



Treatment of Pythiosis

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Dear Editor: Due to its rising global incidence, I have dedicated years to studying pythiosis, a rare yet deadly infectious disease caused by *Pythium insidiosum*.¹ Pythiosis typically presents with the infection of the artery, eye, gastrointestinal tract, and skin, and if left untreated, it can lead to organ loss or even death. In recent decades, a deeper understanding of *P. insidiosum* has been seen across molecular, serological, and histological studies, enhancing clinical awareness and diagnostic advancements.^{1,2} Traditionally mistaken for a fungus because of its microscopic appearance, *P. insidiosum* was treated with antifungal medications like terbinafine and amphotericin B.^{3,4} Molecular research clarifies that *P. insidiosum* is an oomycete, more closely related to algae, with significant biological differences from fungi, impacting drug efficacy.⁵ Since the 1980s, *P. insidiosum* antigen immunotherapy (PIAI) has emerged as a treatment alternative, with ongoing enhancements to increase efficacy.⁶ Surgery often serves as a last resort to limit the disease progression or to save lives.⁷

Current treatment strategies for pythiosis include antimicrobial drugs, PIAI, and surgery. Antimicrobial susceptibility testing reveals a higher sensitivity of

P. insidiosum to antibacterials like macrolides, oxazolidinones, and tetracyclines, reducing the reliance on surgery.⁸ Though less effective, antifungals, sometimes in combination with antibacterials, can treat pythiosis.^{9,10} PIAI, prepared by crude antigen extract of *P. insidiosum*, is beneficial for humans and animals with pythiosis, potentially reducing surgery needs and increasing survival rates. However, its efficacy varies across different disease manifestations.⁶ Surgical intervention, typically reserved for unresponsive cases, ranges from organ-preserving procedures to more radical approaches like amputation, depending on disease progression.^{2,3,7} Additional treatments, including dimethyl sulfoxide, potassium iodide, steroids, ethanol, and mefenoxam, applied singly or combined, have shown promise in treating specific pythiosis forms.^{11,12}

Treatment is the most challenging aspect of pythiosis, but there is hope. The morbidity and mortality of affected patients remain high. However, with continued attention and basic/clinical research by the medical community, we can gain insight into the disease and find a better way of pythiosis control, potentially improving their clinical outcomes.



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References

1. Yolanda H, Krajaejun T. Global distribution and clinical features of pythiosis in humans and animals. *J Fungi (Basel)*. 2022;8(2):182. doi:10.3390/jof8020182
2. Chitasombat MN, Jongkhajornpong P, Lekhanont K, Krajaejun T. Recent update in diagnosis and treatment of human pythiosis. *PeerJ*. 2020;8:e8555. doi:10.7717/peerj.8555



3. Krajaejun T, Sathapatayavongs B, Prachartam R, et al. Clinical and epidemiological analyses of human pythiosis in Thailand. *Clin Infect Dis*. 2006;43(5): 569-576. doi:10.1086/506353
4. Dória RG, Carvalho MB, Freitas SH, et al. Evaluation of intravenous regional perfusion with amphotericin B and dimethylsulfoxide to treat horses for pythiosis of a limb. *BMC Vet Res*. 2015;11:152. doi:10.1186/s12917-015-0472-z
5. Lerksuthirat T, Sangcakul A, Lohnoo T, Yingyong W, Rujirawat T, Krajaejun T. Evolution of the sterol biosynthetic pathway of *Pythium insidiosum* and related oomycetes contributes to antifungal drug resistance. *Antimicrob Agents Chemother*. 2017;61(4):10.1128/aac.02352-16. doi:10.1128/AAC.02352-16
6. Yolanda H, Krajaejun T. History and perspective of immunotherapy for pythiosis. *Vaccines (Basel)*. 2021; 9(10):1080. doi:10.3390/vaccines9101080
7. Permpalung N, Worasilchai N, Plongla R, et al. Treatment outcomes of surgery, antifungal therapy and immunotherapy in ocular and vascular human pythiosis: a retrospective study of 18 patients. *J Antimicrob Chemother*. 2015;70(6):1885-1892. doi:10.1093/jac/dkv008
8. Yolanda H, Krajaejun T. Review of methods and antimicrobial agents for susceptibility testing against *Pythium insidiosum*. *Heliyon*. 2020;6(4):e03737. doi:10.1016/j.heliyon.2020.e03737
9. Luangnara A, Chuamanochan M, Chiewchanvit S, Pattamapaspong N, Salee P, Chaiwarith R. Pythiosis presenting with chronic swelling and painful subcutaneous lesion at right deltoid. *IDCases*. 2023; 33:e01873. doi:10.1016/j.idcr.2023.e01873
10. Torvorapanit P, Chuleerarux N, Plongla R, et al. Clinical outcomes of radical surgery and antimicrobial agents in vascular pythiosis: a multicenter prospective study. *J Fungi (Basel)*. 2021;7(2):114. doi:10.3390/jof7020114
11. Yolanda H, Lohnoo T, Rujirawat T, et al. Selection of an appropriate in vitro susceptibility test for assessing anti-pythium insidiosum activity of potassium iodide, triamcinolone acetonide, dimethyl sulfoxide, and ethanol. *J Fungi (Basel)*. 2022;8(11):1116. doi:10.3390/jof8111116
12. Billings P, Walton S, Shmalberg J, Santoro D. The use of mefenoxam to treat cutaneous and gastrointestinal pythiosis in dogs: a retrospective study. *Microorganisms*. 2023; 11(7):1726. doi:10.3390/microorganisms11071726