CHAPTER 3

FUNGAL MICROBIOME OF THE SKIN: MALASSEZIA

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3.1. Skin Microbiome

Human skin is covered with a wide variety of microorganisms, including bacteria, fungi, and viruses. The human microbiome consists of more than 100 trillion microorganisms, and their number is well over the number of human cells (60 trillion). Therefore, the human microbiome should be considered responsible for human health or diseases.

The bacterial microbiome differs according to body site (oily, dry, and moist). In oily sites (scalp and face), *Propionibacterium* species predominate because they require lipids for growth. *Staphylococcus* species predominate in dry sites (arm and leg), whereas *Corynebacterium* species predominate in moist sites (axilla).

Regarding the fungal microbiome, *Malassezia* predominate at any site, which is a great difference between fungal and bacterial microbiomes.

3.1.1. *Malassezia*

Malassezia is a yeast-like fungus that taxonomically belongs to Basidiomycota, Ustilaginomycotina, Malasseziomycetes, Malasseziales, and Malasseziaceae. Its cells are globose, ovoid or cylindrical with a size of 1.5-3 µm x 2-8 µm (Figure 1). Their cell size is smaller than other yeast-like fungi, such as *Candida* or *Cryptococcus*. The microorganisms colonize only on human and non-human animal skins, and do not distribute in any environment. One of the most interesting characteristics of *Malassezia* is that its genome size is smaller than other fungi. The *Malassezia* genome is only 7 to 8 Mbp, while that of *Candida* is 12 Mbp and that of *Aspergillus* is over 30 Mbp. Other interesting characteristics of *Malassezia* are that the microorganisms require lipids for growth because they are not able to

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