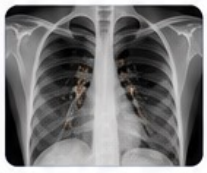
1. GENERAL PRINCIPLES OF PHYSICAL EXAMINATION

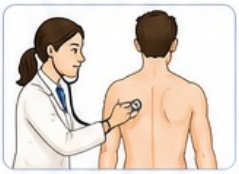
- Subtle abnormalities in the demeanor, gait, or appearance even before the consultation begins.

Imagine that the clinician is a detective gathering clues while the physical assessment is the investigation.

- With modern technological advances, we have been seeing an increase in the reliance on imaging and laboratory testing for the diagnosis.
- But that does not decrease the importance of physical examination.
- Diagnostic investigations such as detection of interstitial edema on a chest ray in heart failure is subject to variation between clinicians, and it is not always more sensitive than detection of physical signs such as audible crackles on auscultation of the lungs.
- And there are some diseases that can be diagnosed only by detection of a characteristic pattern of physical examination.



Interstitial edema on chest X-ray (variable)



Audible crackles on auscultation (clinical sign)

Key Point

Technology supports, but does not replace the value of skilled clinical examination.

2. PREPARING FOR PHYSICAL EXAMINATION

1. Introduce yourself to the patient and seek permission to conduct the consultation.
2. Ask for a chaperone, or offer a chaperone.
3. Maintain an environment that is private, well-lit, and warm.
4. **Hand hygiene** – follow these steps and warm your hands.
5. Ensure all your equipment is with you.
6. Make sure the posture of the patient is correct for the examination (e.g., sitting upright, supine).
7. Ensure exposure is adequate to the areas that are going to be examined.
8. Always remain gentle and patient at all times.

HAND HYGIENE – follow the sequence (and warm your hands)

1. Palm to palm

2. Right palm over the back of the other hand with interlaced fingers (and vice versa)

3. Palm to palm with fingers interlaced

4. Back of rubbing of the thumb (and vice versa)

5. Rotational rubbing backwards with closed fingers of right hand in left palm (then vice versa)
6. Rotational rubbing of fingers to opposing palms with fingers interlaced

7. Rinse and dry thoroughly

3. PERFORMING A PHYSICAL EXAMINATION – THE PURPOSE

- The purpose of a physical examination is to look for the presence or absence of physical signs that confirm or refute the differential diagnosis.
- Depending on the inquiry – e.g., a patient presenting to a general practitioner with a headache, a single system may be examined.
- In other circumstances, a full system examination may be required.
- Follow a systematic approach to help you.

The IPPA sequence

Inspection → Palpation → Percussion → Auscultation

4. THE INITIAL OBSERVATION

4.1 Vital Signs (Early Warning Scoring Systems)

- Pulse
- Blood pressure
- Respiratory rate
- Oxygen saturation (SpO_2)
- Temperature
- Conscious level (AVPU / GCS)
- Pain score (0–10)

0 1 2 3 4 5 6 7 8 9 10

4.2 ABC LOOKS

A **Appearance:** Does the patient look generally well or unwell?

B **Behavior/Demeanor:** How is the demeanor of the patient?

C **Clues from:** Clothing (attire), lines/devices

- **Attire:** e.g., thyrotoxicosis – dresses for summer in depths of winter (heat intolerance).
- **Lines/Devices:** IV lines, catheters, oxygen, drains.
- **Devices:** insulin pump, hearing aids, walker, CPAP, etc.

4.3 Gait and Posture

- Are they using a walking aid?
- Is there evidence of pain, immobility, or weakness?

Pathognomonic Gaits and Signs

Hemiplegic gait (after stroke)	Circumduction of the leg on the affected side, arm held in flexion.
Ataxic gait (cerebellar disease)	Broad-based, unsteady, scissoring, abnormal heel-to-toe walking.
Marche à pasitants (walk of athethisis) (diffuse cerebrovascular disease or Parkinsors's)	Short shuffling steps, stooped posture, reduced arm swing.
Dystonia (abnormal posture)	Sustained or repetitive muscle contractions causing twisting or abnormal postures.
Tremor (alcohol withdrawal)	Fine tremor of outstrescheed hands, tongue, or eyelids.
Chorea (Huntington's disease)	Jerky, involuntary movements that flow from one body part to another.

