

INTEGRATED LISTS OF LESSONS AND SYLLABUS

Faculty: Cecilia Garlanda (Clinical Pathology), Armando Tripodi (Clinical Biochemistry), Michela Bernardi Letterio Politi and Marco Franzone (Radiology), Silvia Uccella, Piergiuseppe Colombo, Lorenzo renne, Arturo Bonometti and Luca Di Tommaso (Pathology)

Year/Semester 3rd year/1st semester

Credits 9

Course coordinator: Luca Di Tommaso (luca.di tommaso@hunimed.eu)

EXAM

The exam consists in a written test (Clinical Pathology and Clinical Biochemistry) and an oral evaluation (Radiology and Pathology).

Passing the written test is a prerequisite for the oral evaluation.

In case of failure in the oral evaluation, the written test will be kept valid within the exam session (winter, summer, or fall session)

The written test:

This part of the exam will take place on the first day of the exam session.

Structure: 15 multiple choice questions (5 Clinical pathology; 10 Clinical biochemistry) with only one correct answer

Passing threshold for admission to the oral evaluation:

Clinical pathology, at least 3 correct answers

Clinical Biochemistry, at least 6 correct answers

The oral evaluation:

On day 2 of the exam candidates that have successfully passed the written test will be admitted to the oral evaluation of Radiology.

On day 3 of the exam, candidates that have successfully passed Radiology will be admitted to the oral evaluation of Pathology.

In case of failure of the Pathology evaluation, the Radiology evaluation will be kept valid within the exam session

Evaluation criteria:

written (D1)	Oral radiology (D2)		Oral Pathology (D3)	
Clinical pathology grade 3 and Laboratory	Sufficient examination:	6	Sufficient examination:	6
Pathology grade 6: 6				
Clinical pathology grade 4 and	Discrete examination:	7 or 8	Discrete examination:	7 or 8
Laboratory Pathology grade 7 or 8: 7 or 8				
Clinical pathology grade 5 and	Good/excellent examination: 9 or 10		Good/excellent examination: 9 or 10	
Laboratory Pathology grade 9 or 10: 9 or 10				



The final grade will be determined by the sum of the individual grades (writte+oral1+oral2)

LIST OF LESSONS.

PATHOLOGY LESSONS

Topic 1. What is pathology: yesterday, today and tomorrow (2h)

Topic 2. The role of pathology in the precision-medicine era (2h)

Topic 3. Inflammatory diseases of upper GI tract (2h)

Topic 4. Inflammatory diseases of lower GI tract, with particular attention to RCU and Crohn disease (2h)

Topic 5. Neoplastic disease of upper GI tract (2h)

Topic61. Neoplastic disease of lower GI tract (2h)

Topic 7. Inflammatory and autoimmune disorders of the liver, biliary system and pancreas (2h)

Topic 8. Neoplastic diseases of the liver, biliary system and pancreas (2h)

Topic 9. Frozen section: guiding surgeon's hand (2h)

Topic 10. Neoplastic disease of the lung, pleura and mediastinum (2h)

Topic 11. From the cytological diagnosis to the molecular classification in bladder tumors (2h). *This lesson should be integrated with the contents of Neoplastic diseases of urinary tract and bladder (2h) (course of Nephrology and Urology).*

Topic 12. No time to die: from indolent to aggressive tumors of the prostate (2h). *This lesson should be integrated with the contents of Neoplastic and not neoplastic disease of the prostate (2h)(Course of Nephrology and Urology)*

Topic 13. Neoplastic and not neoplastic diseases of the breast (2h)

Topic 14. Neoplastic and not neoplastic diseases of the cervix (2h)

Topic 15. Neoplastic and not neoplastic diseases of the uterus (2h)

Topic 16. Neoplastic and not neoplastic diseases of the ovary (2h)

- Topic 17. Neoplastic and not neoplastic diseases of CNS* (2h)
- Topic 18. Neoplastic and not neoplastic diseases of the skin (2h)
- Topic 19. Neoplastic and not neoplastic diseases of thyroid (2h)

Topic 20. Tumors of the soft tissue (2h)

Topic 21. Tumors of the bone (2h)

Topic 22. An histopathological approach to hematological disorders (2h)

Practice (2h): The clinical pathological correlations (gross specimen and clinical features)

Integrated pathology lessons.

Neoplastic diseases of the kidney. This topic will be presented during the course of Nephrology and Urology



Neoplastic diseases of the testis. This topic will be presented during the course of Nephrology and Urology

CLINICAL PATHOLOGY LESSONS

- Topic 1. Laboratory tests of humoral immunity
- Topic 2. Laboratory evaluation of the cellular immune system
- Topic 3. Laboratory tests for cancer

CLINICAL BIOCHEMISTRY LESSONS

- Topic 1. Aims and fields of the clinical laboratory
- Topic 2. Laboratory organization
- Topic 3. Laboratory test prescription
- Topic 4. General characteristics of laboratory tests
- Topic 5. Types of errors in laboratory medicine
- Topic 6. Reference intervals
- Topic 7. Decision levels
- Topic 8. Risk estimation
- Topic 9. Preparation of patients to blood sampling
- Topic 10. Biological specimens
- Topic 11. Pre-analytical variability of blood tests
- Topic 12. Expression of results in laboratory medicine
- Topic 13. Types of methods in laboratory medicine
- Topic 14. Serum proteins
- Topic 15. Testing for Hemostasis
- Topic 16. Testing for thrombosis
- Topic 17. Monitoring drugs



