**Scientists Unveil Promising Breakthrough in Antifungal Treatment Research**

Meet Dr. Karen Wozniak, an associate professor for the Department of Microbiology and Molecular Genetics. Dr. Wozniak’s lab is at the forefront of decoding the mechanisms of pathogenic fungal infections, but looking at how all this started, a chance encounter was all it took. As an undergraduate, Dr. Wozniak researched parasites, but due to the retirement of her professor, she had to find a new lab to work with. After several rounds of lab rotations, she found her niche in fungal immunology. However, it wasn’t until her postdoctoral position that she focused on pathogenic fungi, with her species of choice being *Cryptococcus neoformans*.

Current research out of the Wozniak lab has detailed the potential antifungal activity of the novel compound eumelanin-inspired indoylenepheyleneethynylene (EIPE-1).

How this research became possible was actually by happenstance. Dr. Wozniak denotes that the research was jump-started by a collaboration between her lab and a former OSU professor, Dr. Nelson. Dr. Nelson is the creator of EIPE-1, a brown-black pigmented chemical compound, and wanted to see if the compound had antifungal properties, so that is where Dr. Wozniak and her expertise came into play. As EIPE-1 is a new antimicrobial agent, little is known about how it works. So, to determine its abilities as an antifungal agent, Dr. Wozniak’s group conducted research by testing its efficacy against *C. neoformans*. First, they looked at minimum inhibitory concentration (MIC), which determines the lowest concentration needed of the compound to inhibit the growth of *C. neoformans*. Second, they looked at what structural changes occurred in the fungal species when exposed to the agent. What they found was that even at a low concentration, EIPE-1 was able to inhibit growth. They also found that damage to the cell wall of *C. neoformans* occurred, although the mechanism at play is still unknown.

Something exciting and unexpected that Dr. Wozniak noted was the weird morphology that fungi took on after being treated with EIPE-1. It also was noted outside the scope of the lab’s most recent paper that macrophages, which are a type of white blood cell that is involved in the immune system, showed that EIPE-1 might have some mechanism that allows it to have better antifungal effects on macrophages with *C. neoformans*. When macrophages engulf *C. neoformans* and are treated with EIPE-1, they have better antifungal effects on *C.neoformans* still within the macrophage than the *C. neoformans* themselves. This bodes well for being therapeutic candidates against *C. neoformans.*

The findings from their current publication provide the opportunity to continue research to garner a better understanding of EIPE-1. If it is effective, combination therapy and low MIC value make it a promising lead into potentially becoming a new antifungal treatment.

There is considerable concern about antimicrobial/antibiotic-resistant genes evolving faster than novel treatments can be discovered. As EIPE-1 is a novel antimicrobial agent, could there be a potential for *C. neoformans* to gain resistance to EIPE-1? Dr. Wozniak notes that it is always a possibility. She proposes that a workaround to prevent resistance from occurring would be multi-drug therapy. Currently, no known antagonist to EIPE-1 exists, but multi-drug therapy can lower the resistance of fungal pathogens to treatment.

References

Conn, B.N., Lieberman, J.A., Chatman, P., Cotton, K., Essandoh, M.A., Ebqa’ai, M., Nelson, T.L. and Wozniak, K.L., 2024. Antifungal activity of eumelanin-inspired indoylenepheyleneethynylene against Cryptococcus neoformans. *Frontiers in Microbiology*, *14*, p.1339303.