4.4 Facial Expression and Speech

Facial expression

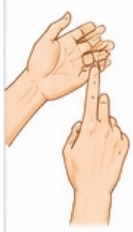
Poverty of expression (P for P) (mask-like face)	Parkinson's disease
Stolid expression	Hyperthyroidism
Poverty of expression with poor eye contact and apathy	Depression
Apathy with pale, puffy skin	Hypothyroidism
Agitated / anxious expression	Hypomania, anxiety, hyperthyroidism

Speech

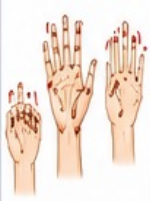
Slurring	Alcohol intoxication
Dysarthria	Motor neuron disease
Hoarseness	Recurrent laryngeal nerve damage
Abnormality of speech cadence (pressure of speech)	Hyperthyroidism

4.5 The Hands

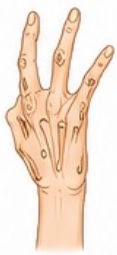
Failure to release a hand grip (due to delayed muscle relaxation) is a sign of a rare disease known as myotonic dystrophy.



In a patient with a neurological disease, they may be unable to move their hands or there may be signs of muscle wasting or tremor.

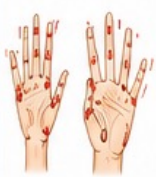


Deformity may indicate nerve palsies or arthritic changes.



Arthritis that involve the small joints of the hand.

- Rheumatoid arthritis affects the metacarpo-phalangeal and the proximal.
- Osteoarthritis and psoriatic arthropathy affects the distal interphalangeal.



Small muscle wasting is common in rheumatoid arthritis. This produces dorsal guttering, and also in cervical spondylosis.

In carpal tunnel syndrome, the median nerve compression leads to the wasting of the thenar muscles. It is also seen in damage that affects T1.

Dupuytren's contracture (thickening of the palmar fascia) causes the fixed flexion deformity and is usually affects the little and ring fingers.

Arachnodactyly (long, slender fingers) is typical of Marfan syndrome.

Trauma is the most common cause of hand deformity.

4.6 Color and Skin

- Peripheral cyanosis is present in the nail bed.

- Tobacco staining – brown discoloration of fingers.

- Examine the skin creases for pigmentation, although it is normal in non-Caucasian races.

TEMPERATURE – A GUIDE TO PERIPHERAL PERFUSION

COPD

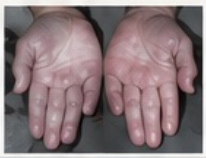
Cyanosed but warm hands

Due to ↓ arterial O_2 saturation, but warm due to vasodilation from ↑ PCO_2 levels.

HEART FAILURE

Cold and cyanosed hands

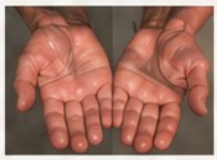
Due to vasoconstriction and poor peripheral perfusion.



HYPERTHYROIDISM

Warm hands

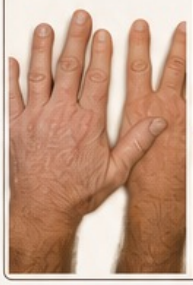
Due to increased metabolic activity and vasodilation.



OTHER SKIN CHANGES IN THE HANDS

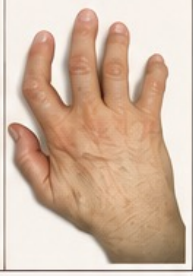
ACROMEGALY

Coarse skin and broad hands



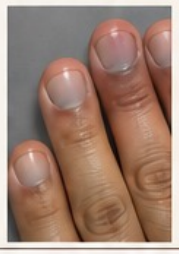
SCLERODERMA

Tight, contracted hand



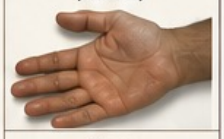
CALCINOSIS IN SYSTEMIC SCLEROSIS

Calcium deposits (subcutaneous nodules)



LIFESTYLE CLUES

Manual worker (calluses)



Disuse (smooth, soft hands)