RADIOLOGY LESSONS

- Topic 1. Conventional radiography.
- Topic 2. Contrast Media.
- Topic 3. Ultrasound, Computed Tomography and Magnetic Resonance
- Topic 4, Fundamentals of chest X-Ray semeiotics
- Topic 5. Radiology of upper and lower GI tract
- Topic 6. Radiology of the pancreas
- Topic 7. Fundamentals of brain imaging
- Topic 8. Fundamentals of breast imaging
- Topic 9. Interventional Radiology and Image guided therapy
- Topic 10. Rad-path correlation in lung cancer
- Topic 11. Rad-path correlation in focal liver lesions
- Topic 12. Rad-path correlation in breast cancer

_

Topic 13. Rad-path correlation in primary brain tumors



PATHOLOGY SYLLABUS

Overview:

At the end of the Course, students should have knowledge and understanding skills to be able to describe what is Pathology; what are the main areas of application of Pathology in personalized medicine, with particular regard to molecular biology and digital pathology; how does Pathology integrate in the management of a patient. The final goal will be to interpret all the information listed in the pathological report

General Learning Outcomes

- Interpret the terminology used in the report (histotype, grade; diagnosis, prognosis and prediction)
- Explain the basic principles and clinical significance of immunohistochemistry and molecular pathology
- Illustrate and exemplify the role of histology and immunocytochemistry in the management of an oncological patient.
- Discuss the advantages and limits of cytology in the diagnostic workflow and in the screening.
- Explain why, when and how they should use cytology, histology or both.
- Interpret the impact of molecular pathology in the management of oncological diseases.
- Comment on processing, diagnosis and clinical significance of sentinel lymph node procedure.
- Discuss the significance of intraoperative examination in guiding surgeon's hand.
- Explain the role of biopsy sampling and surgical resection as regard the pathological staging and grading of tumors.
- The role of imaging and of clinical informations in the diagnostic pathological process.
- Interpret and discuss a pathology report of a patient with a tumoral lesion.

Learning/teaching methods

-Lectures

-Tutorial activities with digital slides.

Texts

Kumar, Abbas, Ester: Robbins and Cotran, Pathologic Basis of Disease, 10th Edition, Elsevier

Learning Outcomes for specific lessons

What is pathology: yesterday, today and tomorrow

What pathology is The basic instruments: macroscopic and microscopic evaluation How pathology has evolved over the years The new tools: Molecular Pathology and Digital Pathology The report of pathology and the check list The pathology archive as a bank of tissue samples for treatment and research

The role of pathology in the precision-medicine era

Cells, tissues and organs: different information from different specimens Principles of fixation, sampling, and processing Gross evaluation and microscopic pattern recognition The diagnostic workflow: from fine needle biopsy to intra-operatory examination Histotype, grading and staging Beyond morphology: the phenotype aiding to prove the histopathological diagnosis The role of molecular pathology in the precision medicine The role of digital pathology: augmented microscopy and Artificial Intelligence in the precision medicine

Inflammatory diseases of upper GI tract



Illustrate the main etiologies and morphology of inflammatory esophagus diseases with emphasis on gastroesophageal reflux disease (GERD) and infectious esophagitis

Illustrate the integrated role of clinical, endoscopic and histological features for the diagnosis of Barrett's Esophagus

Illustrate the macroscopic and microscopic features of Barrett's esophagus

Illustrate the main histological features for grading dysplasia in Barrett's esophagus

Illustrate the natural history of dysplasia in Barrett's esophagus

Illustrate the main etiology and morphological features of acute and chronic gastritis (infectious and autoimmune) with emphasis on the role of HP infection

Illustrate the main complications of chronic gastritis, with particular regard to HP infections

Inflammatory diseases of lower GI tract, with particular attention to RCU and Crohn disease

Illustrate the main morphological findings of self-limiting, infectious, antibiotic-associated, ischemic and radiation-induced colitis Illustrate the main morphological features of idiopathic inflammatory bowel diseases (IBD) with emphasis on the distinction between Ulcerative colitis and Crohn diseases with emphasis on epidemiology, etiology, pathogenesis, clinical, macroscopical and microscopical features

Discuss the main complication of IBD

Discuss the link between cancer and IBD and illustrate the role of colorectal biopsy and the concept and classification of mucosal dysplasia

Neoplastic disease of upper GI tract

Illustrate the main histologic types of malignant esophageal tumors and principles for grading and staging

Discuss the role of intestinal metaplasia in esophageal and gastric carcinogenesis

Illustrate the sequence of morphological events linking HP infection to gastric cancer and malignant lymphoma

Illustrate the histologic features of gastric dysplasia with emphasis on dysplasia grading and on the concept of "indefinite for dysplasia" Illustrate the natural history of gastric dysplasia in chronic gastritis

Illustrate the main macroscopical and microscopical features of gastric cancer with emphasis on gender, age, tumor histotype, molecular findings, grading and staging

Discuss the concept and natural history of early gastric cancer

Illustrate the main prognosticators and predictive biomarkers of gastric cancer.

