

# Investigations



Kotkot's MED  
*life with medicine* 

Sources used for investigations:

1. Macleod's text book 14th edition
2. AMBOSS
3. Slides
4. MED study for internal medicine
5. Chat GPT for making tables
6. 020 OSCE stations

**Note** : This file has the high yield Investigations for the common medical diseases based on the previous Station's topics .

I know this field is demanding, and you may sometimes feel like you're not good enough to be here or that everyone else is doing better than you. But always remember, you were chosen to learn what many cannot even imagine learning. So keep going and do your best—first for yourself and then for your parents, because they deserve the best care you can offer. Your struggles and patience will always be noticed by your Creator, and in them lies great reward. Good luck !

# Systemized investigations from Macleod 14th Edition

## 1. Cardiovascular System

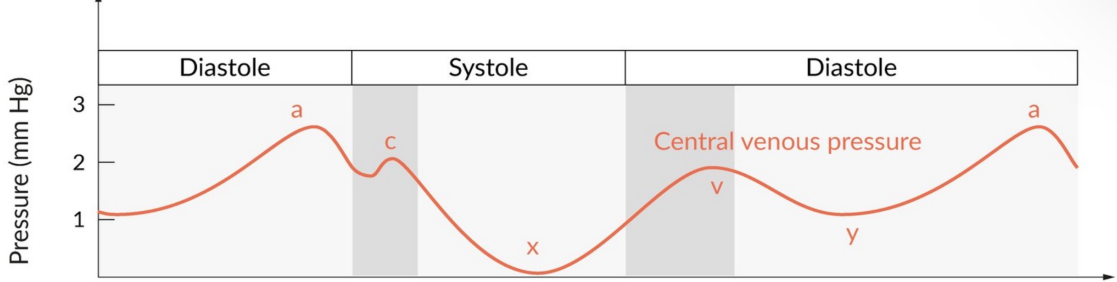
- **Laboratory Tests:** Troponins (MI, Myocarditis...) , lipid profile (Dyslipidemia), ECG
- **Imaging:**
  - **Chest X-ray:** Evaluates cardiothoracic ratio, heart failure signs (e.g., pulmonary edema).
  - **Echocardiography:** Valve function, ventricular function, Doppler studies.
  - **Cardiac MRI:** High-resolution imaging, myocardial disease.
  - **Coronary Angiography:** Evaluates coronary circulation.
  - **Radionuclide Studies:** Perfusion imaging (e.g., Technetium-99, Thallium).
  - **CT Angiography:** Coronary artery evaluation, aortic aneurysms.
- **Procedures:** Cardiac catheterization.(PCI for atherosclerotic occluded coronary vessels).

## 2. Respiratory System

- **Laboratory Tests:** Arterial blood gases (ABG ;in case of exacerbation in Obstructive lung disease ,CBC (leukocytes in Infection ;pneumonia ),RAST test for IgE Ab for allergic reactions ,D-dimer (for PE)
- **Imaging:**
  - **Chest X-ray:** Pneumonia(Opacification) , effusion (Transudate or Exudate ? Refere to Lights criteria ) , pulmonary edema
  - **CT scan:** Lung nodules, fibrosis, and embolism (CTPA with contrast)
- **Procedures:** Spirometry (with reversibility for Asthma , With DLCO for Sarcoidosis ) , bronchoscopy ( BAL : brochoalveolar lavagein case of looking for the cause of infection ;TB,Exacerbation of COPD )  
more than MRI

Table 6-2: Typical PFTs

	VC	TLC	FEV <sub>1</sub>	FEV <sub>1</sub> /FVC	RV	DLCO
<u>Restrictive Intrathoracic</u>	↓	↓ (< 80%)	↓ or normal	NI	↓	↓
<u>Restrictive Extrathoracic</u>	↓	↓ (< 80%)	↓ or normal	NI	↓	NI
<u>Obstructive</u>	↑	NI to ↑	↓	↓ (< 70%)	↑↑	NI to ↓



### Jugular venous pressure waveform

Normal jugular venous pressure (JVP) waveforms have three waves (a, c, v) and two descents (x, y) that occur in the following order:

- a wave: caused by atrial contraction
- c wave: caused by tricuspid valve closure
- x descent: caused by atrial relaxation
- v wave: caused by venous refilling of the atria
- y descent: caused by passive filling of the right ventricle when the tricuspid valve opens

© AMBOSS

#### JVP waves and abnormalities <sup>[1]</sup>

Wave	Description	Abnormalities
<b>a wave</b>	• The first peak caused by atrial contraction	• Absent in atrial fibrillation
<b>c wave</b>	• The second peak caused by tricuspid valve closure, contraction of the right ventricle, and bulging of the tricuspid valve into the right atrium	• cv wave : severe tricuspid valve regurgitation
<b>x descent</b>	• A drop in JVP caused by atrial relaxation	• Absent in: <ul style="list-style-type: none"> <li>◦ Tricuspid valve regurgitation</li> <li>◦ Right heart failure</li> </ul>
<b>v wave</b>	• The third peak caused by venous refilling of the right atrium against the closed tricuspid valve	• Prominent in: <ul style="list-style-type: none"> <li>◦ Tricuspid valve regurgitation</li> <li>◦ Right heart failure</li> </ul>
<b>y descent</b>	• A drop in JVP caused by decreased right atrial pressure as blood flows into the right ventricle after opening of the tricuspid valve	• Prominent in: <sup>[7]</sup> <ul style="list-style-type: none"> <li>◦ Tricuspid valve regurgitation</li> <li>◦ Constrictive pericarditis</li> </ul> <ul style="list-style-type: none"> <li>• Absent in: <ul style="list-style-type: none"> <li>◦ Cardiac tamponade</li> <li>◦ Tricuspid valve stenosis</li> </ul> </li> </ul>

