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Foot Health and Wellness



Toenails, including Fungal Toenails

People often wonder why their toenails and the surrounding skin look as they do!

Different diseases, medical conditions, injuries, as well as fungi, yeast, and bacteria can affect the whole nail-module or part of it. The more knowledge, the better understanding.

The nail-plate consists of three nail layers. The visible nail is pink because it sits on top of the very vascular nail-bed. Each nail layer originates from the matrix bed that grows on top of the underlying last bone of each toe and is covered by skin. Most nails have a visible white, circular sliver at the beginning that happens to be the end of the matrix.

The bottom nail layer originates from the end of the matrix. It glides forward over the nail-bed because it has an epithelium skin layer attached to its under-side. And, this epithelium layer has vertical ridges on its under-side that fit into grooves on the upper-side of the nail-bed. The top nail layer originates from the beginning of the matrix and the middle layer originates from the middle of the matrix.

The cuticles at the beginning and sides of the nail-plate make a tight seal between the top nail layer and the surrounding skin folds. At the end of the pink nail another seal, the solehorn, is made from cornified epithelium between the bottom of the nail-plate and that skin fold. This tight seal holds all three nail layers together to form the nail-plate.

The transverse shape of the nail depends on the transverse shape of the matrix. Unless the matrix-bed is damaged, its shape will be the same as the shape of the bone.

There are four different transverse nail shapes: **Flat nails** are normal. **Trumpet nails** grow from a normal-shaped matrix. But there is often a bone spur on top of the underlying bone that causes the nail-bed and entire nail-plate to be raised up. The tall and narrow nail has normal thickness. The two sides often grow together at the end. **Tile-shaped nails** are excessively rounded as is the matrix. **Plicatured nails** are flat on the top but curve downward at about 90% on one or both sides due to a damaged matrix. **Ingrown nails** are often due to a plicatured nail or a very wide or curved nail-plate. It can also be caused by the very side of the nail not being removed when the nail was last clipped, resulting in a nail hook causing pressure and penetration of the skin. A foot care nurse can round the nail corner as a temporary solution; a podiatrist can remove the whole side of the nail or the entire nail as a permanent solution. **Club nails** are rounded the longitudinal way. If they affect both the fingernails and toenails, they are usually connected to lack of oxygen in the blood related to anemia and low hemoglobin. This is a serious condition that needs medical attention from a primary doctor.

Other interesting nail facts: The shorter the matrix, the thinner the nail; as well as the opposite. Poor arterial circulation (both amount and quality of the blood), high fevers, severe infections, cold external temperatures, and more, cause the nails to grow slower. Psoriasis, warm external temperatures, and more, cause the nails to grow faster. It takes 12-18 months for an entire nail-plate to grow out. The free edge grows faster. Decreased mobility causes the bones to get smaller, increasing the nail transverse curvature.



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Abnormalities to the visible toenail module, such as detachment of the nail-plate from the nail-bed; detachment between the different nail layers; broken and missing nail layers; flaky or crumbly nail substances; dark areas; dark vertical lines; dark or white spots; the transverse and longitudinal nail shapes and thickness (as described on page 1); areas on the nail having different colors (white, yellow, blue, green); and bright red nail folds, etc. are **often caused by injuries to the matrix or visible nail-plate; systemic or localized diseases or conditions, such as psoriasis, diabetes, arteriosclerosis, chronic eczema, too much water exposure, and more; as well as fungus that invaded the nail-bed at the end of the pink nail or the top nail layer, and yeast that invaded the nail-folds.**

Often the abnormalities cannot be corrected, unless surgery, medications, and/or life-style changes are successful. Some abnormalities will grow forward with the nail and go away when they reach the end of the nail-plate. Other abnormalities are there to stay. If they create a thick, rough or flaky surface, it can be smoothed with specialized tools.

Fungal nails require special attention in this handout as it affects a lot of people:

What may look like fungus is not always the case. A lab test will clarify. Generally, only smaller fungal-infected areas of the nail plate might respond to treatment.

Oral medications can be rough on the liver. They are prescribed by a podiatrist if a cure seems possible and the liver is okay. **Natural products**, such as lavender oil, orange oil, apple cider vinegar, baking soda, tea tree oil (must be diluted), oregano oil, white vinegar, garlic, lemon juice, Listerine mouth wash, may work. I have not heard of any clinical studies or the proper way to use them. Try the products to see if there is any adverse reaction.

Clinical trials have been done on each of the following three topical products:

- Kerydin: On affected nails daily for 48 weeks. 9.1% complete cure. Cost \$14,987.
- Jublia: On affected nails daily for 48 weeks. 16.5% complete cure. Cost \$7,709.
- Vicks VapoRub with Camphor includes anti-bacterial, anti-viral, anti-inflammatory, anti-microbial and anti-fungal properties: Once or twice daily for 48 weeks. 27.8% complete cure; 55.6% partial clearance; 16.6% no change. Cost \$14.64, X1 daily.

If you suspect a new fungal infection at the end of the toenails, try Vicks VapoRub with Camphor. If you have bright red nail-folds likely caused by yeast, please see a podiatrist.

Self-care of your nails at home should only include an Emory board for smoothing the free nail edges or other rough areas carefully if the health of your feet is at high risk.

The foot care nurse will reduce any “overgrowth”; smooth all surfaces; explain the visible abnormalities of your nails; and make medical referrals, if needed.

See the handout on **Skin; *Poor Arterial & Venous Circulation; *Diabetic Feet; and *My Service Overview that explains how the foot care nurse can help your toenails.*