Illustrate the main features of handling and processing a mucosal/submucosal resection for gastric cancer

Neoplastic disease of lower GI tract

Illustrate the morphological spectrum of intestinal polyps including colorectal adenomas

Illustrate the morphological sequence adenoma-carcinoma and the concepts of low and high grade dysplasia (colorectal adenoma) Illustrate the main macroscopical and microscopical features of colorectal carcinoma with emphasis on tumor histotype, molecular changes, grading and staging

Discuss the significance of the main prognosticators and predictive biomarkers currently used in the pathology report of colorectal cancer

Inflammatory and autoimmune disorders of the liver, biliary system and pancreas

Illustrate the role of the liver biopsy in the characterization of inflammatory diseases of the liver.

Discuss the concept of liver biopsy adequacy in these settings.

Illustrate the main features and significance of a some histopathological elementary lesions (spotty necrosis, piecemeal necrosis, confluent necrosis, cholestasis, pericentral and periportal fibrosis, septal fibrosis, nodular fibrosis, steatosis) occurring in different etiological settings (viral, metabolic, autoimmune, drug-induced) of chronic hepatitis

Illustrate the concepts of grading and staging in chronic inflammatory conditions of the liver in the biopsy and their quantification in a scoring system

Illustrate the main etiology and morphological features and complications of acute and chronic pancreatitis

Neoplastic diseases of the liver, biliary system and pancreas

Illustrate the pathogenesis and morphology of liver cirrhosis

Illustrate the role of the liver biopsy in the diagnostic work up of benign and malignant liver tumors

Illustrate the epidemiology, natural history and main pathological features of hepatocellular carcinoma and cholangiocarcinoma Illustrate the main macroscopical and microscopical features of precursors of hepatocellular carcinoma in cirrhosis/chronic liver disease

Illustrate the main features of benign liver tumors with emphasis on adenomas and their distinction from focal nodular hyperplasia Discuss the concept of phenotypical and molecular heterogeneity of adenomas

Discuss the diagnostic role of FNAB (fine needle aspiration biopsy) in pancreatic lesions

Illustrate the precursors of pancreatic adenocarcinoma (PanIN)

Illustrate the main macroscopical and microscopical features (cystic, solid) pancreatic tumors with emphasis on sex, site (head, body, tail), histotype and natural history



Illustrate the main criteria for grading and staging of pancreatic cancer and the main morphological prognosticators Illustrate the main features for handling and processing a surgical resection for pancreatic cancer Illustrate the main clinical, morphological and immunohistochemical features of neuroendocrine tumors of the pancreas with emphasis on criteria for diagnosis and prognosis

Neoplastic disease of the lung, pleura and mediastinum

Illustrate the pathogenetic basis and the main etiological agents of pleuro-pulmonary tumors.

Illustrate how pulmonary tumors arise through a series of morpho-phenotypic and molecular events, and how some of them may be of diagnostic, prognostic and predictive importance.

Illustrate the main histopathological and cytopathological approaches to the diagnosis of pleuro-pulmonary tumors.

Illustrate the main histotypes of pulmonary tumors with regard to epidemiology, gross and microscopical features and behaviour with emphasis on grading and staging.

Illustrate which are the main information which have to be reported in a pathological diagnosis of pleuro-pulmonary tumors.

Neoplastic diseases of the kidney

(Lecture in Nephrology and Urology)

Describe the main types of renal tumors.

Illustrate and describe the gross and microscopic features of the clear cell RCC.

Describe the impact of sarcomatoid change and necrosis in renal cell carcinoma.

Understand the differences between tumor with cystic changes and cystic tumor among clear cell neoplasms.

Describe the microscopic features of the papillary renal cell carcinoma.

Illustrate the so-called molecularly-defined renal cell carcinoma types.

Describe and compare gross and microscopic features of chromophobe renal cell carcinoma and oncocytoma

Describe the utility to use grading in most common histotypes of renal tumor.

Illustrate the role of immunohistochemistry in differential diagnosis of renal cell tumors.

Neoplastic diseases of urinary tract and bladder

(Lecture in Nephrology and Urology)

Describe the microscopic anatomy of the muscular layers of the urinary bladder.

Define a (bladder) diverticulum.

Indicate the epidemiology, risk factors and the main morphological features of neoplasms in bladder, ureter and renal pelvis.

Describe the natural history of papillary and non-papillary neoplasms of the bladder with emphasis on in situ carcinoma (CIS), muscle invasiveness, multifocality.

Define the impact of grading classification on bladder tumors prognosis.

Describe staging in bladder carcinoma.

Understand the significance of frozen sections in management of bladder and ureteral tumor patient.

Indicate the potential and limits of the different cytological and histological procedures in the diagnosis of urological tract tumours. Indicate what information you need for a pathological report of a urinary tract tumor to be complete.

From the cytological diagnosis to the molecular classification in bladder tumors

(Lecture in Pathology and Diagnostic)

Describe the molecular classification of urinary bladder carcinoma and possible predictive implications in the management of patients. Define the different methods to obtain a cytological material.

Understand the accuracy of cytological diagnosis in urine and the relationship with tumor grading.

Describe examples in which urine cytology analysis is useful or not useful.

Neoplastic and not neoplastic disease of the prostate

(Lecture in Nephrology and Urology)

Describe the zonal anatomy of the prostate.

Describe the main gross and histological features of prostatitis and benign hyperplasia.

Illustrate the epidemiology of prostatic neoplasm.

Describe the topographical distribution of tumor in the gland.

Illustrate the main morphological features of adenocarcinoma of the prostate, with focus on acinar and ductal tumors.

