

Malasseziosis in canines and felines

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Abstract

Malassezia is lipophilic yeast commonly seen as skin commensals and causes opportunistic cutaneous infections in various mammals and birds. These unipolar budding yeasts are capable of producing diseases under certain predisposing circumstances such as changes in the cutaneous microenvironment, alterations in the host defense mechanism, etc. Phenotypic or genotypic techniques are used to identify and characterize different *Malassezia* species. Microscopic features, culture-based techniques, different types of Polymerase Chain Reactions and PCR-associated techniques, matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) mass spectrometry and the chemical imprint technique are some of the techniques used to characterize *Malassezia* isolates. *Malassezia* is a common cause of otitis and skin infections in immune-compromised dogs. A combination of topical, systemic, and environmental disinfection is necessary for the effective treatment of malasseziosis in canines and felines.

Introduction

Malassezia is a yeast commonly seen as commensal in the body surface of mammals and birds. A total of 18 species of *Malassezia* have been identified so far (Lorch *et al.*, 2018; Theelen *et al.*, 2018). Most of the *Malassezia* species require lipid supplementation in the growth media they lack the fatty acid synthase gene except *M. pachydermatitis*. However, lipid supplementation will enhance its growth. The lipophilic *M. pachydermatitis* is a member of the natural skin flora of canines and felines and is associated with several skin conditions in immune-compromised animals (Nuttall *et al.*, 2009).



Dogs with atopic dermatitis in particular are more likely to develop secondary *Malassezia* dermatitis (Patel et al, 2008). Skin conditions such as pityriasis versicolor, seborrheic dermatitis, atopic eczema, and folliculitis can be caused by *Malassezia* species. *Malassezia* spp is a common cause of canine otitis and *M. pachydermatitis* is the major species associated with the disease in cats and dogs. Asexual reproduction occurs in *Malassezia* species through unipolar broad-based budding. The mating-type locus region has been identified; however, the sexual form has not yet been found (Gioti et al., 2013).

Predisposing factors to *Malassezia* infection

- Cutaneous hypersensitivity
- Pyoderma
- Increased wetness
- Modified surface lipids
- Endocrine disorders
- Ectoparasitic skin disease
- Disorders of keratinization
- Disruption of stratum corneum barrier function

(Bond et al., 2020)

Clinical signs

Clinical manifestations mainly include moderate to severe pruritis. Other symptoms include paronychia, cheilitis/muzzle erythema, hyperpigmentation, greasy exudation, scaling (visible flake of aberrant or compacted epithelial cells), erythema (with or without papules), hyperpigmentation, and leathery, elephant-like skin. Exudates, erythema, edema, an awful odour, and pruritus are the commonest infection symptoms. Depending on where the infection is, the pruritus may appear as facial rubbing, head shaking, ear scratching, paw licking or biting, anal scooting, or generalized scratching. All breeds, ages, or sex are susceptible to *Malassezia* dermatitis. Pruritus can range in severity from moderate to quite severe. The disease is common during the summer or humid months. In dogs, *Malassezia* dermatitis can cause localized or widespread skin lesions. The mouth, lips, ventral neck, axillae, ventral belly, medial hind limbs, interdigital skin, perineum, external ear canal,



and intertriginous areas are common sites for regional dermatitis (Bollez *et al.*, 2018). Skin lesions with both hypo- and hyperpigmentation are observed (Glatz *et al.*, 2015).

Diagnosis

The diagnosis is made based on the clinical picture and symptoms, along with mycological detection and treatment response (Prohic *et al.*, 2016). *Malassezia* folliculitis can be distinguished from other kinds of folliculitis using histopathology. To find *Malassezia* yeasts in skin disorders, a variety of sampling procedures have been used. These approaches include tape stripping, skin scraping, swabs, and contact plates. In therapeutic settings, direct microscopy is routinely employed (Saunte *et al.*, 2018). Potassium hydroxide, dye like lactophenol blue, May-Grunwald-Giemsa, Gram staining, or a fluorescent dye like Calcofluor white and Blancophor, can be used for the direct microscopic examination. Gram staining can also be used to identify *Malassezia* (Tu *et al.*, 2018). Additional diagnostic techniques such as reflectance confocal microscopy can also be used (Andersen *et al.*, 2018).

Dixon agar and Sabouraud dextrose agar can be used to isolate *Malassezia* spp. The colonies will be rounded, less convex, and had wrinkled borders. "Spaghetti and meatballs appearance" has been used to describe the distinctive appearance of *M. furfur* under the microscope. To distinguish between the species and strains of *Malassezia*, molecular-based techniques are frequently used. Polymerase Chain Reaction (PCR) methods, matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF); (Honnarav *et al.*, 2018), mass spectrometry and/or Raman spectroscopy have been used (Petrokilidou *et al.*, 2019).

Treatment

Malassezia in canines and felines requires a combination of topical, systemic, and environmental disinfection to be successfully treated. The first line of treatment is topical antifungal therapy. The topical azole antifungals are highly effective in pityriasis versicolor. Imidazoles such as clotrimazole, climbazole, and miconazole are also used topically when predisposing factors cannot be identified or controlled in an animal suffering from recurrent *Malassezia* infections, regular topical or pulsed oral antifungal therapy has been recommended to minimize the frequency of infection (Theelen *et al.*, 2018). Topical therapy is suggested over systemic therapy in the long-term course because it carries a lesser risk of toxicity (Petit *et al.*, 2016). The mechanical action of shampoos makes them



particularly intriguing since they have the potential to lessen scaling and oily exudation. Some are made with keratoregulating ingredients such as salicylic acid, phytosphingosine, ammonium lactate, and zinc gluconate. Preparations of chlorhexidine alone or in combination with an azole antifungal are typically used for topical therapy (Bond *et al.*, 2020). Topical treatment with 2% miconazole and 2% chlorhexidine is also practiced.

For oral therapy, ketoconazole or itraconazole are preferred in dogs and itraconazole in cats for severe *Malassezia*-associated skin disorders or cases that do not respond to topical therapy alone. It has been established that itraconazole pulsed therapy (5 mg/kg orally once a day, two days on/five days off for three weeks) is efficient in the treatment of *Malassezia* dermatitis in dogs. Pulse therapy with ITZ is employed with 7 days on, 7 days off, 7 days on, or twice weekly administration due to its high concentration and durability inside the stratum corneum (Berger *et al.*, 2012). Ketoconazole at 5-10 mg/kg once or twice daily and itraconazole at 5 mg/kg orally once daily or two consecutive days per week are recommended for treating canine *Malassezia* dermatitis according to moderate evidence. Only limited evidence supports the use of itraconazole in cats at doses of 5–10 mg/kg once daily or 5 mg/kg seven days per week (Rhimi *et al.*, 2021).

Conclusion

Yeast infections in humans and animals have gained significant importance in recent years. The *Malassezia* yeasts are intricate fungus that is naturally found in the skin's microbiome. *Malassezia* species have been linked to a wide range of skin conditions in humans as well as companion, farm, avian, and exotic animals. The widespread use of broad-spectrum antibiotics and the rising number of immunosuppressed individuals are the key contributors to the increasing prevalence of these diseases. Zoonotic transmission is proven, particularly for *M. pachydermatis*. So a better understanding of *Malassezia* based on advanced and deeper research is a need of the hour.

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