NAIL CHANGES IN SYSTEMIC DISEASES

NAIL CHANGE	APPEARANCE	ASSOCIATED CONDITIONS	IMAGE
Beau's lines	Transverse grooves	Sequel of any severe systemic illness that affects the growth of the nail	
Clubbing	Loss of angle between nail and nail fold; bulbous fingertip	Serious cardiac, respiratory, or GI diseases (> 90% serious underlying disorder)	
Leukonychia	White spots, streaks or discoloration	Trauma, infection, poisoning, chemotherapy, vitamin deficiency	
Lindsay's nails	White (proximal) and brown (distal) half-and-half nails	Chronic kidney disease	
Koilonychia	Spoon-shaped depression of the nail	Iron deficiency anemia, lichen planus, repeated exposure to detergents	
Muehrcke's lines	Narrow, white transverse lines	Protein synthesis ↓ or protein loss (e.g., renal disease, malnutrition)	
Nail fold telangiectasia	Dilated capillaries and erythema at nail fold	Connective tissue disorders: systemic sclerosis, SLE, dermatomyositis	
Onycholysis	Separation of nail from the nail bed	Psoriasis, fungal infection, thyrotoxicosis, trauma, tetracyclines	
Onychomycosis	Yellow or brown discoloration, thickening	Fungal infection	
Pitting	Fine or coarse pits	Psoriasis, alopecia areata, eczema, lichen planus	
Splinter hemorrhage	Red streaks (longitudinal) in the nail plate	Trauma, infective endocarditis	
Yellow nails (Yellow nail syndrome)	Yellow discoloration and thickening	Yellow nail syndrome (triad: yellow nails, lymphedema, respiratory disease)	

EXAMINATION SEQUENCE FOR CLUBBING

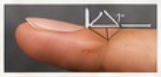
1. Interphalangeal (IP) depth
2. Hyponychial angle
3. Schamroth window
4. Fluctuation of the nail (touch test)

CLUBBING ASSESSMENT

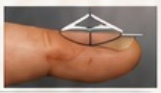
TEST	NORMAL	ABNORMAL
Interphalangeal depth	≤ 1	> 1
Hyponychial angle	≤ 190°	> 190°
Schamroth window	Present	Absent
Fluctuation (touch test)	None	Increased

HOW TO MEASURE

IP DEPTH — Measure the depth of soft tissue over the dorsal aspect of the distal phalanx.



HYPONYCHIAL ANGLE — Angle between the nail plate and the proximal nail fold.



SCHAMROTH WINDOW — Look at the nail from the side. If the window (diamond-shaped space) is present, it is normal.

FLUCTUATION — Press the dorsal nail fold.
Normal: firm
Clubbing: spongy / fluctuating

SKIN: COLOR CHANGES AND THEIR MEANINGS

NORMAL PIGMENTS

- Melanin
- Keratin
- Carotene (e.g., carrots)
- Oxyhemoglobin (pink-red)
- Deoxyhemoglobin (bluish)

VITILIGO

Irregular pale patches, often asymmetrical.

Associated with:

- Diabetes mellitus
- Thyroid & adrenal disorders
- Pernicious anemia

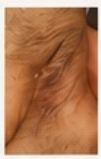
ALBINISM

Little or no melanin in skin or eyes.

Reddish or blue eyes.

HYPERPIGMENTATION

- ↑ ACTH (e.g., Addison's disease)
- Cushing disease (↑ ACTH)
- Brown pigmentation in creases, bony prominences, scars



PREGNANCY / OCP

- Chloasma (blotchy facial hyperpigmentation)
- ↑ Pigmentation of areola, axilla, genital skin
- Linea nigra (lower abdomen)

HEMOCHROMATOSIS

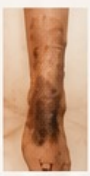
Excess iron absorption → ↑ iron deposition & melanin production.

If related to DM (iron in pancreas) → **BRONZE DIABETES**

HEMOSIDERIN

Product of hemoglobin breakdown.

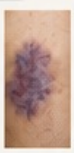
Deposited in lower legs (venous insufficiency) or after heat damage (sitting near fire, local heat).



EASY BRUISING

Due to:

- Glucocorticoid use
- Advanced age
- Coagulopathy



HYPERCAROTENEMIA

Excessive intake of carotene-rich vegetables.