Describe malignant non-invasive "in situ" (PIN and Intraductal) tumors in the prostate.

Describe the diagnostic strategy of prostate cancer, and the different type of tissue you need for a diagnosis.

Understand the different architectures in the Gleason system and the correlation to ISUP Grade Groups.

Justify the role of immunohistochemistry in the diagnosis of prostate adenocarcinoma.

List the histological prognostic parameters of prostate cancer.



Describe staging of prostate tumor.

Understand the significance of frozen sections in management of prostate tumor patient.

Indicate what information you need for a pathological report of prostate adenocarcinoma to be complete.

No time to die: from indolent to aggressive tumors of the prostate

(Lecture in Pathology and Diagnostic)

Describe differences between clinical indolent tumors to high risk and aggressive adenocarcinoma and their prognostic impact. Understand and illustrate DNA repair genes defect and its implication in prostate tumor.

Describe synthetic letality on BRCA in prostate adenocarcinoma.

Neoplastic and not neoplastic diseases of the uterus

List the settings that may lead to chronic endometritis

Describe the incidence, common locations, pathogenesis and clinical features of endometriosis.

Define adenomyosis.

Explain the relationship between endometrial hyperplasia and endometrial adenocarcinoma.

Illustrate risk factors, pathogenesis, clinical features, and spread of endometrial carcinoma.

Describe and compare the typical clinical presentation and microscopic features of uterine leiomyoma and leiomyosarcoma. Define malignant mixed mullerian tumor and endometrial stromal tumor.

Neoplastic and not neoplastic diseases of the cervix

Illustrate the epidemiology of cervical carcinoma.

Define the cervical transformation zone.

List risk factors for the development of cervical carcinoma.

Illustrate the correlation between HPV genotype and the risk of cervical carcinoma.

Explain the role of human papillomaviruses (HPV) in the pathology of benign and malignant cervical tumors.

Illustrate the morphologic and biologic spectrum of squamous intraepithelial lesion (SIL) in PAP smear.

Illustrate the morphologic and biologic spectrum of cervical intraepithelial neoplasia (CIN).

Correlation between cytological information (SIL) and pathological findings (CIN).

Describe the impact of PAP test in the screening and prevention of cervical carcinoma.

Role of vaccination in cervical carcinoma.

Illustrate the main morphological features of cervical carcinoma with regard to histotype, invasive properties, staging and grading and way of metastatization

Neoplastic and not neoplastic diseases of the breast

Epidemiology of a breast nodule.

Define the pathological (cytology, histology and gross findings) and clinical features of fibrocystic disease

Define the pathological features and the clinical significance of the followings: a. non-proliferative fibrocystic changes; b. proliferative fibrocystic changes; c. ductal hyperplasia; d. sclerosing adenosis

Compare and contrast the major clinical and pathological features of the following breast diseases: a. fibroadenoma; b. phyllodes tumor; c. intraductal papilloma.

Describe the epidemiological features of invasive and not invasive carcinoma of the female breast.

Describe the potential impact of family history of breast cancer on a patient with a breast nodule.

Compare and contrast the pathological (cytology, histology and gross findings) and clinical features (relative incidence and prognosis) of the following types of breast carcinoma: a. high-grade in situ ductal carcinoma; b. low-grade in situ ductal carcinoma; c. in situ lobular carcinoma; d. infiltrating ductal carcinoma; e. infiltrating lobular carcinoma.

Describe the role, if any, of special types (tubular, medullary, mucinous, etc) of breast cancer.

Discuss the role of fine needle aspiration (FNA) in the diagnosis of a patient with a breast nodule.

Discuss the role of core-biopsy in the diagnosis of a patient with a breast nodule.

Describe the role of intraoperative examination in a patient with a breast nodule.

Describe how stage and grade impact on the clinical course of breast cancer.

List the main clinical or pathologic features that predict poor survival in breast cancer.

Illustrate the role of biomolecular profile (estrogen, progesteron, MIB1 and HER2 expression) on the management of a patient with breast cancer.

Know the correlation between the morphological and the molecular classification of breast cancer.

Define the pathological and clinical features of gynecomastia.

Know the main pathological and clinical features of invasive male breast cancer.

Neoplastic and not neoplastic diseases of the ovary

Describe the pathogenesis and clinical features of polycystic ovarian disease.



Illustrate the basis of the classification of ovarian tumors and incidence of main histological types.

Describe and contrast the pathologic and clinical features of ovarian surface tumors (serous and mucinous cystadenomas, borderline tumors, and carcinomas).

Illustrate the issue of peritoneal involvement in the staging of ovarian surface tumors.

Describe the usual clinical presentation and pathologic features of mature cystic teratomas.

Describe the two most common types of sex cord-stromal tumors: granulosa-theca cell tumors and fibrothecomas.

Define Krukenberg tumor.

Neoplastic diseases of the testis

Describe the epidemiology of testicular tumor with particular regard to the age distribution of different histotypes.

Illustrate the rationale for classification in testicular tumor.

Define germ cell neoplasia in situ and describe its pathogenetic role in germ cell neoplasia.

Define the terms prepubertal-type, postpubertal-type, pure, mixed and regressed germ cell tumor.

Illustrate the clinical, serological, gross, microscopic and immuhistochemical features of seminoma, embryonal carcinoma, yolk sac tumor, choriocarcinoma, teratoma.

