Detection of dermatophytes in culture-negative and contaminated nail samples using molecular diagnostics

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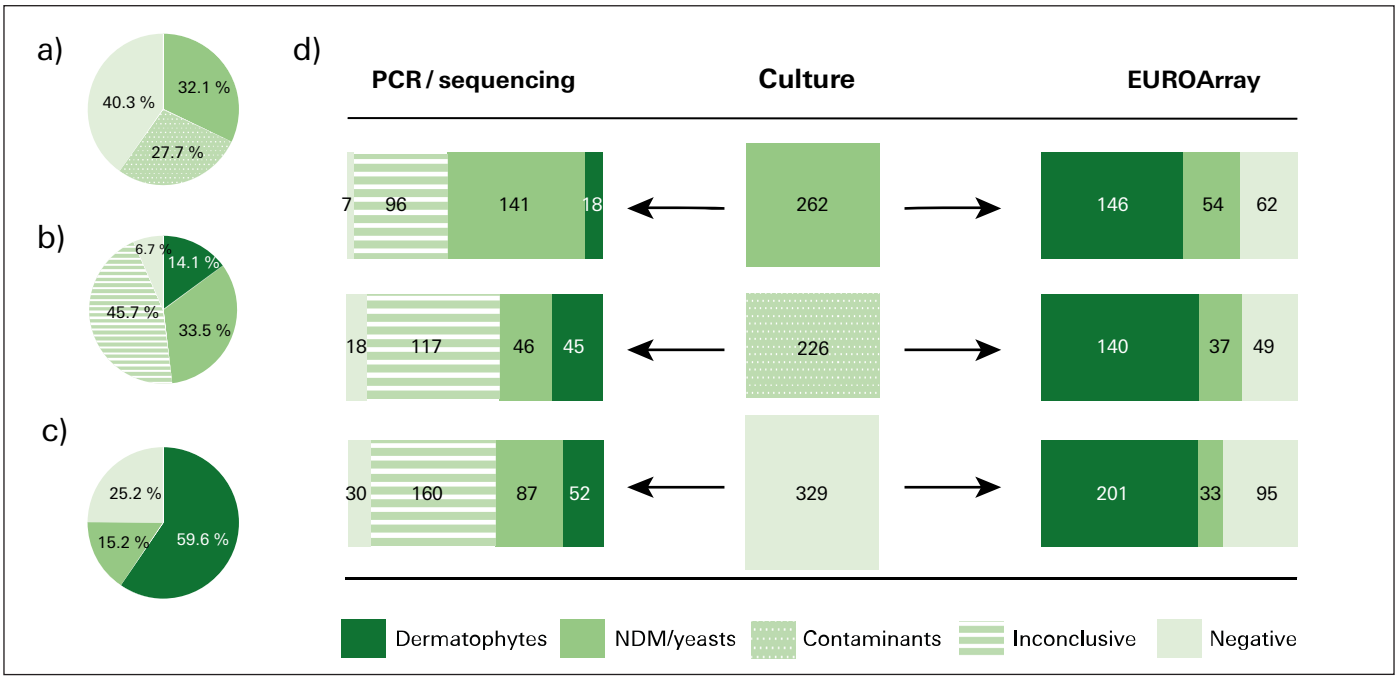

Results from the 817 microscopy-positive nail samples from patients with clinically suspected onychomycosis from (**a**) culture[#], (**b**) PCR/sequencing, (**c**) EUROArray[+] and (**d**) in direct comparison (n); [#] in total 8.4% of the of the NDM/yeast-positive cultures were composed of more than one NDM and/or yeast species; [+] among the samples that were positive for dermatophytes by the EUROArray, two infecting dermatophytes were detected in 9.6% of the samples and co-infecting NDM/yeast were detected in 44.3% of the samples

Introduction

Onychomycosis, a fungal nail infection affecting about 4% of the general population, is primarily caused by dermatophytes, though non-dermatophyte molds (NDMs) and yeasts can be involved.

The diagnostic gold standard combines direct microscopy and fungal culture. While microscopy is a rapid and specific method for detecting fungal elements, culture allows for species identification but lacks sensitivity and is time-consuming.

This study evaluates the applicability of molecular mycology techniques, specifically PCR/sequencing and DNA microarray analysis, as diagnostic tools to complement fungal culture.

Methods

In this retrospective study, 817 microscopy-positive nail samples from patients with suspected onychomycosis, for which conventional culture was negative for dermatophytes or failed to yield conclusive results, were analyzed using molecular mycology, i.e. PCR/sequencing (D2 LSU rDNA) and DNA microarray analysis (EUROArray Dermatomycosis).

Results

Among the 262 samples with NDM/yeast-positive cultures, a dermatophyte was detected in 18 (6.9%) and 146 (55.7%) of the samples using PCR/sequencing and DNA microarray, respectively. Species identification by culture was confirmed by PCR/sequencing in 94 (35.9%) samples and by DNA microarray in 74 (26.3%) samples. Among the 555 nail samples that had produced contaminated or negative cultures, PCR/sequencing identified fungi in 230 (41%) samples, including 97 dermatophytes, while the DNA microarray detected fungi in 411 (74.1%) samples, inclusive of 341 dermatophytes.

Conclusion

Molecular mycology methods, particularly the EUROArray Dermatomycosis, improve the detection of onychomycosis pathogens in nail samples compared to fungal culture. Incorporating molecular techniques into routine practice provides increased sensitivity and reduces the time required for diagnosis and treatment.

*EUROIMMUN holds patents and patent applications relating to means and methods for detecting an infection with certain dermatophyte species, such as EP3382041B1 and EP3926055A1.

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