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.
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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

Neoplastic and not neoplastic disease of the prostate
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.

Neoplastic diseases of urinary tract and bladder
Describe the microscopic anatomy of the muscular layers of the urinary bladder.
Define a (bladder) diverticulum.

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,

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

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.

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

Laboratory medicine diagnosis of disease in the clinical laboratory - M. Laposata - Ed. McGraw Hill Professional
The PowerPoint presentations used across lectures will be made available

Learning Outcomes for specific lessons

RADIOLOGY SYLLABUS

- 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)

Topic 2. Contrast Media

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:

- 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:

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