**JVP OSCE station for doc020!**

## 4.15 Differences between carotid artery and jugular venous pulsation

Carotid	Jugular
Rapid outward movement	Rapid inward movement
One peak per heart beat	Two peaks per heart beat (in sinus rhythm)
Palpable	Impalpable
Pulsation unaffected by pressure at the root of the neck	Pulsation diminished by pressure at the root of the neck
Independent of respiration	Height of pulsation varies with respiration
Independent of the position of the patient	Varies with the position of the patient
Independent of abdominal pressure	Rises with abdominal pressure

## Pulmonary physical Findings

	Main symptom	Tactile fremitus	Percussion	Auscultation (breath sounds)	Tracheal deviation
<b>Physiological</b>	-	Normal	Resonant	Vesicular	None
<b>Pleural effusion</b>	Dyspnea may be present	Decreased	Dull	Decreased	To the opposite side of the lesion (no deviation in small effusions)
<b>Pulmonary edema</b>	Severe dyspnea	Possibly increased	Dull	Fine or coarse crackles, depending on severity	None
<b>Simple pneumothorax</b>	Acute dyspnea	Decreased or absent	Hyperresonant	Decreased or absent	None
<b>Tension pneumothorax</b>	Severe dyspnea	Decreased or absent	Hyperresonant	Decreased or absent	To the opposite side of the lesion
<b>Bronchial asthma</b> <sup>1</sup>	Paroxysmal attacks of dyspnea, wheezing	Decreased	Hyperresonant	Wheeze, a prolonged expiratory phase, possibly decreased breath sounds	None
<b>Chronic bronchitis</b> <sup>1</sup>	Chronic cough	Decreased	Hyperresonant	Wheezing, rhonchi	None
<b>Emphysema</b>	Chronic dyspnea	Decreased	Hyperresonant	End-expiratory wheezing, decreased breath sounds	None
<b>Pneumonia</b> <sup>2</sup>	Fever, dyspnea	Increased	Dull	Coarse crackles	None
<b>Lung fibrosis</b>	Cachexia and weakness, dyspnea	Normal or slightly increased	Dull	Basal inspiratory crackles	To the side of the lesion
<b>Atelectasis</b>	Pain may be present	Decreased	Dull	Decreased	To the side of the lesion
<b>Pulmonary embolism</b> <sup>1</sup>	Acute dyspnea, pleuritic chest pain, tachypnea	Normal	Normal	Normal	None
<b>Tumor</b> <sup>1,2,3</sup>	Hemoptysis, constitutional symptoms (weight loss, fever, night sweats)	Possibly decreased	Possibly dull	Possibly decreased	To the opposite side of the lesion

The following conditions frequently complicate the aforementioned pulmonary disease: <sup>1</sup>pneumonia, <sup>2</sup>pleural effusion, <sup>3</sup>atelectasis.

Primary pleural fluid analysis			
Laboratory parameters	Transudative effusion	Exudative effusion	
Light criteria	Pleural fluid protein/serum protein ratio	• $\leq 0.5$	• $> 0.5$
	Pleural fluid LDH/serum LDH ratio	• $\leq 0.6$	• $> 0.6$
	Pleural fluid LDH	• $< \frac{2}{3}$ the upper limit of normal serum LDH	<ul style="list-style-type: none"> <li>• Pleural fluid LDH <math>&gt; \frac{2}{3}</math> the upper limit of normal serum LDH</li> <li>• Very high LDH levels, e.g., <math>&gt; 1000</math> U/L, suggest empyema, malignancy, or rheumatoid effusion.</li> </ul>
Pleural fluid cholesterol	• $< 45$ mg/dL	• $> 55$ mg/dL	
Pleural fluid LDH	• $< 200$ U/L	• $> 200$ U/L	
Pleural fluid cholesterol:serum cholesterol ratio	• $< 0.3$	• $> 0.3$	

Light criteria for pleural fluid

### Well's criteria for PE

Modified Wells criteria for deep vein thrombosis [19][20][21]		
Criteria		Score
Medical history	Active cancer	+ 1
	Previously documented DVT	+ 1
Immobilization	Paralysis, paresis, or recent (cast) immobilization of lower extremity	+ 1
	Recently bedridden for $\geq 3$ days OR underwent major surgery within the past 12 weeks under general/local anesthesia	+ 1
Clinical features	Tenderness localized along the deep venous system	+ 1
	Swelling of the entire leg	+ 1
	Calf swelling $\geq 3$ cm compared to the contralateral leg	+ 1
	Pitting edema confined to the symptomatic leg	+ 1
Differential diagnosis	Distended collateral superficial veins (nonvaricose)	+ 1
	Alternative diagnosis as likely as or more likely than DVT	- 2

### Interpretation (pretest probability for DVT) [15]

- 0: low
- 1–2: intermediate
- $\geq 3$ : high

## CURB-65 score for pneumonia patients admission

- **CURB-65 score** <sup>[31]</sup>
  - **Confusion** (disorientation, impaired consciousness)
  - Serum **Urea** > 7 mmol/L or B **UN** > 20 mg/dL
  - **Respiratory rate** ≥ 30/min
  - **Blood pressure**: systolic BP ≤ 90 mm Hg or diastolic BP ≤ 60 mm Hg
  - Age ≥ **65** years
  - **Interpretation**
    - CURB-65 score 0 or 1: The patient may be treated as an outpatient.
    - CURB-65 score ≥ 2: Hospitalization is indicated.