Describe the staging system of testicular tumor.

Neoplastic and not neoplastic diseases of thyroid

Illustrate the main etiology and morphological features and complications of thyroiditis, multi-nodular goiter, hyperthyroidism and hypothyroidism.

Discuss the diagnostic role of FNA (fine needle aspiration) in neoplastic and non-neoplastic thyroid lesions

Illustrate the neoplastic and non-neoplastic pathologies displaying follicular pattern.

Illustrate the main clinical, morphological, immunohistochemical and molecular features of papillary, follicular, medullary and undifferentiated (anaplastic) carcinoma, with emphasis on criteria for diagnosis and prognosis

List the components of the multiple endocrine neoplasia (MEN) syndromes type I, IIA, and IIB and describe genetic alterations in MEN syndromes.

Discuss how to manage a patient with a solitary thyroid nodule.

Describe how cytology impact on the diagnosis of a patient with a solitary thyroid nodule.

Describe how to manage a patient at risk of medullary carcinoma.

Neoplastic and not neoplastic diseases of CNS

Distinguish the histologic from the biologic malignancy in primary brain neoplasms.

Compare and contrast the clinical manifestations of a localized mass effect and the generalized increased intracranial pressure.

Compare the incidence and distribution of meningiomas and gliomas and illustrate the main histological subgroups of glial tumors.

List the histologic features to be evaluated when grading a glial neoplasm.

Describe the clinical course and prognosis of glial neoplasms.

Illustrate the role of intraoperative examination in the diagnosis of primary and metastatic brain tumors

Illustrate the main prognostic features of glial tumors with emphasis on immunocytochemical and molecular markers

Indicate the putative cell of origin of medulloblastoma, the age group most likely to develop this neoplasm, and typical routes of dissemination.

Indicate the main neoplasms that can metastasize to the brain and discuss the main clinico-pathological features of help in the differential diagnosis with primary tumors

Explain the similarities and the differences between schwannomas and neurofibromas.

Describe the major clinical features of neurofibromatosis 1 and 2.

Illustrate the clinico-pathological features of intracranial hematoma (intraparenchymal, subdural, extradural).

Illustrate the main histopathological features of Alzheimer and Parkinson diseases.

Melanocytic and not melanocytic tumors of the skin

Illustrate the significance of the following terms: Macule, Papule, Plaque, Pustule, Vescicle, Bullae, Blisters; acantholisis, acanthosis, dyskeratosis, erosion, exocytosis, hydropic swelling, hypergranulosis, hyperkeratosis, lentiginous growth, papillomatosis, parakeratosis, spongiosis, ulceration, vacuolization and illustrate in which pathological context these alterations are more likely to take place. Discuss the role of immunofluorescence in the diagnosis of bullous lesions of the skin

Describe the nonmelanocytic pigmented disorders of the skin.

Define a melanocytic nevus in terms of clinical manifestations.

List the variant forms of melanocytic nevi.

Know the importance of the family history of patients with multiple nevi.

Define a dysplastic nevus in terms of architectural and cytologic features and clinical significance.

Discuss the concept that some dysplastic nevi are precursors of malignant melanomas.

Define a malignant melanoma in terms of architectural difference from a melanocytic nevus.

Describe the risk factors for the development of a malignant melanoma.

List the clinical early warning signals for melanoma and the main histological variants of melanoma.

Discuss the concept of orizontal and vertical growth in melanoma.



Illustrate the main phenotypic features of melanoma cells.

Discuss the significance of tumor regression as prognostic parameter related to the staging of melanoma

Illustrate the Breslow and Clark criteria and their significance in the staging of melanoma.

Illustrate the role of sentinel node dissection in the evaluation of melanoma staging

Discuss the predictive significance of b-raf mutation in melanoma cells

List all the information that need to be reported in a diagnosis of melanoma.

Illustrate the potential sites of a metastasis for a melanoma

Define actinic keratosis in terms of clinical presentation, etiology and behaviour.

Define squamous cell carcinoma of the skin in terms of etiology, pathogenesis, and prognosis.

List the predisposing factors for the development of a squamous cell carcinoma of the skin.

Illustrate criteria useful to define the grading of squamous cell carcinoma.

Discuss whether keratoacantoma is a nosologic entity

Define a basal cell carcinoma in terms of frequency, pathogenesis, localization, and clinical outcome.

Illustrate the differential diagnosis of basal cell carcinoma

Describe the treatment of basal cell carcinoma and how it differs from the treatment of squamous cell carcinoma

Tumors of the soft tissue

describe the basic concepts for connective tissue tumors classification.

illustrate the most important clinic-pathological features to asses a patient with a soft tissue mass.

define the 'intermediate' biologic potential category.

discuss the epidemiology of soft tissue neoplasm.

illustrate the 'FNCLCC grading system'

illustrate the most frequent benign and intermediate malignancy soft tissue tumours, in particular lipoma, tenosynovial giant cell tumor, schwannoma, fibromatoses.

illustrate the most frequent malignant soft tissue tumors, in particular dedifferentiated liposarcoma, myxoid liposarcoma, synovial sarcoma.

discuss the gastrointestinal stromal tumor etiology, risk assessment, therapeutic implications.

discuss pediatric rhabdomyosarcoma and fibrosarcoma and therapeutic implications

illustrate the most important radiological features approach to a bone lesion

discuss the grading system in bone neoplasm

illustrate the epidemiology of most frequent bone sarcomas

Describe epidemiological, clinical, gross and microscopic features of osteochondroma, chondrosarcoma, and osteosarcoma.

