



Porphyrin-based polymers for antifungal photodynamic inactivation of *Candida albicans*

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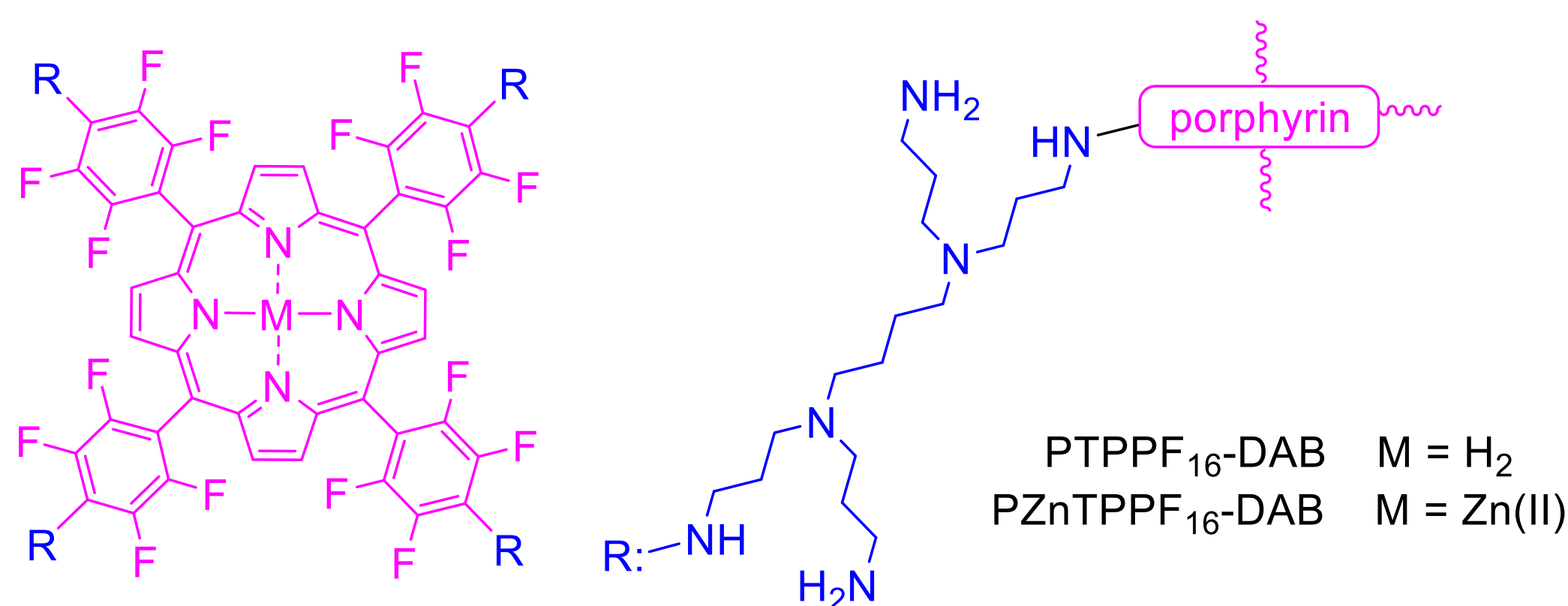
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INTRODUCTION & AIM