The CURB-65 score and PSI are tools for evaluating the risk of mortality. They have not been validated for determining the necessity for ICU admission.

## CHA<sub>2</sub>DS<sub>2</sub>-VAsC score :system for assessing the risk of stroke in Afib.

<b>CHA<sub>2</sub>DS<sub>2</sub>-VAsC score</b> <sup>[50][8][13]</sup>	
<b>Risk factor</b>	<b>Points</b>
<b>Congestive heart failure or LV dysfunction</b>	1
<b>Hypertension</b>	1
<b>Age ≥ 75 years</b>	2
<b>Diabetes mellitus</b>	1
<b>Prior stroke, transient ischemic attack, or thromboembolism</b>	2
<b>Vascular disease</b>	1
<b>Age 65–74 years</b>	1
<b>Sex: female</b> <sup>[51]</sup>	1
<b>Risk of stroke</b> <sup>[8][13]</sup>	
<ul style="list-style-type: none"> <li>• 0 points (male) or 0–1 point (female): low risk</li> <li>• 1 point (male) or 2 points (female): intermediate risk</li> <li>• ≥ 2 points (male) or ≥ 3 points (female): high risk</li> </ul>	

### 3. Gastrointestinal System

- Laboratory Tests: Stool calprotectin (to differentiate between IBD and other Gastrointestinal Disorders like IBS , **liver function tests bilirubin, AST, ALT**,// GGT,ALP (for cholestatic causes )ascitic fluid analysis (please Refere to **SAAG** ) ,amylase ,lipase (pancreatitis),tTG-IgG/ IgA(ceeliac disease) ,

#### - Imaging :

- Abdominal **Ultrasound**: Gallstones, liver masses.
- Abdominal CT/MRI: **Pancreatitis, tumors, staging.**
- **MRE**: Magnetic resonance Enterography Now it's used for visualization of IBD changes
- **Barium** studies: GI obstruction (Esophageal ;Barium swallow ,lower : Barium enema ), or diverticulosis.
- **MRCP**: Obstructive jaundice( Diagnostic MRI for the biliary tree) .

#### - Procedures:

- **Endoscopies**: Upper (gastric ulcers, persistent GERD despite PPI ,Red flags of Upper GI symptoms ), lower (colonoscopy).
- **ERCP**:(Therapeutic more than Diagnostic due to risk of Pancreatitis) for Bile duct **stones**, strictures.
- **Capsule Endoscopy**: Small bowel evaluation (IBD ;Crohn's disease )

### 5. Renal and Urological System

- Laboratory Tests:

- **Urinalysis, Dipstick** : Blood, protein, nitrites.
- Serum Electrolytes, **Creatinine(Normal is 0.6-1.2)** , **eGFR**.
- Plasma and urine osmolality (Sodium disorders ;HypoNa,HyperNa)

#### - Imaging:

- Renal **Ultrasound**: Obstruction, cysts.
- CT scan for Tumors , Stones ( Ct without contrast )
- Renal artery Doppler U/S ( renal artery stenosis )
- CT KUB: Stones.
- Renal Doppler: Vascular evaluation.
- Isotope Scans: Functional assessment.
- Procedures: Urodynamic studies, renal biopsy.



# Urinalysis

<b>Casts in urine</b>	Presence of casts indicates that hematuria/pyuria is of glomerular or renal tubular origin. Bladder cancer, kidney stones → hematuria, no casts. Acute cystitis → pyuria, no casts. All casts contain a matrix composed primarily of Tamm-Horsfall mucoprotein (uromodulin), secreted by renal tubular cells to prevent UTIs.
<b>RBC casts A</b>	Glomerulonephritis, hypertensive emergency.
<b>WBC casts B</b>	Tubulointerstitial inflammation, acute pyelonephritis, transplant rejection. <i>UTI</i>
<b>Granular casts C</b>	Acute tubular necrosis (ATN). Can be “muddy brown” in appearance.
<b>Fatty casts (“oval fat bodies”)</b>	Nephrotic syndrome. Associated with “Maltese cross” sign D.
<b>Waxy casts</b>	End-stage renal disease/chronic kidney disease.
<b>Hyaline casts E</b>	Nonspecific, can be a normal finding with dehydration, exercise, or diuretic therapy.

