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Short Communication

Fungal Pathogens and Their Impact on Human Animal and Plant Health

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DESCRIPTION

Fungal pathogens represent a diverse group of microorganisms capable of causing diseases in humans, animals and plants. Fungal infections were considered relatively rare and mostly opportunistic. In humans, opportunistic fungal pathogens such as *Candida albicans*, *Aspergillus fumigatus* and *Cryptococcus neoformans* are responsible for severe infections, particularly in immunocompromised individuals[1]. Advances in medical interventions, including organ transplantation, chemotherapy and the widespread use of immunosuppressive drugs, have inadvertently expanded the susceptible population[2]. Infections caused by these fungi range from superficial skin and mucosal infections to life threatening systemic diseases such as candidemia, invasive aspergillosis and cryptococcal meningitis. The clinical management of these infections is complicated by limited antifungal treatment options and the emergence of drug resistant strains[3]. Multidrug resistant species like *Candida auris* highlight the urgency for novel therapeutics and improved diagnostic approaches. Fungal pathogens are not limited to human health they also play a significant role in animal diseases. Livestock, poultry and aquaculture systems are increasingly affected by fungal infections, which can reduce productivity, compromise animal welfare and threaten food security[4]. Aspergillus species can infect poultry, causing respiratory diseases and significant economic losses. Similarly, mycotoxin producing fungi, such as *Fusarium species*, contaminate feed and crops, leading to indirect health impacts on animals and humans through the food chain. These examples underscore the need for integrated One Health strategies that consider human, animal and environmental health collectively[5].

In agriculture, fungal pathogens continue to be major threats to global food security. Diseases such as rice blast, caused by *Magnaporthe oryzae*, wheat stem rust, caused by *Puccinia graminis* and gray mold, caused by *Botrytis cinerea*, result in significant crop losses annually. Beyond yield reduction, these infections often necessitate the extensive use of chemical fungicides, which can have environmental consequences and promote the emergence of resistant fungal populations[6]. Understanding the biology, ecology and virulence mechanisms of plant pathogenic fungi is therefore critical for developing sustainable disease management strategies, including resistant crop varieties, biocontrol agents and precision agricultural practices. The adaptability of fungal pathogens is partly attributed to their genetic plasticity and ability to respond to environmental stress. Fungi can modulate gene expression, produce biofilms and undergo morphological changes to survive in hostile conditions, including antifungal exposure[7]. Biofilm formation, in particular, is a key virulence factor in species such as *Candida albicans*, providing protection against host immune defenses and antifungal drugs. Furthermore, the widespread use of azole fungicides in agriculture has been linked to the development of resistance in environmental fungi, which may subsequently infect humans, illustrating the interconnectedness of environmental and clinical fungal resistance. Advances in genomics, transcriptomics and proteomics have transformed our understanding of fungal pathogens. Whole genome sequencing and comparative genomics have elucidated genes associated with virulence, host specificity and antifungal resistance[8]. Functional genomics approaches, including RNA sequencing and proteomic profiling, provide insights into fungi adapt to host environments, evade immune defenses and respond to environmental stressors. These molecular insights are guiding the development of targeted antifungal therapies, novel diagnostics and vaccine candidates, addressing both human and plant health concerns[9].

Despite their growing significance, fungal pathogens remain underrecognized in global health and research priorities[10]. Limited public awareness, underfunded research and insufficient surveillance contribute to delays in diagnosis and treatment, increasing morbidity and mortality. Emerging fungal pathogens such as Candida auris exemplify how environmental change, climate variability and international travel can accelerate the spread of virulent fungi[11]. Fungal pathogens are emerging as critical threats to human, animal and plant health, driven by their adaptability, resistance potential and ecological versatility. Their impact spans clinical, agricultural and environmental domains, underscoring the need for coordinated research and management strategies[12]. Integrating genomic technologies, functional studies and One Health approaches offers a promising pathway for understanding and mitigating the risks posed by fungal pathogens.

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REFERENCES

1. Thorarinsdottir A. E, David Harris T. Metal-Organic Framework Magnets. Chem. Rev. 2020;120:8716-8789.
2. Silva P, Vilela S. M. F, Tome J. P. C, Almeida Paz F. A. Multifunctional metal-organic frameworks from academia to industrial applications. Chem. Soc. Rev. 2015;44:6774-6803.
3. Bisercic M. S, Marjonovic B, Zasonska B. A, Stojadinovic S, Marjanovic G. C. Novel microporous composites of MOF-5 and polyaniline with high specific surface area. Synth. Met. 2020;262:116348.
4. Hu M. L, Razavi S. A. A, Piroozzadeh M, Morsali A. Sensing organic analytes by metal–organic frameworks a new way of considering the topic. Inorg. Chem. Front. 2020;7:1598-1632.
5. Hu M. L, Joharian M, Razavi S. A. A, Morsali A, Wu D. Z, Tehrani A. A, et al. Phenolic nitroaromatics detection by fluorinated metal–organic frameworks Barrier elimination for selective sensing of specific group of nitroaromatics. J. Hazard. Mater. 2021;406:124501.
6. Zhang L, Wu H. B, Lou X. W. Metal-organic-frameworks-derived general formation of hollow structures with high complexity. J. Am. Chem. Soc. 2013;135:10664-10672.
7. Li J.R, Sculley J, Zhou H.C. Metal-Organic Frameworks for Separations. Chem. Rev. 2012;112:869-932.
8. Kreno L. E, Leong K, Farha O. K, Allendorf M, Van Duyne R. P, Hupp J. T. Metal-Organic Framework Materials as Chemical Sensors. Chem. Rev. 2012;112:1105-1125.
9. Talin A. A, Centrone A, Ford A. C, Foster M. E, Stavila V, Haney P, et al. Tunable Electrical Conductivity in Metal–Organic Framework Thin-Film Devices. Science. 2014;343:66-69.
10. Feng X, Ling X.L, Liu L, Song H.L, Wang L.Y, Ng S, et al. A series of 3D lanthanide frameworks constructed from aromatic multi-carboxylate ligand: Structural diversity, luminescence and magnetic properties. Dalton Trans. 2013;42:10292-10303.
11. Feng X, Xu C, Wang Z.Q, Tang S.F, Fu W, J. Ji, et al. Aerobic Oxidation of Alcohols and the Synthesis of Benzoxazoles Catalysed by a Cuprocupric Coordination Polymer (Cu+-CP) Assisted by TEMPO. Inorg. Chem. 2015;54:2088-2090.
12. Qin J.H, Huang Y.D, Zhao Y, Yang X.G, Li F.F, Wang C, et al. Highly Dense Packing of Chromophoric Linkers Achievable in a Pyrene-Based Metal–Organic Framework for Photoelectric Response. Inorg. Chem. 2019;58:15013-15016.