Illustrate the clinical, morphological and prognostic features of Ewing sarcoma.

Haematopathology: a matter of multidisciplinary integration

Illustrate the normal histology of lymph nodes, and bone marrow.

Illustrate the general principle and functions of hematopoiesis.

Describe the signs and symptoms of leukemia, and lymphoma at presentation.

Illustrate when nodal excision and bone marrow biopsy are clinically indicated.

Illustrate the role of multidisciplinary integration of clinical, epidemiological, radiological, histopathological, and genetic data in the preliminary evaluation and diagnosis of blood cancers.

List the most importance histopathological features to assess during the examination of a bone marrow biopsy.

Describe the major clinical and histopathological differences of patients with myelodysplastic syndromes, myeloproliferative neoplasms, acute myeloid leukemia.

Illustrate the main genetic alteration of myeloproliferative neoplasms.

Discuss the importance of morphology and immunohistochemical markers in the differential diagnosis of lymphomas.

Discuss the epidemiology, clinical features, and diagnostic immunophenotype of acute lymphoblastic leukemia.

Discuss the incidence, and prognosis of T-cell lymphomas and illustrate how to distinguish them from B- cell lymphomas through immunohistochemistry.

Describe a minimal immunohistochemical panel for the diagnosis of "small B-cell lymphomas".

List the most frequent histotypes of B-cell lymphomas and describe the diagnostic histopathological characters of Diffuse Large B-cell Lymphoma.

Illustrate the clinical and histopathological peculiarity of Hodgkin lymphoma, its subtypes, and prognosis.

Describe the clinical consequences of lymphoproliferative disorders associated with paraproteinemia (lymphoplasmacytic lymphoma, plasma cell neoplasms).

Illustrate the incidence, epidemiology, and clinical presentation of Systemic Mastocytosis, Langerhans cell histiocytosis, Juvenile Xanthogranuloma, and Erdheim-Chester disease.



Practice 1: The clinical pathological correlations gross evaluation of surgical/autoptic specimen and correlation with clinical feature



CLINICAL PATHOLOGY SYLLABUS

Overview:

The course has the aim to describe laboratory techniques used in the diagnosis of clinical conditions associated with inflammatory and immune disorders, as well as in cancer.

General Learning Outcomes

• Understanding the significance of laboratory tests in the management of differential diagnoses in conditions associated with inflammation, immune disorders, and cancer.

Learning/teaching methods: Lectures and small group activities (journal paper presentations). The aim of small group activities is to involve students in reading (on their own, in small groups) and the publicly discussing some examples from the literature related to the topics presented in frontal lessons, and to increase student engagement in a collaborative learning setting. Participation is mandatory.

Learning Outcomes for specific lessons

Laboratory tests of humoral immunity

-Immunoassays and immunochemistry

-Laboratory evaluation of inflammatory and immune reactions: the acute phase response proteins, the complement, cytokines and chemokines, and immunoglobulins in laboratory diagnosis.

Laboratory evaluation of the cellular immune system

-Immunophenotyping and applications of Flow cytometric analysis.

-Blood count test

-Laboratory evaluation of the cellular immune system, leukocyte alterations

-Biomarkers of cellular immunity

Laboratory tests for cancer:

-Circulating cancer biomarkers: Classification and clinical applications

-Liquid biopsy: Detecting circulating tumor cells (CTC) and nucleic acids (ctDNA) -Inflammation and cancer



CLINICAL BIOCHEMISTRY SYLLABUS

Overview

The module of Clinical Biochemistry is focused on general concepts of Laboratory Medicine, which represent the fundamental background to assist clinicians to substantiate diagnoses, help preventing diseases and monitoring treatments. In particular, the module will be a comprehensive course dealing with the general concepts on prescribing clinical analyses, obtaining results and their interpretation.

General learning goals

To understand on how the laboratory can help clinicians to

- 1. Making diagnoses
- 2. Preventing diseases
- 3. Making decision on appropriate treatment
- 4. Monitoring treatment

Teaching Methods

Lectures, clinical case presentation and interactive discussion

Text book & Consultation materials

Widman's Clinical Interpretation of Laboratory Tests. RA Sacher, RA McPherson. Ed. FA Davis Company, Philadelphia. The PowerPoint presentations used across lectures will be made available

Learning Outcomes for specific lessons

Topic 1. Aims and fields of the clinical laboratory **Learning goals** Understanding the aims and the fields of the clinical laboratory

Topic 2. Laboratory organization

Learning goals Core laboratory, specialized laboratory, emergency laboratory, point-of-care laboratory

Topic 3. Laboratory test prescription

Learning goals

Understanding the indications to prescribe laboratory tests, their limitation and appropriateness of prescription.

Topic 4. General characteristics of laboratory tests

Learning goals

Understanding the concept of precision, accuracy, analytical sensitivity, diagnostic sensitivity & specificity and their estimation

Topic 5. Types of errors in laboratory medicine

Learning goals

Understanding the concept, causes and consequences of casual, systematic and gross errors and their estimation

Topic 6. Reference intervals

Learning goals

Understanding the concept of reference interval and the parameters for its estimation (e.g., frequency distribution, mean, standard deviation, percentiles)

Topic 7. Decision levels

Understand the concept of "decision levels" in special clinical situations (e.g., risk levels of cardiovascular disease owing to hypercholesterolemia, diagnosis of acute venous thromboembolism, etc.).