## 6.10 Causes of hepatomegaly

### Chronic parenchymal liver disease

- Alcoholic liver disease
- Hepatic steatosis
- Autoimmune hepatitis
- Viral hepatitis
- Primary biliary cirrhosis

### Malignancy

- Primary hepatocellular cancer
- Secondary metastatic cancer

### Right heart failure

### Haematological disorders

- Lymphoma
- Leukaemia
- Myelofibrosis
- Polycythaemia

### Rarities

- Amyloidosis
- Budd–Chiari syndrome
- Sarcoidosis
- Glycogen storage disorders

## 6.13 Causes of splenomegaly

### Haematological disorders

- Lymphoma and lymphatic leukaemias
- Myeloproliferative diseases, polycythaemia rubra vera and myelofibrosis
- Haemolytic anaemia, congenital spherocytosis

### Portal hypertension

### Infections

- Glandular fever
- Malaria, kala-azar (leishmaniasis)
- Bacterial endocarditis
- Brucellosis, tuberculosis, salmonellosis

### Rheumatological conditions

- Rheumatoid arthritis (Felty’s syndrome)
- Systemic lupus erythematosus

### Rarities

- Sarcoidosis
- Amyloidosis
- Glycogen storage disorders

## 6.17 Investigations in gastrointestinal and hepatobiliary disease

Investigation	Indication/comment
<b>Clinical samples</b>	
Stool:	
Faecal occult blood	Gastrointestinal haemorrhage; sensitive but not specific; used as population screening tool for colorectal cancer
Faecal calprotectin	Inflammatory bowel disease – raised
Urine: dipstick or biochemistry	Jaundice (see <a href="#">Box 6.7</a> )
Ascitic fluid: diagnostic tap	Acute abdominal pain Clear/straw-coloured – normal Uniformly blood-stained – malignancy Turbid – infection Chylous – lymphatic obstruction High protein (exudate) – inflammation or malignancy Low protein (transudate) – cirrhosis and portal hypertension
<b>Radiology</b>	
Chest X-ray	Suspected acute abdomen, suspected perforated viscus or subphrenic abscess Pneumonia, free air beneath diaphragm, pleural effusion, elevated diaphragm
Abdominal X-ray	Intestinal obstruction, perforation, renal colic Fluid levels, air above liver, urinary tract stones
Barium meal	Rarely indicated unless gastroscopy not possible and there is suspicion of pharyngeal or gastric outlet obstruction on clinical symptoms (dysphagia or vomiting) Oesophageal obstruction (endoscopy preferable, especially if previous gastric surgery) Subacute small bowel obstruction, duodenal diverticulosis
Small bowel follow-through	Crohn's disease, lymphoma, obscure gastrointestinal bleeding
Small bowel magnetic resonance imaging or magnetic resonance enteroclysis (real-time imaging of liquid moving through the small bowel)	
CT colonography	Altered bowel habit, iron deficiency anaemia, rectal bleeding: alternative to colonoscopy in the frail, sick patient, if colonoscopy is unsuccessful or if not acceptable to patient to diagnose colon cancer, inflammatory bowel disease or diverticular disease; useful in colon cancer screening
Abdominal ultrasound scan	Biliary colic, jaundice, pancreatitis, malignancy
Abdominal CT	Gallstones, liver metastases, cholestasis, pancreatic calcification, subphrenic abscess Acute abdomen, suspected pancreatic or renal mass, tumour staging, abdominal aortic aneurysm
MR cholangiopancreatography (MRCP)	Confirms or excludes metastatic disease and leaking from aortic aneurysm
Pelvic ultrasound scan	Obstructive jaundice, acute and chronic pancreatitis Pelvic masses, inflammatory diseases, ectopic pregnancy, polycystic ovary syndrome Pelvic structures and abnormalities Ascitic fluid
<b>Invasive procedures</b>	
Upper gastrointestinal endoscopy	Dysphagia, dyspepsia, gastrointestinal bleeding, gastric ulcer, malabsorption Gastric and/or duodenal biopsies are useful
Lower gastrointestinal endoscopy (colonoscopy)	Rectal bleeding, obscure gastrointestinal bleeding, altered bowel habit, iron deficiency anaemia Able to biopsy lesions and remove polyps
Video capsule endoscopy	Obscure gastrointestinal bleeding with bidirectional negative endoscopies, suspected small bowel disease (vascular malformations, inflammatory bowel disease)
Endoscopic retrograde cholangiopancreatography (ERCP)	Obstructive jaundice, acute and chronic pancreatitis Mainly therapeutic role Stenting strictures and removing stones
Endoscopic ultrasound ± fine-needle aspiration (FNA) or Tru-Cut needle biopsy	Staging of upper gastrointestinal or pancreatobiliary cancer Drainage of pancreatic pseudocysts
Laparoscopy	Suspected appendicitis or perforated viscus, suspected ectopic pregnancy, chronic pelvic pain (e.g. due to endometriosis or pelvic inflammatory disease), suspected ovarian disease (e.g. ruptured ovarian cyst), peritoneal and liver disease
Ultrasound- or CT-guided aspiration cytology and biopsy	Liver metastases, intra-abdominal or retroperitoneal tumours
Liver biopsy	Parenchymal disease of liver Tissue biopsy by percutaneous, transjugular or laparoscopic route
<b>Others</b>	
Pancreatic function tests	Stool elastase, pancreolauryl test

## 6.14 Causes of ascites

Diagnosis	Comment
<b>Common</b>	
Hepatic cirrhosis with portal hypertension	Transudate
Intra-abdominal malignancy with peritoneal spread	Exudate, cytology may be positive
<b>Uncommon</b>	
Hepatic vein occlusion (Budd–Chiari syndrome)	Transudate in acute phase
Constrictive pericarditis and right heart failure	Check jugular venous pressure and listen for pericardial rub
Hypoproteinaemia (nephrotic syndrome, protein-losing enteropathy)	Transudate
Tuberculous peritonitis	Low glucose content
Pancreatitis, pancreatic duct disruption	Very high amylase content