Also seen in:

- Hypothyroidism
- Anorexia nervosa

Does NOT affect sclera or conjunctiva.

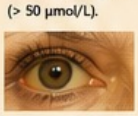
DISCOLORATION (DRUGS & OTHERS)

- **Yellow-brown:** Chronic kidney disease
- **Bluish:** Abnormal hemoglobins (sulfhemoglobin, methemoglobin)
- Drugs:
  - Mepacrine – yellow
  - Amiodarone – bluish/gray
  - Clofazamine – brownish/black
  - Phenothiazines – slate blue

JAUNDICE

Yellow discoloration of skin, sclera & mucosa.

Detectable when serum bilirubin > 3 mg/dL (> 50 µmol/L).



PALLOR

Usually due to anemia → ↓ oxyhemoglobin.

Or vasoconstriction (cold exposure).

Often with:

- Angular stomatitis
- Glossitis
- Koilonychia
- Blue sclera

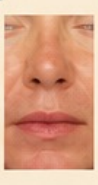
VASODILATION / FLUSHING

Physiological: fever, exercise, heat, emotions

Drugs: anorexics

Endocrine: ↓ estrogen (menopause), ↓ androgen (men)

Others: carcinoid syndrome, medullary thyroid carcinoma, serotonin syndrome, alcohol, rosacea, mastocytosis



CYANOSIS

Blue discoloration of skin and mucosa due to ↑ deoxyhemoglobin.

Polycythemia: more easily detectable than anemia.

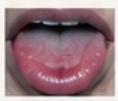
Rarely: ↑ methemoglobin.

CENTRAL CYANOSIS

Lips, tongue, buccal and sublingual mucosa.

Due to ↑ deoxyhemoglobin.

Detected when ≥ 5 g/dL.



PERIPHERAL CYANOSIS

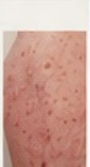
Distal extremities (fingers, toes).

Often due to cold exposure.

OTHER CHARACTERISTIC SKIN CHANGES

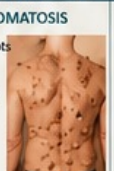
SCURVY

- Petechiae, ecchymoses, follicular hyperkeratosis, corkscrew hairs, poor wound healing



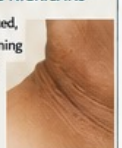
NEUROFIBROMATOSIS

- Café-au-lait spots
- Cutaneous neurofibromas



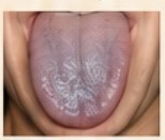
ACANTHOSIS NIGRICANS

- Hyperpigmented, velvety thickening (neck, axillae, groin)

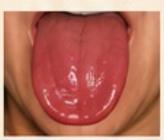


TONGUE: CLINICAL CLUES

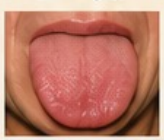
Central cyanosis (blue tongue)



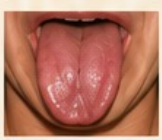
Smooth tongue (iron deficiency)



Enlarged tongue (acromegaly)



Wasting & fasciculations (motor neuron disease)



ODORS

Odors can provide clues to a patient's social and behavioral habits.

- Stale urine and anaerobic skin infections can have distinctive smells.

HALITOSIS (BAD BREATH)

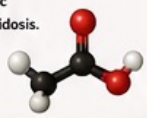
May be due to:

- Poor dental hygiene
- Gingivitis
- Stomatitis
- Atrophic rhinitis
- Tumors of the nasal passage
- Suppurative lung conditions such as lung abscesses or bronchiectasis

OTHER CHARACTERISTIC ODORS

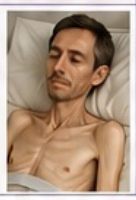
KETONES

Sweet smell due to acetone in diabetic ketoacidosis.



FETOR / STARVATION

A sweet, acetone-like odor in prolonged starvation.



FETOR HEPATICUS

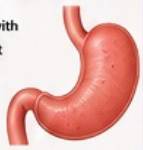
Stale, mousey smell of the volatile amine dimethyl sulfide in patients with liver failure.

UREMIC FETOR

Fishy or ammoniac smell on the breath in uremia.