Topic 8. Risk estimation

Learning goals

Understanding the concept of Odds Ratios and their significance in the risk estimation of diseases associated with the presence/absence of genetic polymorphisms.



Topic 9. Preparation of patients to blood sampling

Learning goals

Understanding on how to prepare patients to blood sampling and the impact that some variables (e.g., timing of blood drawing, circadian variation, fasting, physical & emotional status) may have on results interpretation.

Topic 9. Biological specimens

Learning goals

Types of biological specimens (e.g., blood, urine, etc.) and the modality of blood drawing (e.g., syringe-plastic tube, vacuum devices, etc.). How to collect urine specimens.

Topic 10. Pre-analytical variability of blood tests

Learning goals

Understanding on how to centrifuge blood, prepare and store plasma until the analysis and their impact on laboratory results.

Topic 11. Expression of results in laboratory medicine

Learning goals

Understanding the concept of concentration & activity measurements and their differences.

Topic 12. Types of methods in laboratory medicine

Learning goals

Understand the principles of the polymerase chain reaction and search for genetic polymorphisms and their diagnostic significance; main immunochemistry methods and their characteristics (e.g., radial immune-diffusion, immune-electrophoresis, latex agglutination, nephelometry, ELISA, etc.).

Topic 13. Serum proteins

Learning goals

Understanding the general characteristics of serum proteins. Protein separation and quantitation by zone electrophoresis (e.g., albumin and globulins). The equipment used for separation (e.g., electrophoresis chambers, buffers, electrodes, power supplier, etc.). The significance of protein results in different clinical settings.

Topic 14. Testing for Hemostasis

Learning goals

Revision of the concepts of blood coagulation. Understanding the translational relevance that the laboratory diagnosis of hemorrhagic coagulopathies may have across different medical specialties or organs, including their method of investigation (e.g., bleeding time, prothrombin and activated partial thromboplastin time, factor XIII, fibrinolysis, von Willebrand factor, dysfibrinogenemia).

Topic 15. Testing for thrombosis

Learning goals

The translational relevance that the laboratory diagnosis of thrombotic coagulopathies may have across medical specialties or organs, including their methods of investigation (e.g., prothrombotic parameters, the presence of genetic polymorphisms, etc.).

Topic 16. Monitoring drugs

Learning goals

The role of the clinical laboratory in monitoring drugs with special interest in the laboratory methods used for dose adjustment of heparin, warfarin, direct oral anticoagulants and antiplatelet drugs.



RADIOLOGY SYLLABUS

General learning outcomes

Upon completion of this course, students should be able to:

- Demonstrate a comprehensive understanding of various diagnostic imaging modalities, with a particular emphasis on modern MRI and CT techniques, and their applications in clinical practice.
- Evaluate the technical aspects of radiological images, from X-ray to nuclear medicine and MR and CT scans, to ensure diagnostic quality and accuracy.
- Utilize contrast media effectively and ethically in different imaging procedures.
- Interpret basic imaging findings and correlate them with the underlying pathological conditions in a wide range of clinical scenarios.
- Recognize the clinical significance of interventional radiology procedures and understand their role in modern diagnostic and therapeutic interventions.
- Apply their radiological knowledge to enhance their clinical decision-making skills, including the ability to develop and follow correct diagnostic algorithms based on imaging findings.

These updated general learning outcomes encompass the importance of diagnostic imaging procedures in modern medicine and emphasize the integration of radiological knowledge into clinical practice, including the ability to correlate imaging findings with pathological substrates and follow appropriate diagnostic algorithms.

Teaching Methods:

The course will employ a combination of teaching methods, including:

Lectures: To provide foundational knowledge and principles for each topic.

Case Studies: To illustrate practical applications and enhance critical thinking.

Hands-on Training: To allow students to practice image interpretation.

Group Discussions: To encourage peer learning and problem-solving.

Laboratory Work: For practical experience in acquiring and processing images.

Topic 1. Conventional Radiography

General Learning Outcomes:

- Describe the principles and data acquisition strategies used in radiography, mammography, fluoroscopy, and angiography.
- Explain the importance of radiation safety in radiography.
- Recognize the fundamental differences between various radiographic techniques.

Specific Learning Outcomes:

Students should be able to:

- Identify and differentiate between common bone fractures and dislocations.
- Recognize the radiographic features of lung diseases such as pneumonia, pneumothorax, and pleural effusion.
- Understand the role of radiography in evaluating soft tissue abnormalities. In particular, regarding breast imaging, recognize the main mammographic features (i.e. micro-calcifications, distortions, mass lesions)



General Learning Outcomes:

- Understand the rationale for using contrast media in radiology.
- Identify relative and absolute contraindications for contrast media use.
- Discuss the role of contrast agents in different imaging modalities.

Specific Learning Outcomes:

Students should be able to:

- Explain the use of iodinated contrast media in CT scans for visualizing blood vessels and organs.
- Describe the principles of contrast-enhanced mammography for breast imaging.
- Recognize complications associated with contrast media administration, such as contrast-induced nephropathy.

Topic 3. Ultrasound, CT, and MRI

General Learning Outcomes:

- Explain the basic principles of ultrasound, computed tomography, and magnetic resonance imaging.
- Compare the strengths and limitations of each imaging modality.
- Interpret images obtained from ultrasound, CT, and MRI scans.