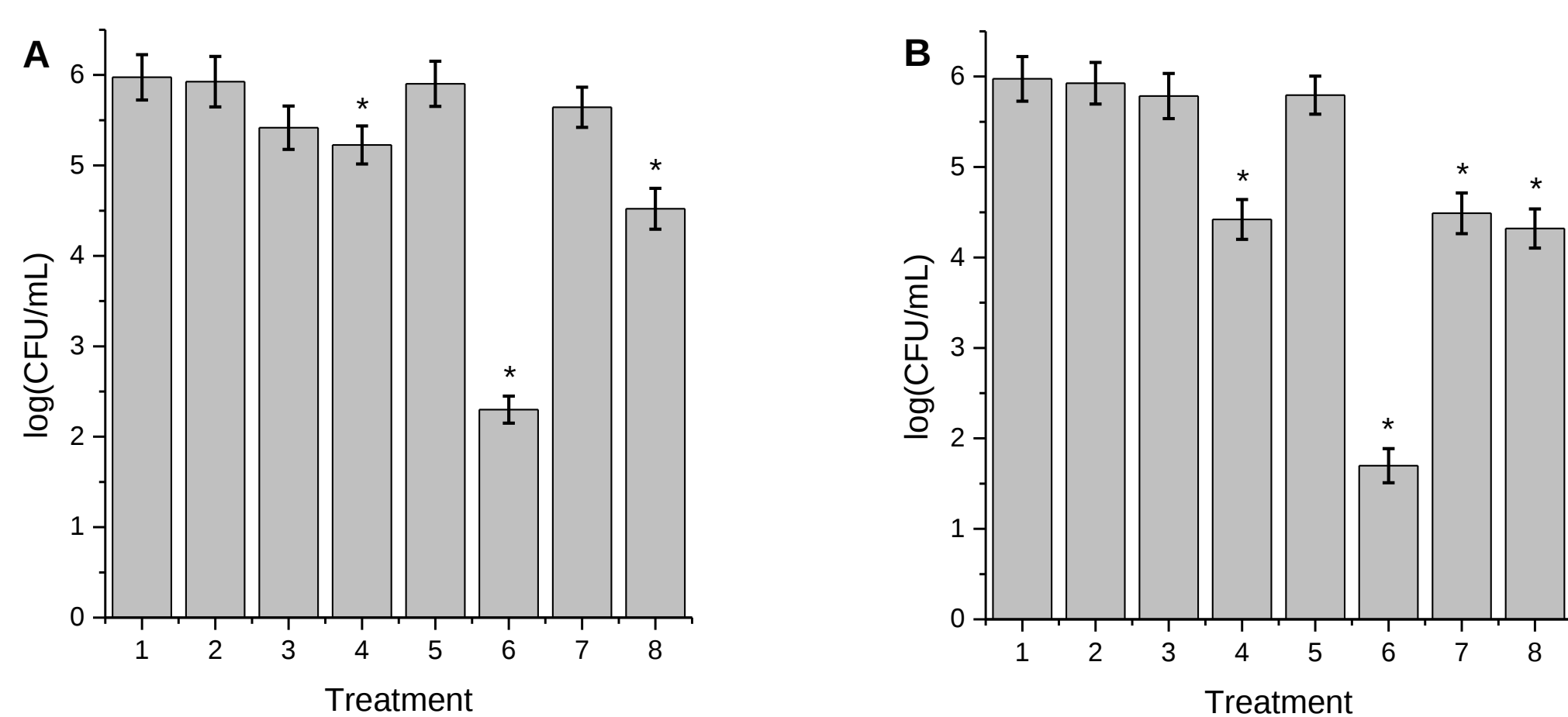
Fungal infections are a growing health concern, associated with high mortality rates, elevated treatment costs, and an increasing number of hospitalized patients [1]. Consequently, novel therapeutic strategies are urgently needed. In this work, two porphyrin-based polymers, PTPPF₁₆-DAB and PZnTPPF₁₆-DAB, were evaluated as photosensitizers for the photodynamic inactivation (PDI) of *Candida albicans*. These polymers are constructed from 5,10,15,20-tetrakis(pentafluorophenyl)porphyrin (TPPF₂₀) or its Zn(II) complex (ZnTPPF₂₀) as porphyrinic units, and *N,N,N',N'*-tetrakis(3-aminopropyl)-1,4-butanediamine (DAB) as a multifunctional crosslinker.

METHOD

The polymers PTPPF₁₆-DAB and PZnTPPF₁₆-DAB were synthesized following the methodology previously described [2]. The studies in *C. albicans* were developed according to the procedures previously reported [3].