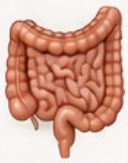
FOUL-SMELLING BELCHING

In patients with gastric outlet obstruction.



FECAL SMELL

In patients with gastrocolic fistula.



WEIGHT AND BODY MASS INDEX (BMI)

BMI is calculated by dividing the weight in kilograms by the height in meters squared.

BMI = weight (kg) / height (m²)

BMI CLASSIFICATION – NON-ASIANS	
CLASSIFICATION	BMI (kg/m²)
Underweight	< 18.5
Normal	18.5 – 24.9
Overweight	25 – 29.9
Obese	30 – 39.9
Morbidly obese	≥ 40

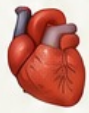
BMI CLASSIFICATION – ASIANS	
CLASSIFICATION	BMI (kg/m²)
Underweight	< 18.5
Normal	18.5 – 22.9
Overweight	23 – 24.9
Obese	25 – 30
Morbidly obese	≥ 30

OBESITY

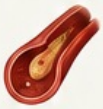
Obesity is related to malignancy.

IN BOTH SEXES	IN MALES	IN FEMALES
• Renal • Esophageal	• Thyroid • Colon	• Endometrial • Gallbladder

Obesity is also associated with:

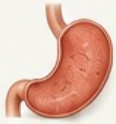


Hypertension



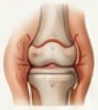
Hyperlipidemia

Type 2 diabetes



Gastroesophageal reflux

Gallbladder disease



Osteoarthritis

Sleep apnea

- Result of an increase in calorie intake relative to the expended calories.
- Rarely, may be secondary to hypothyroidism or Cushing syndrome.

FAT DISTRIBUTION

PEAR SHAPE
(Lower waist-to-hip ratio)

Tends to have a better prognosis.

APPLE SHAPE
(Higher waist-to-hip ratio)

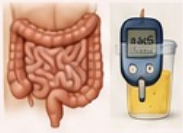
Associated with increased risk of coronary artery disease and metabolic syndrome.

WEIGHT LOSS

Weight loss can be due to malnutrition.

INADEQUATE ENERGY CONSUMPTION / UTILIZATION

- Malabsorption
- Anorexia
- Glucosuria



INCREASED NUTRITIONAL DEMAND

- Fever
- Infection
- Thyrotoxicosis
- Malignancy
- Surgery
- Certain psychiatric diseases
- Alcohol or drug dependency

Can also be associated with hypoalbuminemia or vitamin deficiencies.

STATURE (HEIGHT)

SHORT STATURE

- May result from general nutritional deficiency or significant illness during childhood.
- May be familial. (Important to ask about parents' heights.)

LOSING HEIGHT

Normal part of aging, but may be associated with compression of the spine due to osteoporosis in women.

Loss > 5 cm is usually an indicator of osteoporosis.

TALL STATURE

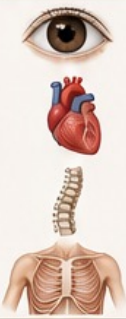
Less common; may be caused by:

- Marfan syndrome
- Prepubertal hypergonadism
- Gigantism

Increase in length is due to delayed closure of the epiphyses. This is seen in Klinefelter syndrome or gigantism, or may be due to a pituitary adenoma.

MARFAN SYNDROME: KEY FEATURES

- Acromedactyly (long, slender fingers and toes)
- Tall stature with thin build
- Upward dislocation of the lens
- High arched palate
- Mitral valve prolapse
- Dilation of the aortic root with aortic regurgitation
- Scoliosis
- Pectus carinatum ("pigeon chest")



HYDRATION

LOCALIZED EDEMA

Localized edema can be caused by four main causes:

1. VENOUS CAUSES (Most common)

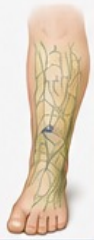
- ↑ Hydrostatic pressure (e.g., deep vein thrombosis)
- External pressure (tumor or pregnancy)
- Venous valvular incompetence (previous thrombosis or surgery)
- ↓ Venous return (hemiparesis or forced immobility)
  - prolonged sitting or immobility

2. LYMPHATIC CAUSES

Usually due to obstruction in the lymphatics → persistent fibrosis and proliferation.