# = 200

Serum Albumin – Ascitic Albumin

	SAAG (g/dL)	
	$\geq 1.1$	$< 1.1$
<b>Total protein (g/dL)</b>		Both cases have low SAAG + low protein
$< 2.5$ (liver problem)	Cirrhosis	Nephrotic syndrome
	Acute liver failure	Malabsorptive $\rightarrow$ + Celiac disease + Short Bowel Syndrome
$\geq 2.5$	CHF	Peritoneal carcinomatosis
	Constrictive pericarditis	TB peritonitis
at the beginning the patients aren't cirrhotic yet	Budd-Chiari syndrome	Malignancy $\rightarrow$ low SAAG + High protein TB $\rightarrow$ it's located inside the peritoneal fluid due to peritoneal pathology of inflammation
So there's still Total protein $> 2.5$ at with progression it could transform into Liver Cirrhosis	Veno-occlusive disease	Chylous ascites

Type of Hepatitis	Diagnostic Tests	Key Findings
Hepatitis A	- <b>Anti-HAV IgM</b> (Acute infection)	Positive in acute or recent HAV infection.
	- <b>Anti-HAV IgG</b> (Immunity)	Indicates past infection or vaccination.
Hepatitis B	- <b>HBsAg</b> (Hepatitis B surface antigen)	Positive in active infection (acute or chronic).
	- <b>Anti-HBs</b> (Antibodies to HBsAg)	Indicates immunity from vaccination or past infection.
	- <b>Anti-HBc IgM</b> (IgM antibodies to core antigen)	Positive in acute or recent infection.
	- <b>Anti-HBc IgG</b> (IgG antibodies to core antigen)	Indicates previous or ongoing infection.
	- <b>HBeAg</b> (Hepatitis B e-antigen)	Marker of active viral replication and infectivity.
Hepatitis C	- <b>HBV DNA (PCR)</b>	Quantifies viral load; used to monitor treatment response.
	- <b>Anti-HCV antibodies</b>	Indicates past or current infection; cannot distinguish active from resolved infection.
	- <b>HCV RNA (PCR)</b>	Detects and quantifies active viral replication; confirms active infection.
	- <b>HCV Genotype Testing</b>	Identifies HCV genotype for treatment planning.
Hepatitis D	- <b>Anti-HDV antibodies (IgM and IgG)</b>	Indicates past or current HDV infection.
	- <b>HDV RNA (PCR)</b>	Confirms active replication of HDV.
	- <b>HBsAg</b>	Required for HDV replication as HDV is dependent on HBV.
Hepatitis E	- <b>Anti-HEV IgM</b>	Positive in acute HEV infection.
	- <b>Anti-HEV IgG</b>	Indicates past HEV infection or exposure.
	- <b>HEV RNA (PCR)</b>	Confirms active infection, especially in immunocompromised patients.

## Notes:

- **Serology** is typically used for initial screening.
- **Molecular Testing (PCR)** is crucial for confirming active infections and assessing viral loads.
- Tests like liver function tests (LFTs), including **ALT**, **AST**, and **bilirubin levels**, are also done alongside serological and molecular tests to assess liver damage.

## Hepatitis serology testing

## 6. Endocrine System

Thyroid :TSH,T3,T4, thyroglobulin Abs,TSH receptor

Graves: Thyroid-Stimulating Immunoglobulins (TSI) , Thyrotropin Receptor Antibodies (TRAb),

Thyroid Peroxidase Antibodies (TPOAb)

Physiologic state	Serum TSH	Serum Free T4	Serum T3	24-h radioiodine uptake
Hyperthyroidism, untreated	Low	High	High	High
Hyperthyroidism, T3 toxicosis	Low	Normal	High	Normal or High
Primary Hypothyroidism, untreated	High	Low	Low or Normal	Low or Normal
Hypothyroidism secondary to pituitary disease	Low or Normal	Low	Low or Normal	Low or Normal
Euthyroid, on exogenous thyroid hormone	Normal	Normal on T4, Low on T3	High on T3, Normal on T4	Low

Test	Normal Value
TSH	0.5 to 5.0 mU/L
Total T4	60 to 145 nmol/L
Total T3	1.1 to 3 nmol/L
Free T4	0.01-0.03nmol/L

DM: Random blood sugar ,FPG, HBA1C,OGTT

### Categories of increased risk for diabetes (prediabetes)\*

FPG 100 to 125 mg/dL (5.6 to 6.9 mmol/L) – IFG

2-hour post-load glucose on the 75 g OGTT 140 to 199 mg/dL (7.8 to 11.0 mmol/L) – IGT

A1C 5.7 to 6.4% (39 to 46 mmol/mol)

