

## New DNA Testing for Nail Fungus Yields Improved Outcomes

Onychomycosis (fungus infection of the nail) causes almost half of all nail deformities. It is important to identify the cause of the nail deformation and determine a proper treatment plan as the clinical features of onychomycosis can mimic a large number of other nail disorders including psoriasis, lichen planus (an inflammatory rash causing grooves or ridges in nail plate) and malignant melanoma.

At first, onychomycosis may only be a cosmetic concern as patients notice their nails have become thickened, discolored, misshapen and brittle. Functional complaints include problems with physical agility (walking, exercising), pain and paresthesia (a sensation of pricking, tingling, or creeping on the skin having no objective cause and usually associated with injury or irritation of a nerve) and occupational limitations.

Onychomycosis as an infection requires proper and specific diagnosis and treatment. Left to linger it may lead to other serious infections that spread beyond your feet and permanent scarring of the nail matrix (where the nail starts and nail cells multiply and harden to form the nail). Diabetes, poor peripheral circulation, peripheral neuropathy (sensory loss in the lower extremities) and a suppressed immune system put you at a greater risk of developing a serious bacterial skin infection (cellulitis).

Because of the prevalence of fungal infections of the nail and the belief that due to appearance these infections are relatively superficial, self-care and OTC topical treatments are chosen to control the problem. Typically they do not. This is because the nail unit is relatively impenetrable and there are many species of fungi that can affect nails. Even clinically managed cases yield poor results due to ambiguous test outcomes and non-targeted treatment with millions of dollars spent annually.

The success of treatment for onychomycotic nails depends on the proper and specific diagnosis and sampling technique used by the physician so that the specific infective organisms can be identified. Self-diagnosis and

misdiagnosis can lead to inadequate treatment, allowing the infection to worsen with extended time. Additionally, this can lead to poor efficacy, unnecessary exposure to medications and increased risk of side effects.

Patients should inquire about the diagnostic options for treatment of onychomycosis including histopathological tests to detect location of the disease within the nail and polymerase chain reaction (PCR) assays developed to detect fungal DNA from infected nails. Conventional laboratory diagnosis of onychomycosis routinely involved only direct microscopic examination (KOH preparation) of the clinical specimen to rule out the presence of fungi however this does not provide genus or species identification and cannot identify the specific pathogen (disease causing fungus ) or differentiate between yeasts and molds. Optimal therapy varies with the pathogen identified. Given the cost associated with current treatments it is important to diagnose and identify the infection as accurately as possible to ensure better, timelier and the most cost effective health care for patients.

The advent of molecular technology has enabled the development of techniques like polymerase chain reaction (PCR), which is a highly sensitive and specific test and can be used for diagnosis of various microorganisms including fungal pathogens. PCR has been used to improve sensitivity in detecting the causative fungi in nail specimens from patients with suspected onychomycosis. A small (2mm) biopsy of the nail is taken and sent to the laboratory for processing. With more specificity regarding the infective organism (PCR can differentiate to species, strain and subtype) physicians can then determine the best treatment plan.