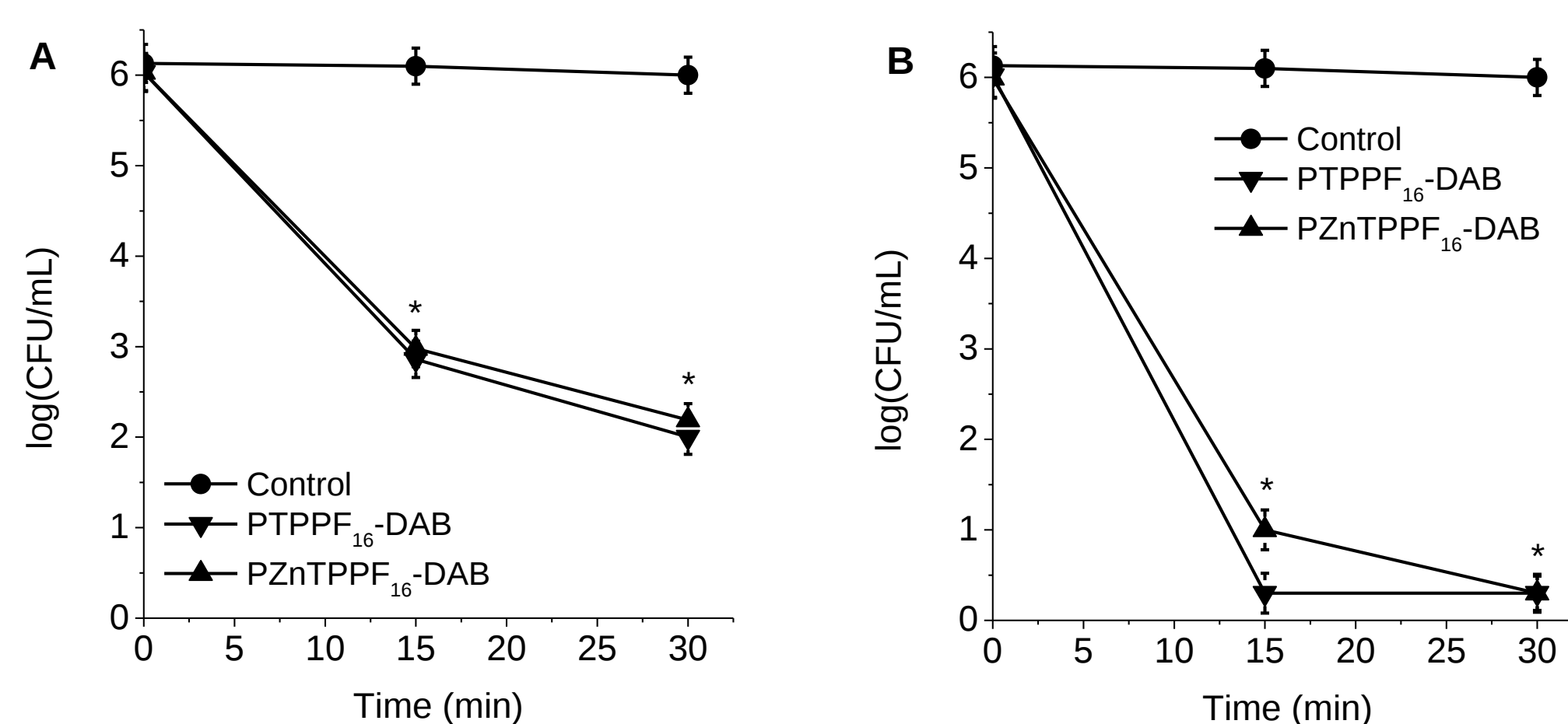
PDI of *C. albicans* biofilms



Survival of *C. albicans* biofilm treated with 5.0 μM (A) PTPPF₁₆-DAB and (B) PZnTPPF₁₆-DAB at 37 °C in the dark and irradiated with white light (90 mW/cm²) for 60 min; 1) dark control, irradiated control, 3) incubation during adhesion phase + dark, 4) incubation during adhesion phase + light, 5) incubation during proliferation + dark, 6) incubation during proliferation + light, 7) incubation after 18 h of growth + dark, 8) incubation after 18 h of growth + light.