### American Diabetes Association criteria for the diagnosis of diabetes

1. A1C  $\geq 6.5\%$ . The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.\*

**OR**

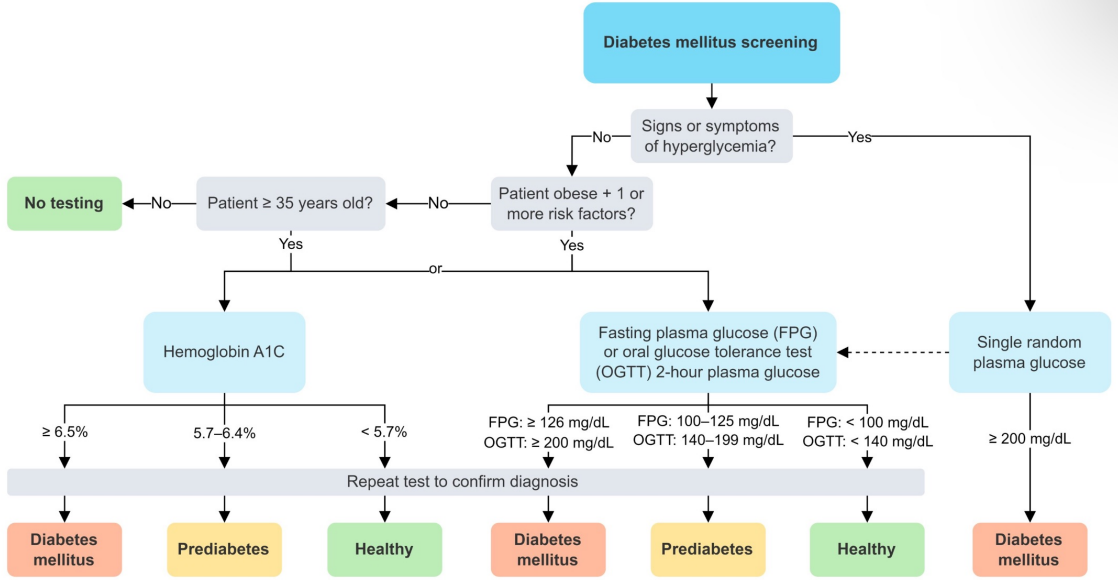
2. FPG  $\geq 126$  mg/dL (7 mmol/L). Fasting is defined as no caloric intake for at least 8 hours.\*

**OR**

3. 2-hour plasma glucose  $\geq 200$  mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.\*

**OR**

4. In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose  $\geq 200$  mg/dL (11.1 mmol/L).



### 10.5 Causes of secondary diabetes

Cause of diabetes	Examples	Clinical features
Pancreatic disease	Pancreatitis Trauma/pancreatectomy Neoplasia Cystic fibrosis Haemochromatosis	Abdominal pain Surgical scar Weight loss Chronic cough, purulent sputum Skin pigmentation ('bronze diabetes')
Endocrinopathies	Acromegaly, Cushing's syndrome	p. 202
Drugs	Glucocorticoids (e.g. prednisolone) Antipsychotics (e.g. olanzapine) Immunosuppressants (e.g. ciclosporin, tacrolimus)	Features of Cushing's syndrome (see Fig. 10.11) Gum hypertrophy may be seen with ciclosporin use
Pregnancy	Gestational diabetes may develop in the third trimester	Gravid uterus
Monogenic defects in beta-cell function	Glucokinase deficiency	Glucokinase deficiency is present from birth with stable mild hyperglycaemia
Genetic syndromes associated with diabetes	Down's syndrome Turner's syndrome	p. 36 p. 36

\*Based on classification by the American Diabetes Association.

### 10.3 Investigations in thyroid disease

Investigation	Indication/comment
<b>Biochemistry</b>	
Thyroid function tests	To assess thyroid status
<b>Immunology</b>	
Antithyroid peroxidase antibodies	Non-specific, high in autoimmune thyroid disease
Antithyroid stimulating hormone receptor antibodies	Specific for Graves' disease
<b>Imaging</b>	
Ultrasound	Goitre, nodule
Thyroid scintigraphy ( <sup>123</sup> I, <sup>99m</sup> Tc)	To assess areas of hyper-/hypocactivity
Computed tomography	To assess goitre size and aid surgical planning
<b>Invasive/other</b>	
Fine-needle aspiration cytology	Thyroid nodule
Respiratory flow-volume loops	To assess tracheal compression from a large goitre

### 10.7 Investigations in diabetes

Investigation	Indication/comment
<b>Diagnostic investigations</b>	
Fasting glucose, random glucose, oral glucose tolerance test HbA <sub>1c</sub>	To make a diagnosis of diabetes. Patients will also monitor capillary blood glucose to adjust their treatment Can be used for diagnosis of type 2 diabetes and to assess glycaemic burden
Urine or blood ketone measurement	Ketones suggest insulin deficiency, which occurs in type 1 diabetes and in diabetes due to pancreatic pathology
Pancreatic antibodies (anti-GAD and islet cell)	To confirm a diagnosis of autoimmune diabetes
<b>Annual review investigations</b>	
HbA <sub>1c</sub>	An important measure of glycaemic control over the preceding 3 months; predicts risk of complications
Urea and electrolytes	To assess for the presence of diabetic nephropathy
Lipid profile	To aid estimation of cardiovascular risk and guide treatment with lipid-lowering therapy
Thyroid function tests	To screen for the commonly associated hypothyroidism
Urine albumin:creatinine ratio	To assess for early signs of diabetic nephropathy (microalbuminuria)
Digital retinal photography or funduscopy	To screen for diabetic retinopathy and/or maculopathy

GAD, glutamic acid decarboxylase.

## 6. Musculoskeletal System & Rheumatology

- Laboratory Tests:

- **Inflammatory markers: ESR, CRP.**

- Autoimmune antibodies: ANA, RF, Anti-CCP.