Examples:

- Congenital hypoplasia of leg lymphatics (Milroy's disease)
- Lymphatic obstruction due to filarial worms or elephantiasis (in tropical countries)

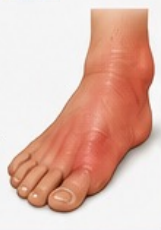


3. INFLAMMATORY CAUSES

Due to inflammatory mediators.

Seen in infection or injury.

Accompanied by other signs of inflammation (redness, warmth, pain, etc.).



4. ALLERGIC CAUSES

Due to increase in capillary permeability.

Examples:

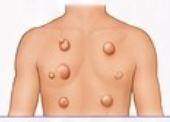
- Acute allergy (insect bite, food allergy)
- Drug reaction

Angioedema is a severe form of allergic edema.

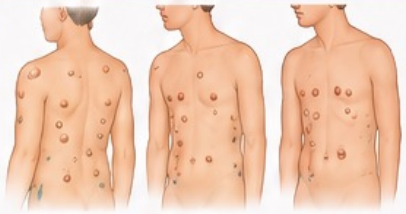
LUMPS (SPACE) – ask also about pain, tenderness & color change

S – SIZE
- Measure the size of the lump using its diameter.

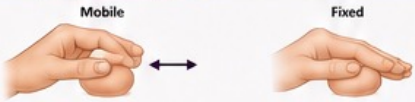
P – POSITION
- Single or multiple lumps?



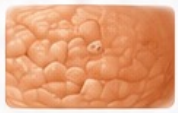
- Multiple lumps may occur in:
  - Neurofibromatosis
  - Skin metastasis
  - Lichen amyloidosis
  - Lymphomas



A – ATTACHMENT
- Fixed or mobile?
- Malignant masses tend to be fixed & immobile.

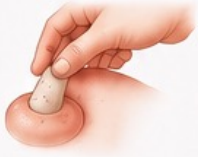


PEAU D'ORANGE
(orange peel appearance)
- Dimpling of the skin textured by hair follicles.



C – CONSISTENCY
- Compare with: forehead (hard), nose (firm), earlobe (soft).

- Very hard: usually malignant, calcified or dense fibrous tissue
- Fluctuation: abscess, cyst, or blister
- Soft: usually encapsulated tumors such as lipoma



E – EDGE
- Well-defined or ill-defined?
- Smooth, sharp or irregular?

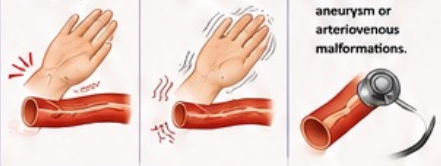
SURFACE & SHAPE
- Smooth or regular: in enlarged spleen or liver, distended bladder or uterine fundus in pregnancy.
- Liver surface is smooth in acute hepatitis, but nodular in metastatic disease.

PULSATION – THRILL – BRUIT

PULSATION
- Palpable arterial pulse due to vascularity.

THRILL
- Palpable vibration due to turbulent blood flow.

BRUIT
- Auscultated sound (systolic murmur).
- Heard over arterial aneurysm or arteriovenous malformations.

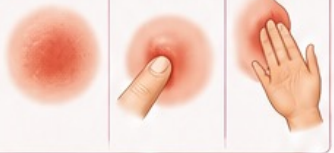


INFLAMMATION (3 features)

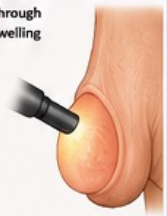
REDNESS
- Due to vasodilation.

TENDERNESS
- Painful.
- Seen in boils or abscesses.

WARMTH
- Increased local warmth.



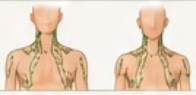
TRANSILLUMINATION
- Light passes through a fluid-filled swelling (translucent).
- Example: **Hydrocele (testicular hydrocele)**



LYMPH NODES – assessment (SPACT)

S – SIZE
- Enlarged?

P – POSITION
- Local or generalized?
- Check which area the nodes drain.



(Regions examined in physical exam)

A – ATTACHMENT
- Fixed or mobile?

C – CONSISTENCY
- Firm, rubbery, hard, or soft?

