Dermatology Practical & Conceptual

Identification of *Malassezia* Species in Basal Cell Carcinoma Lesions by Conventional and Molecular Methods

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Introduction

Recent studies have suggested that aryl hydrocarbon receptor (AhR) activation leads to carcinogenesis in mouse skin and that polymorphism of AhR-dependent detoxification enzymes may be associated with basal cell carcinoma (BCC) pathogenesis. AhRs have many ligands with agonistic and antagonistic effects. *Malassezia* species synthesize ligands that can potently activate AhRs [1]. It has been hypothesized that the regulation of skin immunity and epidermal homeostasis induced by *Malassezia* may play a role in the BCC development. [2] Also, itraconazole was shown to inhibit Hedgehog signaling pathway and reduce tumor area in BCC lesions. [3] The aim of this study was to evaluate the presence of *Malassezia* in BCC lesions by conventional and molecular methods.

Case Presentation

This cross-sectional study included 16 patients with confirmed BCC aged ≥18 years and 13 volunteers for the control group. The samples were taken from the lesion, perilesional area, and chin of the patients by direct contact with Leeming Notman agar. The chin where there is less colonization was chosen as a control in both groups. In the control group, same regions were selected. Phenotypical identification of *Malassezia* was done according to reference criteria [4]. Nested PCR-RFLP were used to identify the colonies from culture growth and in the samples taken from the above-mentioned localizations by skin scraping. All isolates identified by phenotypic methods were confirmed by PCR-RFLP.

In patients, the most common species were *M. pachydermatis* (n=3) and *M. sympodialis* (n=3) in the lesions.

The most common species were *M. pachydermatis* (n=6) and *M. sympodialis* (n=6) in the perilesional areas. The most common species was *M. slooffiae* (n=5) in the chins (Table 1).

M. slooffiae (n=7) was the most common type in the samples taken from localizations in the controls similar to the lesions of the patients. *M. slooffiae* was the most common species in the chins (n=5) (Table 2). There was no statistically significant difference in the rates of *Malassezia* species in lesional and non-lesional skin areas of the patient group. There was no significant difference between the patients and controls.

In this study, the predominant species in BCCs and perilesional areas were *M. pachydermatis* and *M. sympodialis*.

Table 1. The distribution of the Malassezia species in patient group

Subject number	Localization	Culture/ Phenotyping and PCR-RFLP	Skin scraping/ PCR-RFLP	Subject number	Localization	Culture/ Phenotyping and PCR-RFLP	Skin scraping/ PCR-RFLP
P1	Nasal dorsum	-	-	**P9**	Cheek	*M. pachydermatis*	-
	Perilesional area	*M. slooffiae*	*M. furfur/ M. slooffiae*		Perilesional area	*M. pachydermatis*	*M. pacyhdermatis/ M. restricta/ M. slooffiae*
	Chin	-	-		Chin	*M. pachydermatis*	-
P2	Forehead	-	*M. globose*	**P10**	Nasal dorsum	*M. pachydermatis*	-
	Perilesional area	-	*M. slooffiae*		Perilesional area	*M.pachdermatis*	-
	Chin	-	*M. furfur/ M. slooffiae/ M. pachydermatis*		Chin	*M.pachydermatis*	-
P3	Scalp	-	-	**P11**	Nasal dorsum	-	-
	Perilesional area	-	*M. sympodialis*		Perilesional area	*M. pacyhdermatis*	*M. pacyhdermatis*
	Chin	*M. globosa*	-		Chin	-	-
P4	Nasal dorsum	-	-	**P12**	Nasal dorsum	-	*M. slooffiae/ M. retrictra/ M. pacyhdermatis*
	Perilesional area	*M. pacyhdermatis*	-		Perilesional area	-	*M. sympodialis*
	Chin	*M. pacyhdermatis*	-		Chin	-	*M. slooffiae*
P5	Below the lip	-	*M. slooffiae/ M. sympodialis*	**P13**	Cheek	-	*M.furfur*
	Perilesional area	-	*M. slooffiae*		Perilesional area	-	*M. furfur/ M. pachydermatis/ M. obtusa*
	Chin	-	*M. globose/ M. slooffiae*		Chin		*M. furfur*
P6	Cheek	-	*M. sympodialis*	**P14**	Below the lip	*M. furfur/ M. globosa*	-
	Perilesional area	-	*M. sympodialis*		Perilesional area	*M. pacyhdermatis/ M. restricta*	-
	Chin	*M. pachydermatis*	*M. pachydermatis/ M. furfur*		Chin	-	*M. pacyhdermatis/ M.slooffiae*
P7	Lateral nose	-	-	**P15**	Forehead	-	-
	Perilesional area	-	*M. sympodialis*		Perilesional area	-	*M. sympodialis*
	Chin	*M. restricta*	*M. restricta*		Chin	*M. pachydermatis/ M. slooffiae*	-

