**14. Nails**

The fingernail, or nail plate, serves to protect the end of the fingertip and to enhance the sensitivity of the nerves in the fingertip. The nail we see is itself a plate of translucent keratin, but it is part of a system that continually replenishes the nail plate, and protects and seals the system from infection and the environment.

**TOPIC 1: STRUCTURE AND FUNCTION**

**THE COMPONENTS OF THE NAIL SYSTEM**

The nail system that lies beneath the nail has thirteen main components, each with a specific purpose, and each shown in the diagram (right). These are the:

* Free edge
* Hyponychium
* Peronychium (seal at the lateral nail fold)
* Eponychium (seal beneath the cuticle)
* Nail plate
* Cuticle
* Nail bed
* Nail folds
* Matrix
* Mantle
* Lunula
* Nail wall
* Nail groove

**Free edge**

The free edge of the nail is the part extending beyond the end of the skin of the fingertip.

**Hyponychium**

The hyponychium forms a seal between the free edge of the nail and the skin of the fingertip.

**Peronychium**

The paronychial edge or peronychium is the skin that overlaps the sides of the nail. The peronychium is the site of paronychia infections, hangnails and ingrowing nails.

**Eponychium**

The eponychium forms a seal between the skin and the nail plate that protects the underlying matrix from infection. It sits beneath, and is protected by, the cuticle.

**Nail plate**

What we commonly call the fingernail is actually the nail plate, a protective shield of translucent keratin for the nail bed beneath. Grooves in the underneath of the plate help to hold it to the nail bed. While the nail plate is actually translucent, the blood vessels beneath it give it a pink appearance.

**Cuticle**

The layer of skin growing from the base of the nail over the nail plate. In common with the eponychium, it works as a seal to protect the matrix from infection.

**Nail bed**

As the matrix produces new cells, pushing the nail forward, the nail moves along the nail bed, which adds cells to the underside of the nail, thickening and strengthening it as it grows. The nail bed contains the blood vessels (which, seen through the translucent nail plate, give the nail its colour), the nerves that provide sensation and melanocytes. The nail bed lies directly beneath the nail plate. Both have grooves which dovetail into each other, holding the nail plate in place as it grows forward**.**

**Nail groove**

The grooves at the lateral sides of the nail plate along which the nail grows, next to the lateral nail folds.

**Nail folds**

The nail folds are the folds in the skin which protect the matrix, and in which the edges of the nail plate sit. The root of the nail is protected by the proximal nail fold, and the edges by the lateral nail folds.

**Matrix**

The matrix is where the cells of the nail plate and nail bed are produced. It lies mostly beneath the nail and the nail bed with only the tip of the root visible through the nail plate as the lunula. The matrix produces keratin cells for the nail plate and bed, pushing older cells forward along the finger or toe as it does so.

**Mantle**

Deep fold of skin found above the matrix at the base of the nail before the cuticle.

**Lunula**

The half moon on our fingernails, or lunula, is actually the visible front end of the germinal matrix extending underneath the nail plate. The prominence of the lunula varies from person to person, and is normally most visible on the thumbnails. The shape of the lunula is reflected in the natural shape of the free edge of the nail.

**Nail wall**

The folds of skin which overlap the sides of the nail plate for protection.

**HOW THE NAIL GROWS**

Nail growth rate varies, but may be up to 3 mm per week for fingernails and 1 mm for toenails, with the whole fingernail being replaced two or three times per year, and the toenail every year to 18 months. The growth rate peaks in our early teens and then reduces with age, but it may increase again during pregnancy, the summer, or while we sleep.

**FACTORS AFFECTING NAIL GROWTH**

Nail growth and health can be affected by a range of factors, including:

* **Health -** the shape, integrity and colour of the nail can be affected by diseases of the lung, heart, kidney, liver or thyroid.
* **Age -** the growth rate of both fingernails and toenails slows as we get older, and the protein in the nail becomes more brittle and prone to splitting.
* **Diet -** while serious vitamin or mineral deficiencies may affect the nails, diet does not generally cause abnormal nail changes, except in cases of severe malnutrition.
* **Medication -** medication may affect the rate at which fast-growing cells in the body reproduce
* **Climate -** blood increases in hotter climates thereby increasing nail growth.
* **Damage -** if the matrix is damaged nail growth can be affected or retarded.
* **Lifestyle -** environmental factors, example hands in water, or chemical solutions.

**TOPIC 2: NAIL CONDITIONS, DISEASES AND DISORDERS**

Onychosis is the technical term for a nail disease. Pronounce the 'onych' part of the technical

terms 'on-eek'. It comes from the Greek for nail or claw.

