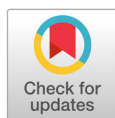


Editorial

Fungal infections: rising threats, diagnostic challenges, and the path forward for clinical microbiology laboratories

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Fungal diseases are becoming a growing global health concern, with an estimated annual incidence of 6.5 million cases of invasive fungal infections and approximately 3.8 million associated deaths, including approximately 2.5 million directly attributable to fungal infections [1]. The World Health Organization, in its first fungal priority pathogen list, identified 19 major fungal pathogens posing considerable public health threats, with *Candida albicans*, *Candida auris*, and *Cryptococcus neoformans* classified as critical fungal pathogens [2]. Moreover, since the onset of the coronavirus disease 2019 pandemic, the prevalence of fungal pathogen interactions has increased significantly in immunosuppressed patients, with reported mortality rates exceeding 50% in cases of coinfection [3].

This special issue of the *Annals of Clinical Microbiology* presents four comprehensive review articles offering insights into the multifaceted landscape of fungal infections in Korea, with a focus on their epidemiology, diagnostic advancements, and clinical implications. It highlights progress and challenges in diagnosing fungal diseases, particularly those caused by *Candida* spp. and *Cryptococcus* spp.

The first article, titled “Fungal identification based on the polyphasic approach: a clinical practice guideline,” authored by Jayoung Kim, highlights the transformative potential of the polyphasic taxonomic approach in mycology [4]. This method integrated genotypic, phenotypic, chemotaxonomic, and phylogenetic data to provide a comprehensive framework for fungal identification. The article emphasizes the utility of molecular technique, such as multilocus sequence analysis (MLSA), that combines phylogenetic and genetic approaches, alongside phenotypic techniques, such as matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). These tools enhance the precision of fungal classification, thereby facilitating improved diagnostics. Despite these advances, challenges persist, including the lack of standardized guidelines and variability in interpretations, necessitating further refinement of this approach. By presenting a consensus-driven classification system, the article underscores the importance of integrating diverse data sources to achieve accurate fungal diagnostics.

The second article, “*Candida* and candidemia in Korea,” by Yong Jun Kwon and Jong Hee Shin, examines the evolving epidemiology of candidemia in Korea [5]. This review documents the increasing prevalence of non-*albicans* *Candida* species, such as *Candida glabrata* and *Candida parapsilosis*, and highlights the emergence of antifungal resistance as a critical public health concern. Notably, the clonal transmission of

C. parapsilosis strains harboring the Erg11p Y132F mutation has become endemic in certain healthcare facilities. The article also explores the multidrug-resistant profiles of *C. glabrata*, emphasizing the molecular mechanisms underlying resistance and their clinical implications. These findings highlight the urgent need for comprehensive surveillance programs and targeted interventions to curb the spread of resistant strains and mitigate the morbidity and mortality associated with candidemia.

The third article, titled “Current nonculture-based diagnosis of candidemia,” authored by Eun Jeong Won, addresses the limitations of traditional blood culture methods and explores innovative nonculture-based diagnostic techniques [6]. Although blood cultures are regarded as the gold standard, their low sensitivity and prolonged turnaround times, often delay the timely initiation of appropriate antifungal therapy. This article reviews alternative diagnostic methods, including immunological assays targeting beta-D-glucan and mannan antigens along with molecular diagnostics employing PCR and next-generation sequencing (NGS) technologies. These advancements offer improved sensitivity and specificity, enabling earlier detection of candidemia and potentially better patient outcomes. However, challenges such as cost, accessibility, and the risk of false positives are discussed, emphasizing the need for a balanced approach that integrates multiple diagnostic methods for optimal clinical utility.

In the fourth article, titled “Current epidemiology and implications for microbiological diagnosis of cryptococcal infections in Korea,” by Myeong Hee Kim provides a detailed analysis of cryptococcosis, a life-threatening fungal infection caused by *Cryptococcus neoformans* and *Cryptococcus gattii*. This study explores the epidemiological trends in Korea, where *C. neoformans* VNI-ST5 was identified as the predominant genotype. Infections caused by *C. gattii*, though rare, are on the rise, indicating potential shifts in the epidemiological landscape. This review discusses available diagnostic methods, including microscopic examination, antigen testing, and molecular techniques. It also highlights the challenges posed by antifungal resistance and emphasizes the need for standardized susceptibility testing protocols. By presenting these insights, the article underscores the importance of integrating epidemiological and microbiological data to enhance the diagnosis and management of cryptococcal infections.

Collectively, these articles provide a comprehensive overview of fungal infections in Korea, offering valuable insights into the interplay between epidemiological trends, diagnostic advancements, and clinical challenges. They highlight the critical need for a multidisciplinary approach to address the rising burden of fungal diseases. Additionally, these reviews underscore the importance of continuous surveillance and research to anticipate emerging trends and combat resistance patterns.

This special issue highlights the significant progress in diagnostic technologies while advocating for sustained research and innovation to enhance laboratory capacity and diagnostic capabilities for fungal infections. It serves as a resource for clinicians, researchers, and public health professionals to mitigate the burden of fungal infections in Korea. The insights presented herein aim to inspire further research and foster collaboration to address the pressing challenges in the field of medical mycology.

Ethics statement

This was not a human population study, and thus, approval by the institutional review board and informed consent were not required.

Conflicts of interest

Jayoung Kim has been on the *Annals of Clinical Microbiology* editorial board since August 2024 and has been a guest editor for this special topic. However, she was not involved in the review process of this article. No potential conflicts of interest relevant to this article have been reported.

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Data availability

None.

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