Table 1. The distribution of the Malassezia species in patient group. *(continued)*

Subject number	Localization	Culture/ Phenotyping and PCR-RFLP	Skin scraping/ PCR-RFLP	Subject number	Localization	Culture/ Phenotyping and PCR-RFLP	Skin scraping/ PCR-RFLP
P8	Forehead	*M. obtusa*	*M. obtusa/ M. restricta*	P16	Ear heliks	-	-
	Perilesional area	-	-		Perilesional area	-	*M. globosa/ M. slooffiae/ M.sympodialis*
	Chin	-	-		Chin	-	*M. sympodialis*

P, Patient; PCR-RFLP, Polymerase chain reaction-Restriction fragment length polymorphism.

Table 2. The distribution of the Malassezia species in control group

Subject number	Localization	Culture/ Phenotyping and PCR-RFLP	Skin scraping/ PCR-RFLP
C1	Nasal dorsum	-	*M. slooffiae*
	Chin	*M. globosa*	-
C2	Nasal dorsum	*M. restricta*	-
	Chin	*M. globosa*	*M. slooffiae*
C3	Below the lip	-	-
	Chin	-	*M. pachydermatis*
C4	Nasal dorsum	-	*M. pachydermatis*
	Chin	-	-
C5	Lateral nose	*M. furfur*	*M. furfur*
	Chin	*M. furfur*	*M. furfur/ M. pachydermatis*
C6	Upper the lip	-	*M. slooffiae*
	Chin	-	*M. furfur/ M. pachydermatis*
C7	Forehead	*M. furfur*	*M. slooffiae/ M. restricta*
	Chin	*M. furfur*	*M. furfur*
C8	Ear helix	-	-
	Chin	-	*M. slooffiae/ M. pachydermatis*
C9	Cheek	-	*M. slooffiae*
	Chin		
C10	Forehead	-	*M. slooffiae/ M. pachydermatis*
	Chin	*M. furfur/ M. pachydermatis*	-
C11	Cheek	*M. slooffiae/ pachydermatis*	-
	Chin	-	*M. restricta/ M. globosa M. / sympodialis*
C12	Nasal dorsum	-	*M. slooffiae*
	Chin	*M. sloffiae*	*M. slooffiae/ M. furfur*
C13	Scalp	-	*M. sympodialis*
	Chin	-	-

C, Control; PCR-RFLP, Polymerase chain reaction-Restriction fragment length polymorphism.

In the samples taken from the chins of the patients and from all localizations in the controls, the most common species was *M. slooffiae*. In mycobiome studies, the presence of *M. pachydermatis* in the nasal vestibule has been detected in healthy individuals and patients with allergic rhinitis [5]. In our study, most of the samples taken from BCCs of the patients as well as from the controls were from the nasal region. However, in nasal samples, one of the most common species was *M. pachydermatis* in the patients, while it was *M. slooffiae* in the controls.

Conclusion

The detection of different species in the BCC lesions that was not detected in the controls may be suggestive for studies aimed at showing whether different *Malassezia* species colonization play a role in the development of BCC. However, further clinical and molecular studies are needed to confirm this association and to prove the role of *Malassezia* in the pathogenesis of BCC.

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