**Ridges and furrows**

Superficial ridges (corrugations) - possibly the result of age (with thickening of nails) or illness

**Longitudinal (vertical ridges) -** possibly associated with ill health

**Single ridges -** result of trauma, constant picking or ill health

**Single transverse (horizontal) furrow (Beau's lines) -** possibly the result of ill health.

**Deep furrows -** possibly the result of dermatitis (see below) or ill health Ridges and furrows can generally be buffed to make them smoother.

**PITTING**

Pitting is a sign of an underlying problem, such as dermatitis or psoriasis (see below).

**WHITE SPOTS (LEUCONYCHIA)**

This is a common condition generally caused by an injury to the nail matrix, allowing an air pocket to form.

**BRITTLE NAILS (ONYCHORRHEXIS)**

Poor blood supply, caused by anaemia, illness or use of over-strong detergents removing natural oils, has dried the nails making them brittle, with a tendency to break easily.

**HANG NAIL**

The cuticle adheres to the nail plate and cannot continue to move forward with the growth of the nail. The cuticle splits and is prone to infection.

**DISCOLOURED NAILS**

**Blue nail -** may be caused by poor circulation, anaemia or a heart problem.

**Black nail -** usually the result of heavy bruising. If particularly severe, the nail plate may detach from the nail bed, but a new nail usually grows to replace it.

**FLAKING (LAMELLA DYSTROPHY)**

Flaking can be due to biting, incorrect or severe hand and nail treatments, lengthy exposure to hot water or harsh chemicals, or to general ill health.

**OVERGROWTH OF THE CUTICLE (PTERYGIUM)**

The cuticle has a hardened growth which has grown over and stuck to the nail plate.

**EXCESSIVE THICKENING (ONYCHAUXIS OR CLAW NAIL)**

The nail plate has thickened and in some cases discoloured, usually due to internal disorders, infection, damage below the nail, or to constant rubbing (for instance by a badly fitting shoe).

**ENLARGED NAIL WITH INCREASED CURVE (ONYCHOGRYPHOSIS)**

Similar to claw nail; the nail plate has thickened and curved over due to an increase in the horny cells of the nail plate. This is a common complaint in older people, especially if combined with ill-fitting shoes or neglect.

**NAIL IS BECOMING SMALLER (ONYCHATROPHIA)**

As it becomes smaller, the nail becomes opaque and ridged and sometimes wastes away completely. It is usually caused by injury under the nail, nervous disorders or disease.

**SPOON-SHAPED NAIL (KOILONYCHIA)**

An abnormal growth causes the nail to splay at the sides, with a depression in the middle. It can be hereditary or due to a type of anaemia or overactive thyroid.

**INGROWING NAILS (ONYCHOCRYPTOSIS)**

Most often affecting the big toe, the side of the nail plate grows into the flesh of the nail wall. Ingrowing nails are usually caused by incorrect cutting or filing too far down the sides, ill-fitting shoes or neglect. They can be very painful and inflamed with swelling and pus.

**BITTEN NAILS (ONYCHOPHAGY)**

Nail biting reduces the size of the nail so it eventually has no free edge. The nails look ragged and the fingertips sore, increasing chances of infection or hangnails.

**ONYCHOPTOSIS**

Onychoptosis is identified as a condition where the nail may occasionally shed and/or come off. It may affect one or more nails and may occur after certain diseases, fever, system upset or medication.

**ONYCHIA**

A bacterial or fungal infection usually caused by a damaged cuticle being infected by biting or thumb sucking, frequent use of detergents or immersion in water. It can be very red and sore.

**RINGWORM**

Highly infectious. First appears as a yellow-brown discolouration at the free edge. This condition is caused by a fungus attacking the nail plate and bed through the free edge but it can spread to the nail root. The nail thickens and becomes furrowed and spongy and sometimes completely detached.

**ATHLETES FOOT (TINEA PEDIS)**

A highly contagious form of ringworm, in which the skin between and under the toes becomes swollen, white and waterlogged.

**PARONYCHIA (WHITLOW)**

A bacterial infection of the skin around the nail, which becomes swollen, red and inflamed. Usually caused by broken skin, rough treatment or injury to the cuticle/nail fold, or exposure to unsterile manicure tools or harsh chemicals. A long-term infection may result in the nail becoming deformed.

**PSORIASIS**

Psoriasis is characterised by small red patches covered in silvery scales. It can affect the skin around and under the nails. It may itch but if rubbed it can start to bleed and then is open to infection. The cause is unknown it can appear at any age and may be inherited or could be triggered by stress or illness. It is not contagious.