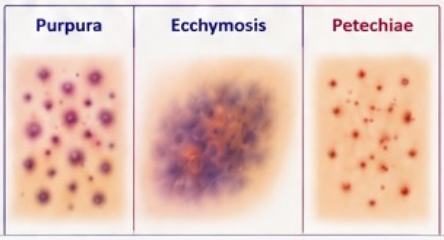
T – TENDERNESS
- Tender or non-tender?

LYMPHADENOPATHY
- Enlargement of lymph nodes.

LOCAL
- Involves one area.

GENERALIZED
- Involves ≥ 2 non-contiguous areas.

OTHER HEMATOLOGIC FEATURES
- **Purpura:** bruising under the skin.
- **Ecchymosis:** large purplish bruise.
- **Petechiae:** pinpoint red/purple spots.



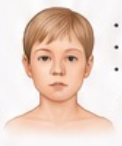
SPOT DIAGNOSIS – look for characteristic features

HYPOTHYROIDISM

- Puffiness
- Apathy
- Coarse hair
- Macroglossia
- Periorbital puffiness
- Dry, waxy skin

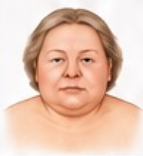
GRAVES' DISEASE

- Anxiety
- Weight loss
- Proptosis (Exophthalmos)

HYPOPITUITARISM

- Pale
- Unwrinkled skin
- Loss of hair (appears younger)

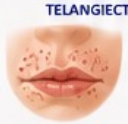
ACROMEGALY

- Coarse skin
- Enlarged hands/ feet
- Enlarged nose
- Prognathism
- Widely spaced teeth
- Macroglossia

CUSHING SYNDROME

- Moon face
- Central obesity
- Purple striae
- Thin skin
- Easy bruising

OSTEOGENESIS IMPERFECTA

- Blue sclerae
- Fragile bones
- Short stature

HEREDITARY HEMORRHAGIC TELANGIECTASIA

- Telangiectasia on and around the lips
- Recurrent nosebleeds

SYSTEMIC SCLEROSIS

- Tight skin
- Microstomia (small mouth)
- Beaking of nose
- Loss of nasolabial fold

MYOTONIC DYSTROPHY

- Frontal balding
- Paucity of expression
- Bilateral ptosis

DOWN SYNDROME (Spot diagnosis)

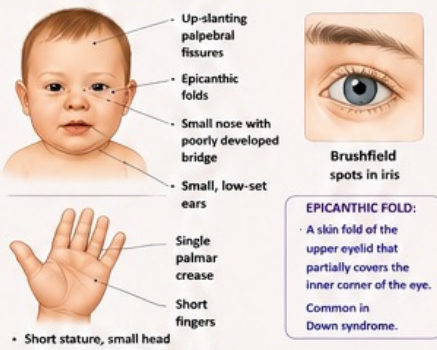
- Flat facial profile
- Up-slanting palpebral fissures
- Small low-set ears
- Macroglossia
- Brushfield spots in iris

SYSTEMIC LUPUS ERYTHEMATOSUS

- Butterfly erythematous rash on
- cheeks

MAJOR CHROMOSOMAL ABNORMALITIES

1) DOWN SYNDROME (Trisomy 21)
47,XX,+21 or 47,XY,+21



EPICANTHIC FOLD:
- A skin fold of the upper eyelid that partially covers the inner corner of the eye.

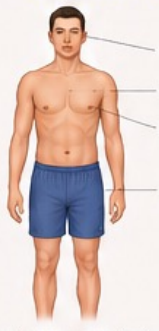
Common in Down syndrome.

- Short stature, small head
- Associated with cognitive, cardiac, gastrointestinal, ophthalmic, endocrine, hematologic disorders

2) TURNER SYNDROME
45,X (Monosomy X)
~1 in 2,500 live female births

- Delayed puberty
- Short stature
- May have cardiac, renal, and learning difficulties

3) KLINEFELTER SYNDROME
47,XXY (Extra X in male)



- Most common cause of primary hypogonadism in males
- May have learning difficulties

4) ACHONDROPLASIA
(Autosomal dominant)

- Most common cause of dwarfism
- Caused by mutation in fibroblast growth factor (FGFR3) gene