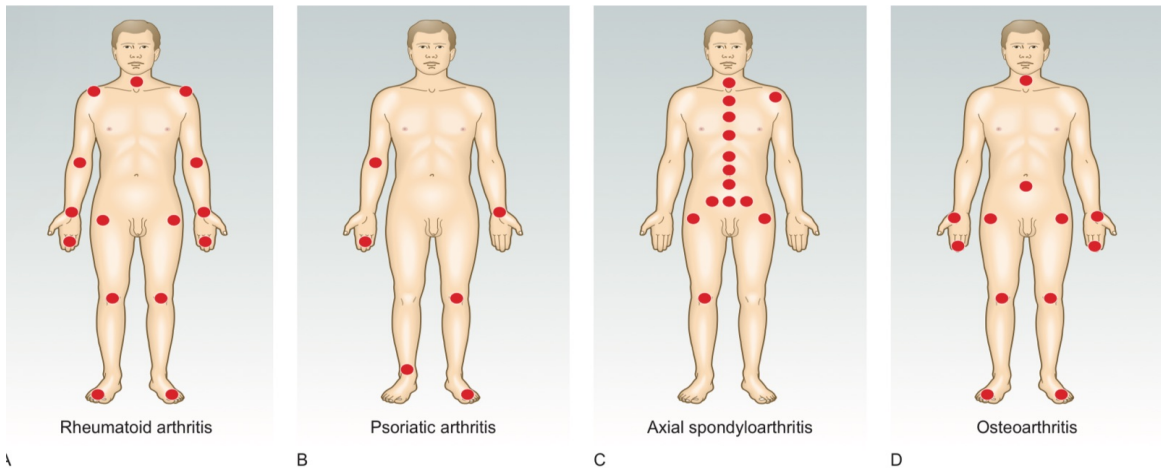
- Imaging:

- X-rays: Joint abnormalities, fractures.

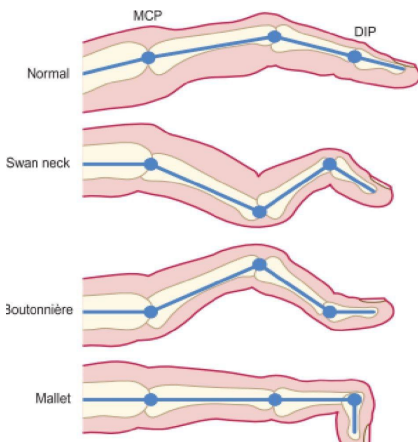
- MRI: Soft tissue and cartilage evaluation.

- Bone Scans: Paget's disease, metastasis.

- Procedures: Joint aspiration for synovial fluid analysis.



**fig. 13.3** Contrasting patterns of joint involvement in polyarthritis. **A** Rheumatoid arthritis (symmetrical, small and large joints, upper and lower limbs). **B** Psoriatic arthritis (asymmetrical, large > small joints, swelling of a whole digit – dactylitis, enthesitis). **C** Axial spondyloarthritis (spine and sacroiliac joints, asymmetrical peripheral arthritis, large > small joints, enthesitis). **D** Osteoarthritis (symmetrical, small and large joints, base of thumb, 1st interphalangeal joints).



### 13.7 Drugs associated with adverse musculoskeletal effects

Drug	Possible adverse musculoskeletal effects
Glucocorticoids	Osteoporosis, myopathy, osteonecrosis, infection
Statins	Myalgia, myositis, myopathy
Angiotensin-converting enzyme inhibitors	Myalgia, arthralgia, positive antinuclear antibody
Antiepileptics	Osteomalacia, arthralgia
Immunosuppressants	Infections
Quinolones	Tendinopathy, tendon rupture

### 13.5 Extra-articular signs in rheumatoid arthritis

Condition	Extra-articular signs
Rheumatoid arthritis	Rheumatoid nodules, palmar erythema, episcleritis, dry eyes, interstitial lung disease, pleural $\pm$ pericardial effusion, small-vessel vasculitis, Raynaud's phenomenon, low-grade fever, weight loss, lymphadenopathy, splenomegaly, leg ulcers
Psoriatic arthritis	Psoriasis, nail pitting, onycholysis, enthesitis, dactylitis
Reactive arthritis	Urethritis, mouth and/or genital ulcers, conjunctivitis, iritis, enthesitis (inflammation of tendon or ligament attachments), e.g. Achilles enthesitis/plantar fasciitis, rash (keratoderma blenorrhagica)
Axial spondyloarthritis	Inflammatory bowel disease, psoriasis, enthesitis, iritis, aortic regurgitation, apical interstitial fibrosis
Septic arthritis	Fever, malaise, source of sepsis, e.g. skin, throat, gut
Gout	Tophi, signs of renal failure or alcoholic liver disease
Sjögren's syndrome	'Dry eyes' (keratoconjunctivitis sicca), xerostomia (reduced or absent saliva production), salivary gland enlargement, Raynaud's phenomenon, neuropathy
Systemic lupus erythematosus	Photosensitive rash, especially on face, mucocutaneous ulcers, alopecia, fever, pleural $\pm$ pericardial effusion, diaphragmatic paralysis, pulmonary fibrosis (rare), Raynaud's phenomenon, lymphopenia
Systemic sclerosis	Skin tightening (scleroderma, see Fig. 3.30C), telangiectasia, Raynaud's phenomenon, calcific deposits in fingers, dilated nail-fold capillaries, pulmonary fibrosis
Adult-onset Still's disease	Rash, fever, hepatomegaly, splenomegaly
Other	Erythema nodosum of shins in sarcoidosis, viral rashes, drug rashes

