Nail Anatomy:

Onycho = NAIL

1. **Nail plate (body):**
   - is the clear, firm & translucent portion, (hard keratin)
   - is created by the nail matrix
   - Its free edge crosses the finger
   - is bordered by proximal & lateral folds

2. **Nail matrix:** directly below the cuticle.
   - produces the nail plate.
   - contains blood vessels and nerves.
   - If the matrix is damaged the nail will grow deformed

3. **Lunula:** is the crescent shaped whitish area of the nail bed

4. **Cuticle or (Eponychium):** skin fold at the proximal end of the nail

5. **Nail fold:** hard skin overlapping the base & sides of the nail

6. **Nail bed:** is continuation of the matrix & the the nail plate rests on

7. **Hyponychium:** is under the free edge of the nail plate

**Nail growth**

- Fingernails growth rate is 0.1 mm/day = 3mm/month so fingernail is replaced in 4-6 ms & toenail in 8-12 ms
- In children the growth is rapid 6 – 8 weeks
- Nail growth is quicker:
  - During pregnancy
  - In the summer than in the winter
- On the hands than the feet
- Pale, opaque and white nails are seen in
  - normal old persons
  - cirrhosis
  - uraemia
  - Hypoalbuminaemia

I- Nail disorders:

1. **Congenital:** Anonychia. Nail patella syndrome, Pachyonychia congenita
2. **Traumatic:** Acute trauma, Nail biting, Hangnail, Onycho-gryphosis, Ingrowing toenail, Onycorrhexis, Pterigium
3. **Infections:** Acute and chronic paronychia, Pseudomonas infection
4. **Neoplastic:** Warts, Fibrokeratoma, Subungual exostosis, Glomus tumour, Squamous cell carcinoma, Melanocytic nevi, Malignant melanoma
   - Dermatoses affecting the nails: Psoriasis, Darier’s disease, Lichen planus, Alopecia areata, Eczema
   - Nail signs in systemic disease: Clubbing, Koilonychia

II-Changes in nail surface:

- Beau’s lines.
- Muehrcke’s lines.
- ’True’ Leukonychia.

III-Changes in nail color:

- Terry’s nails.
- Yellow nail syndrome.
- drugs changes the color.
- Nail cosmetics

1. **Congenital**

**Anonychia:** an=without

- is a rare absence of some or all the nail
- autosomal dominant inheritance pattern

**Nail patella syndrome**

- fingernail dysplasia with triangular lunula
- absent or hypoplastic patellae
- posterior iliac horns
- deformation of the radial heads
Pachyonychia congenita (pachy=thick)

- Hypertrophy and hyperkeratosis of the nails
- Palmoplantar hyperkeratosis
- Warty skin lesions on the limbs
- Hyperhidrosis
- Scalp hair is lustreless (نادر وتشناقة) and kinky (نادر وتشناقة)

2. Traumatic

Acute trauma: Hematoma (bruised nail): blood between nail plate and bed

Nail biting:

- Is due to chronic repetitive trauma
- In 60% of children, 45% of adolescents & 10% of adults
- The majority of nail biters have no psychiatric disorder
- Patients are susceptible to infections
- Aesthetic (جرانيني) aspect has social effects
- The nails are short (no free edge is visible)
- Splitting of the nail into layers or a sand-papered effect, and brown longitudinal streak
- Cure relies on the motivation of the patient: not to bite anymore

Hangnail: Hard pieces of epidermis breaking away from the lateral nail folds due to nail biting and other minor injuries

- Painful when they penetrate to the underlying dermis
- Treatment is surgical removal or chiropodist (podiatrist) removed with sharp, pointed scissors

Onycho-gryphosis: (gryphosis: thick)

- Thick, yellow and twisted great toenail in the elderly
- Due to repetitive trauma by footwear

Ingrowing toenail (Onychocryptosis):

- The edge of the nail plate penetrates the lateral nail fold
- Pain, sepsis and formation of granulation tissue
- Due to compression of the toe from the side due to ill-fitting footwear
- Avoid tight-fitting or high-heeled shoes
- Rx: Surgical removal of the ingrown toenail

Pincer nail (trumpet nail):

- Excessive curvature of the nail causes the nail to pinch into the surrounding skin soft tissue
- Is the most painful type of ingrown nail
Onycorrhexis: (rupture)

- Split or brittle nails. Caused by injury or exposure to harsh chemicals

Pterigium:

- Abnormal winged like growth of skin (living tissue) on the nail plate and the skin is slowly stretched and dragged along the bed.
- caused by severe trauma such as warts, burns & blood circulation disorders.

3. Nail infections

Paronychia: is a soft tissue infection around a fingernail. It is the most common hand infection.

a. Acute paronychia
   - nail biting breaks down the physical barrier between the nail bed and the nail allowing the infiltration of infectious organisms
   - S. aureus is the most common infecting organism.
   - pain, tenderness, and swelling in the lateral folds of the nail
   - erythematous and swollen, pus collects under the skin of the lateral fold
   - Oral antibiotics

b. Chronic paronychia
   - After 6 weeks or longer
   - The nail folds are swollen, erythematous, and tender with pronounced transverse ridges
   - Cause is a mixture of C. albicans and bacteria
   - Can be a complication of eczema
   - In housekeepers, dishwashers, and swimmers

Pseudomonas infection

- It is always a complication of onycholysis or chronic paronychia
- The nail plate has a characteristic bluish-black or green color due to accumulation of the pigment pyocyanin below the nail which may remain after the organism has been removed
- Treatment is as for paronychia

ONYCHOMYCOSIS (TINEA UNGUIUM)

- An infectious fungal disease mainly seen as white spots that can be scraped off the surface, or long yellowish streaks within the nail substance.
- attacks the free edge and moves its way to the matrix.
- The infected portion is thick and discoloured.

