Polish Journal of Veterinary Sciences Vol. 17, No. 2 (2014), 365–366

DOI 10.2478/pjvs-2014-0051

Short communication

Adhesion of *Malassezia pachydermatis* of different growth type to canine epithelial cells

M. Florek, J. Król, Z. Staroniewicz, B. Bażanów

Department of Microbiology, Faculty of Veterinary Medicine,
Wroclaw University of Environmental and Life Sciences, Norwida 31, 50-375, Wrocław, Poland

Abstract

A total of 100 *Malassezia pachydermatis* strains recovered from skin and mucosal membranes of dogs were evaluated for their adhesive properties. Two types of growth, related to colony morphology on Sabouraud agar, were observed (type I and II). The mean number of fungal cells attaching to canine buccal epithelial cells was found to be 17. The number of adhered cells was greater (statistically significant at the level of $p < 0.01$) in strains belonging to the type I.

Key words: *Malassezia pachydermatis*, adherence properties, lipids, dog

Introduction

Malassezia pachydermatis is a lipophilic, but not lipid-dependent species, encountered on the skin and mucosal membranes of animals (Guillot and Bond 1999). The fungus has been isolated from the body surfaces of healthy dogs, however, under favorable conditions it may cause *otitis externa* and *dermatitis* (Guillot and Bond 1999) in these animals.

Phenotypic heterogeneity has been observed within the species – there are strains showing different colony morphology when isolated using Sabouraud dextrose agar (Huang et al. 1993). Adhesion to the hosts' cells is thought to be a key factor initiating infection by microorganisms (Guillot and Bond 1999). The adherence mechanisms of *M. pachydermatis* as well as factors affecting the process are still not fully understood. Therefore, the aim of the study was to evaluate the influence of growth type of the yeast on its ability of the attachment to canine buccal epithelial cells.

Materials and Methods

The examination was performed on 100 *M. pachydermatis* strains recovered from both skin and mucosal membranes of dogs. The yeasts were isolated using Sabouraud dextrose agar incubated for 3 days at the temperature of 37°C. Species identification was performed phenotypically according to Guillout et al. (1996). Strains belonging to *M. pachydermatis* were subsequently classified into two phenotypic types (the type I – producing convex, white to yellow colonies 2-3 mm in diameter; the type II – characterized by flat, yellow to brown colonies measuring 0.5-1 mm

Correspondence to: M. Florek, e-mail: magdalena.florek@up.wroc.pl, tel.: +48 71 320 54 30

Table1. Statistic data concerning adhesion of *M. pachydermatis* strains to canine buccal epithelial cells.

Strains	S	x_{Me}	x_{min}	x_{max}	γ_1
General (n=100)	17.9	17	0	138	1.472
Type I (n=75)	18.2	18	0	138	1.399
Type II (n=25)	16.3	13	0	112	1.743

S – standard deviation; x_{Me} – median; x_{min} – minimum value; x_{max} – maximum value; γ_1 – skewness

in diameter). The adhesion test was carried out by method described by the Macura and Sysło (1994). Statistical analysis was conducted by the nonparametric Kruscal-Wallis and median tests.

Results and Discussion

The mean number of *M. pachydermatis* cells attached to one canine epithelial cell was 17, with a range from 0 to 138. Dworecka-Kaszak using similar method established the mean number of the yeast cells adhered to epithelial cells to be 13.9 (Dworecka-Kaszak 1997). That significant difference may be due to fact that in vitro adherence examination may be influenced by a number of factors (Schechtman et al. 1995, Bond and Lloyd 1996).

Huang et al. (1993) described two morphological types of *M. pachydermatis* strains, which varied with colony size, lipid-dependency, viability and fatty acid composition. Further investigation revealed that isolates of both types have differed in cell hydrophobicity and activity of some enzymes (Król and Staroniewicz 2000, Staroniewicz et al. 2008). The present study showed statistically important differences in adhesion abilities between *M. pachydermatis* strains presenting above-mentioned phenotypes. The mean number of attached fungal cells in groups tested amounted to 18 and 13 in the type I and II, respectively (Table 1). The isolates of the type I showed greater adhesion abilities (statistically significant at the level of $p < 0.01$) than the second group tested. The data available do not provide any information on adherence abilities of *M. pachydermatis* taking into consideration a growth type and a possible partial lipid-dependence of this yeast. However, in a research conducted by Schachtman et al. (1995) comparing isolates of *M. pachydermatis* and *M. furfur*, it was observed that cells of the latter (lipid-dependent) species adhered to human keratinocytes in significantly lower numbers than those of non lipid-dependent *M. pachydermatis* strains. The results of our investigation as well as the data obtained by Schachtman et al. (1995) may suggest that the difference between lipid-dependent and non lipid-dependent strains or their fatty acid composition may strongly influence the process of adhesion. And since it was also found (Akaza et al. 2012) that in case of *Malassezia* the ability of adherence to keratinocytes is the greatest factor contributing to the proinflamatory cytokine expression in humans, further investigations are required to explain if/how lipid metabolism of the yeast may influence pathogenicity of these organisms.

References

Akaza N, Akamatsu H, Takeoka S, Mizutani H, Nakata S, Matsunaga K (**2012**) Increased hydrophobicity in *Malassezia* species correlates with increased proinflammatory cytokine expression in human keratinocytes. Med Mycol 50: 802-810.

Bond R, Lloyd DH (**1996**) Factors affecting the adherence of *Malassezia pachydermatis* to canine corneocytes in vitro. Vet Dermatol 7: 49-56.

Dworecka-Kaszak B (**1997**) *In vitro* adhesion of *Malassezia pachydermatis* to canine oral epithelial cells stimulated by supernatants from cultures of *Staphylococcus intermedius*. Mikol Lek 4: 167-169.

Guillot J, Bond R (**1999**) *Malassezia pachydermatis*: a review. Med Mycol 37: 295-306.

Guillot J, Guého E, Lesourd M, Midgley G, Chevrier G, Dupont B (**1996**) Identification of *Malassezia* species. A practical approach. J Mycol Med 6: 103-110.

Huang HP, Little CJ, Fixter LM (**1993**) Effects of fatty acids on the growth and composition of *Malassezia pachydermatis* and their relevance to canine otitis externa. Res Vet Sci 55: 119-123.

Król J, Staroniewicz Z (**2000**) Assessment of the activity of egzoenzymes in *Malassezia pachydermatis strains* isolated from dogs. Mikol Lek 7: 7-12.

Macura A, Sysło J (**1994**) Proteolytic activity and adherence capacity of *Candida albicans* fungi. Mikol Lek 1: 7-10.

Schechtman RC, Midgley G, Bingham JS, Hay RJ (**1995**) Adherence of *Malassezia* isolates to human keratinocytes in vitro – a study of HIV-positive patients with *seborrhoeic dermatitis*. Br J Dermatol 133: 537-541.

Staroniewicz Z, Florek M, Król J (**2008**) Hydrophobic properties of *Malassezia* and *Candida* yeasts isolated from dogs. Mikol Lek 15: 67-71