNING REQUIREMENTS, PRIOR KNOWLEDGE AND SELF LEARNING.

Students will be expected to have acquired basic knowledge of the identification of problems and certain diagnostic methods as prerequisites for this subject, covered in the course on "General Semiology and Clinical

Propedeutics". In any case, students will have acquired knowledge of the following specific areas in the first stage of the medical degree course.

1. Hydroelectrolytic homeostasis
2. Sodium metabolism
3. Renal regulation of water and salt
4. Physiopathology of edema
5. Potassium metabolism
6. Phospho-calcium metabolism
7. Physiology of the acid-base balance: buffer systems, renal and pulmonary regulation.
8. Hormonal effects on the kidney
9. The kidney as an endocrine organ
10. Embryology of the genitourinary apparatus
11. Functional anatomy of the nephron: mechanism of urine formation: glomerular filtration, concentration and dilution, urinary acidification, proteinuria.
12. Hormonal functional regulation: ADH, ALDOSTERONE, CORTISOL, RENIN-ANGIOTENSIN, CATECHOLAMINES, ANF, ENDOTHELIN, NO, PROSTAGLANDINS, PARATHORMONE.
13. Control mechanisms of arterial pressure. Cardiac flow, autonomous NS, baroceptors, peripheral resistance, hormonal, renal, cellular bases.
14. Mechanisms of action in diuretics
15. Mechanisms of action in antihypertensive drugs
16. Regulation of the immune response
17. Mediation of the immune response
18. Autoimmunity
19. Experimental glomerulonephritis
20. Transplantation immunology
21. Pharmacological immunodepression
22. Immunology laboratory techniques
23. The genetics of hereditary diseases
24. Endocrinology of the suprarenal glands
25. The hypothalamo-hypophyseal axis
26. The testicle as an endocrine organ
27. Physiology and pharmacology of the autonomic nervous system
28. Uropathogenic germs
29. Pulmonary and systemic tuberculosis
30. Oncogenesis