4. Tumors

a. Warts
b. Fibrokeratoma: periungual hyperkeratotic tip
c. Subungual exostosis: bony outgrowth of the distal part of the toe
d. Glomus tumour:
   - is painful, (pain may be spontaneous or evoked by mild trauma or temperature change)
   - Nail-plate changes depend on the location of the tumour:
     - Matrix tumours cause splitting and distortion of the nail plate.
     - Nail bed lesions appear as bluish or red foci of 1-5mm diameter beneath the nail

e. Squamous cell carcinoma: hyperkeratotic, warty changes, erosions and fissuring, macerated cuticle, periungual swelling & erythema

f. Melanocytic nevi: longitudinal melanonychia

g. Malignant melanoma: features suggest the possibility of malignant melanoma:
   ✓ 75% will have Longitudinal melanonychia
   ✓ Brown-black periungual pigmentation in a single digit in adult life
   ✓ The pigmentation becomes darker and broader and has blurred edges

**Dermatoses affecting the nails**

1. **Psoriasis:** is the most common disorder affecting fingernails (50% of psoriatics)

   Nail changes are:
   - Pitting: Punctate surface depressions
   - Onycholysis: Separation of the nail from the nail bed either proximally or distally
   - Subungual hyperkeratosis: most marked distally and extends proximally
   - Splinter hemorrhage: due to the increased capillary prominence in nail-bed dermis

2. **Darier's disease:** white and red longitudinal lines and distal notching

3. **Lichen planus (LP):**
   - Nail involvement in 10% of individuals with disseminated LP
   - Nail involvement may be the only manifestation of LP
   - Thin nail plate and longitudinal ridging
   - Lunula is more elevated than the more distal portion

4. **Alopecia areata:** rough nail plate with a "hammered brass" appearance

5. **Eczema**
   - Severe pompholyx around the nail folds may cause nail dystrophy, resulting in irregular ridges

**Nail signs in systemic disease**

1. **Clubbing**
   - bulbous uniform swelling of the soft tissue of the terminal phalanx of a digit with loss of the normal angle between the nail and the nail bed
   - due to vasodilation of the digit blood vessels of unknown cause
   - Causes:
     a. Primary (idiopathic) clubbing e.g. familial clubbing
     b. Secondary clubbing include the following:
        - Pulmonary disease e.g. Lung cancer, cystic fibrosis
        - Cardiac disease e.g. Cyanotic congenital heart disease
\[ \begin{itemize} 
\item GIT disease e.g. inflammatory bowel disease
\item Skin disease e.g. Pachydermoperiostosis
\item Malignancies e.g. Thyroid cancer, Hodgkin disease, leukemia
\item Miscellaneous conditions e.g. Acromegaly, pregnancy, and hypoxemia possibly related to long-term smoking of cannabis
\end{itemize} \]

2. **Koilonychia**

- concave (spoon-shaped) Nails
- common in infancy as a benign feature of the great toenail
- The most common systemic association is with iron deficiency

### Changes in nail surface

#### Beau's (بَكْٰر) line

- Is a deep single horizontal ridge grooved line from side to side
- caused by an infection or trauma in the nail matrix
- Systemic diseases: coronary occlusion, hypocalcaemia, diabetes, certain drugs - including beta blockers

#### Muehrcke's (مورکس) lines: or leukonychia striata

- are superficial white lines (not grooved as beau’s line) extend all the way across the nail and lie parallel to the lunula
- are in the vascular nail bed underneath the nail plate, and so they do not move with nail growth and disappear when pressure is placed over the nail
- is nonspecific, often in decreased protein synthesis (after chemotherapy) and nephrotic syndrome

#### 'True' Leukonychia

- small white spots affecting one or two nails
- in young children and nail biters
- In most cases disappear after around eight months

### Changes in nail color

#### Terry's nails

- The nail is proximally white and normal distally
- in cirrhosis, congestive heart failure and adult-onset diabetes

#### Yellow nail syndrome

- The nails are yellow due to thickening, sometimes with a tinge of green
- The Lunula is obscured and there is increased transverse and longitudinal curvature and loss of cuticle
- It is usually accompanied by lymphoedema and pleural effusions
Color changes due to drugs:

- Chloroquine may produce blue-black pigmentation of the nail
- Arsenic may produce longitudinal bands of pigment or transverse white stripes (Mees' stripes) across the nail

Nail cosmetics

- Manicure: is professional taking care of the hands and fingernails
- Pedicure: is professional taking care of the feet and toenails

Nail polish

- Consists of pigments suspended in a volatile solvent to film formers
- The ingredients are as follows:
  1. Cellulose film formers, such as nitrocellulose.
  2. Resins
  3. Plasticizers
  4. Suspending agents, such as bentonite
  5. Solvents
  6. Color substances. These are either inorganic (iron oxides) or a variety of certified organic colors

Problems of nail polish

1. Contact dermatitis
   - Frequently appears on any part of the body accessible to the nails, with no signs in or around the nail
   - The commonest areas involved are the eyelids, the lower half of the face, the sides of the neck and the upper chest
   - Formaldehyde resin is the most common cause
   - DD: Dermatomyositis
2. Nail plate discoloration:
   - Nail-plate staining from the use of polish is most commonly yellow-orange in color
3. Nail polish removers:
   - Acetone: occasionally cause trouble by
   - Excessive drying of the nail plate
   - Inflammation of nail folds