### 13.20 Common musculoskeletal investigations

Investigation	Indication/comment
<b>Urinalysis</b>	
Protein	Glomerular disease, e.g. SLE, vasculitis Secondary amyloid in RA and other chronic arthropathies Drug adverse effects, e.g. myocrisin, penicillamine
Blood	Glomerular disease, e.g. SLE, vasculitis
<b>Haematological</b>	
Full blood count	Anaemia in inflammatory arthritis, blood loss after trauma Neutrophilia in sepsis and very acute inflammation, e.g. acute gout Leucopenia in SLE, Felty's syndrome and adverse effects of antirheumatic drug therapy
Erythrocyte sedimentation rate/plasma viscosity	Non-specific indicator of inflammation or sepsis
C-reactive protein	Acute-phase protein
<b>Biochemical</b>	
Urea and creatinine	$\uparrow$ in renal impairment, e.g. secondary amyloid in RA or adverse drug effect
Uric acid	May be $\uparrow$ in gout. Levels may be normal during an acute attack
Calcium	$\downarrow$ in osteomalacia; normal in osteoporosis
Alkaline phosphatase	$\uparrow$ in Paget's disease, metastases, osteomalacia and immediately after fractures
Angiotensin-converting enzyme	$\uparrow$ in sarcoidosis
Urinary albumin:creatinine ratio	Glomerular disease, e.g. vasculitis, SLE
<b>Serological</b>	
Immunoglobulin M rheumatoid factor	$\uparrow$ titres in 60–70% of cases of RA; occasionally, low titres in other connective diseases. Present in up to 15% of normal population. Superseded by anti-cyclic citrullinated peptide antibodies
Anti-cyclic citrullinated peptide antibody (ACPA)	Present in 60–70% of cases of RA and up to 10 years before onset of disease. Highly specific for RA. Occasionally found in Sjögren's syndrome
Antinuclear factors	$\uparrow$ titres in most cases of SLE; low titres in other connective tissue diseases and RA
Anti-Ro, Anti-La	Sjögren's syndrome



## 13.20 Common musculoskeletal investigations – cont'd

Investigation	Indication/comment
Anti-double-stranded DNA	SLE
Anti-Sm	SLE
Anti-ribonucleoprotein	Mixed connective tissue disease
Antineutrophil cytoplasmic antibodies	Granulomatosis with polyangiitis, polyarteritis nodosa, Churg–Strauss vasculitis
<b>Other</b>	
Schirmer tear test, salivary flow test	Keratoconjunctivitis sicca (dry eyes), Sjögren's syndrome
<b>Imaging</b>	
Plain radiography (X-ray)	Fractures, erosions in RA and psoriatic arthritis, osteophytes and joint-space loss in osteoarthritis, bone changes in Paget's disease, pseudofractures (Looser's zones) in osteomalacia
Ultrasonography	Detection of effusion, synovitis, cartilage breaks, enthesitis and erosions in inflammatory arthritis. Double contour sign in gout Detection of bursae, tendon pathology and osteophytes
Magnetic resonance imaging	Joint and bone structure; soft-tissue imaging
Computed tomography	High-resolution scans of thorax for pulmonary fibrosis
Dual-energy X-ray absorptiometry	Gold standard for determining osteoporosis. Usual scans are of lumbar spine, hip and lateral vertebral assessment for fractures
Isotope bone scan	Increased uptake in Paget's disease, bone tumour, infection, fracture. Infrequently used due to high radiation dose.
<b>Joint aspiration/biopsy</b>	
Synovial fluid microscopy	Inflammatory cells, e.g. ↑ neutrophils in bacterial infection
Polarised light microscopy	Positively birefringent rhomboidal crystals – calcium pyrophosphate (pseudogout) Negatively birefringent needle-shaped crystals – monosodium urate monohydrate (gout)
Bacteriological culture	Organism may be isolated from synovial aspirates
Biopsy and histology	Synovitis – RA and other inflammatory arthritides

RA, *rheumatoid arthritis*; SLE, *systemic lupus erythematosus*.

### Medicine OSCE 020

23/05/2024

#### 1. Abdominal palpation and percussion

Q1) DDX for 11cm palpable liver span and nodular:

Cirrhosis

Q2) DDX for hard liver edge

(ans. Malignancy)

Q3) ddx for pulsatile liver:

right sided heart failure with tricuspid regurgitation. ++ the patient was smoker with COPD:  
hyperinflation

#### 2. PEx ant. Chest with general

Q) name investigations for pneumonia (chest xray)

What does indrawing of intercostal spaces indicate?

Accessory muscle use and respiratory failure

### 3. Hx DVT

Name risk factors (travel/ pregnancy / ocp / family hx/ sx)

Q1) name 3 complications

(PE/compartment syndrome/venous ulcer(postthrombotic syndrome))

Q2) name 3 investigations

(d-dimer / venography) + Doppler US

### 020 Internal OSCE

#### DAY 1

- Hx Thyroid (hypothyroidism)
- PEx posterior chest with general
- JVP examination

### 020 Internal OSCE

#### DAY 2

Hx: 18 years old single female came to your clinic with uncontrolled hypertension 200/100

Take focused history for secondary hypertension causes

Physical:

1-Precordium without general

Dx: 35 years old male, mid systolic murmur increased with valsalva maneuver :

HOCM

2-patient diagnosis with along hepatitis B, General+Inspection for abdomen + splenomegaly

Mention hepatic decompensation symptoms