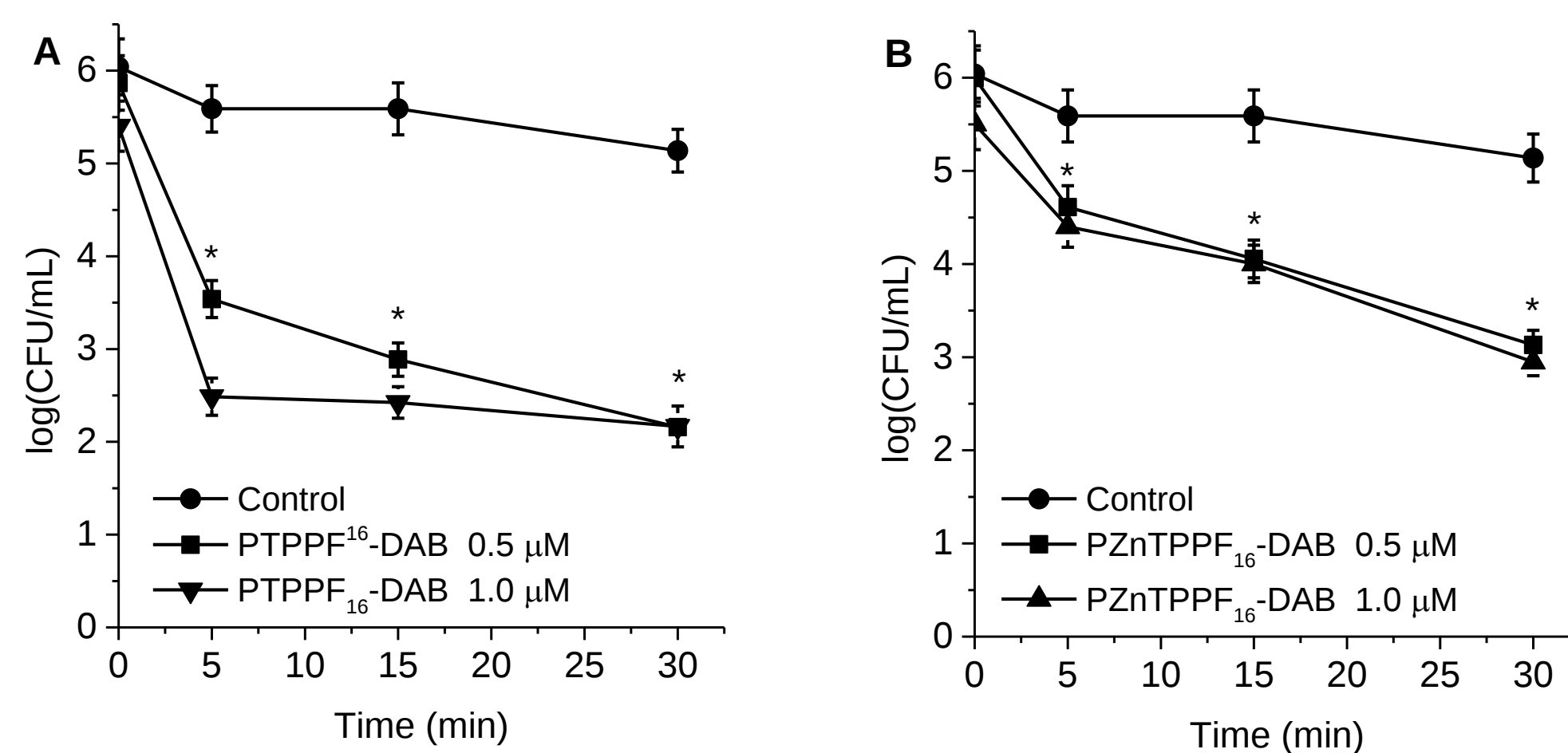
RESULTS & DISCUSSION

PDI of *C. albicans* planktonic cells



Survival of *C. albicans* planktonic cell suspensions in PBS incubated with (A) 2.5 μM polymer and (B) 5.0 μM polymer for 30 min at 37 °C in the dark and irradiated with white light (90 mW/cm²) for different times.

PDI of *C. albicans* pseudohyphae



Survival of *C. albicans* pseudohyphae suspensions in PBS incubated with 0.5 μM and 1.0 μM polymer (A) PTPPF₁₆-DAB and (B) PZnTPPF₁₆-DAB for 30 min at 37 °C in the dark and irradiated with white light (90 mW/cm²) for different times.

CONCLUSION

These results indicate that both porphyrin-based polymers, PTPPF₁₆-DAB and PZnTPPF₁₆-DAB, have potential applications as phototherapeutic agents for fungal inactivation under different culture conditions.

REFERENCES

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- [2] S. C. Santamarina, D. A. Heredia, A. M. Durantini, E. N. Durantini, Polymers 2022, 14, 4936.
- [3] P. V. Cordero, M. G. Alvarez, E. J. Gonzalez Lopez, D. A. Heredia, E. N. Durantini, Antibiotics 2023, 12, 105.