Specific Learning Outcomes:

Students should be able to:

- Identify normal and abnormal findings in abdominal ultrasound, including liver and kidney pathologies.
- Identify normal and the most common abnormal findings atn breast ultrasound
- Interpret CT scans to diagnose intracranial hemorrhage, brain tumors, and traumatic brain injuries.
- Recognize the advantages of MRI in evaluating soft tissue structures like breast, brain, spinal cord, and musculoskeletal system.

Topic 4. Fundamentals of Chest X-Ray Semiotics

General Learning Outcomes:

- Recognize technical adequacy and common artifacts in chest X-rays.
- Identify radiological signs of various pulmonary and pleural pathologies.

Specific Learning Outcomes: Students should be able to:

- Interpret chest X-rays to diagnose conditions like atelectasis, pleural effusion, pneumonia, pneumothorax, pneumomediastinum, pneumopericardium, and subcutaneous emphysema.
- Understand the radiological features of common chest infections and lung malignancies.

Topic 5. Radiology of Upper and Lower GI tract

General Learning Outcomes:

- Describe the radiographic evaluation of the upper and lower gastrointestinal tract.
- Recognize common gastrointestinal pathologies using imaging techniques.

Specific Learning Outcomes:

Students should be able to:



- Interpret barium studies and endoscopic procedures to diagnose conditions like gastroesophageal reflux disease (GERD), peptic ulcers, and colorectal cancers.
- Understand the radiological features of inflammatory bowel disease (IBD) and diverticulitis.

Topic 6. Radiology of the Pancreas

General Learning Outcomes:

- Explain the imaging techniques used for pancreatic evaluation.
- Recognize radiological findings in pancreatic diseases.

Specific Learning Outcomes:

Students should be able to:

- Identify pancreatic tumors, including pancreatic adenocarcinoma and pancreatic neuroendocrine tumors (PNETs).
- Recognize the complications of acute and chronic pancreatitis on imaging.

Topic 7. Fundamentals of Brain Imaging

General Learning Outcomes:

- Identify ischemic, hemorrhagic, and stroke-related abnormalities on brain images.
- Discuss the clinical significance of brain imaging findings.

Specific Learning Outcomes:

Students should be able to:

- Interpret CT and MRI scans to diagnose ischemic strokes, intracerebral hemorrhages, and subarachnoid hemorrhages.
- Recognize brain tumors, including gliomas, meningiomas, and metastases, using imaging.

Topic 8. Fundamentals of Breast Imaging

General Learning Outcomes:

- Understand the principles and techniques of breast imaging.
- Interpret mammograms and recognize the most common breast abnormalities.

Specific Learning Outcomes:

Students should be able to:

- Identify breast masses, calcifications, and architectural distortions on mammograms.
- Describe the BI-RADS (Breast Imaging Reporting and Data System) classification system and its clinical implications.

Topic 9. Interventional Radiology and Image-Guided Therapy

General Learning Outcomes:

- Explain the significance and clinical applications of interventional radiology procedures.
- Describe the role of image guidance in minimally invasive interventions.

Specific Learning Outcomes:



Students should be able to:

- Understand the indications and techniques for procedures such as angioplasty, embolization, and biopsy.
- Recognize the complications and limitations associated with interventional radiology procedures.

Topic 10. Rad-Path Correlation in Lung Cancer

General Learning Outcomes:

- Correlate radiological findings with pathological changes in lung cancer.
- Understand the staging and prognostic implications of lung cancer imaging.

Specific Learning Outcomes:

Students should be able to:

- Identify different types of lung cancer (e.g., adenocarcinoma, squamous cell carcinoma) on imaging.
- Interpret PET-CT scans for staging and treatment planning in lung cancer.

Topic 11. Rad-Path Correlation in Focal Liver Lesions

General Learning Outcomes:

- Correlate radiological findings with pathological changes in focal liver lesions.
- Discuss the diagnostic value of liver imaging in hepatobiliary diseases.

Specific Learning Outcomes:

Students should be able to:

- Recognize liver tumors, including hepatocellular carcinoma (HCC) and metastatic lesions, using imaging.
- Understand the role of contrast-enhanced imaging in characterizing liver lesions.

Topic 12. Rad-Path Correlation in Breast Cancer

General Learning Outcomes:

• Correlate radiological findings with pathological changes in breast cancer.

Specific Learning Outcomes:

Students should be able to:

• Interpret breast imaging findings and correlate them with the pathological changes for different breast diseases

Topic 13. Rad-Path Correlation in Primary Brain Tumors

General Learning Outcomes:

- Correlate radiological findings with pathological changes in primary brain tumors.
- Discuss the diagnostic challenges and treatment implications of brain tumor imaging.

Specific Learning Outcomes:

Students should be able to:



- Recognize common primary brain tumors, such as glioblastoma and meningioma, using MRI and CT scans.
- Understand the importance of functional imaging techniques like fMRI and spectroscopy in brain tumor evaluation.

Suggested books:

- Squire's Fundamentals of Radiology: Seventh Edition
- Learning Radiology, Recognizing The Basics, 4th Edition
- eBook for Undergraduate Education in Radiology from the European Society of Radiology https://www.myesr.org/education/ebook-for-undergraduate-education-in-radiology/