

〈シンポジウム I〉

『環境と皮膚免疫』

## 腸内環境と皮膚生理

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### Gut Environment and Skin Physiology

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#### Abstract

It is known that 100 trillion of bacteria inhabit the gut and are involved in the metabolism of food-derived materials. Gut microbiota is basically stable in healthy condition, but can be easily disturbed by various causes, resulting in many diseases. Therefore, recovery of normal gut microbiota is quite important to maintain health. In general, metabolites derived from proteins generated by gut bacteria are injurious to the host. To understand the influence of tyrosine-derived metabolites (phenol and *p*-cresol) on the skin physiology, we bred hairless mice with tyrosine-containing diet. As a result, phenol and *p*-cresol levels in serum and skin were elevated and their skin conditions took a turn for the worse as represented by the increase of  $b^*$  value and the reduction of corneocyte size. We isolated phenol-producing bacteria from the intestine of hairless mice fed tyrosine-containing diet and transferred it to germ-free hairless mice to establish gnotobiont (TD4-GB). Phenol was not detected in the cecal contents and skin of gnotobiont colonized by phenol-non-producing bacteria. In contrast, TD4-GB showed high level of phenol, higher value of  $b^*$  and less size of corneocyte in their skin. These data demonstrate that phenol produced by gut bacteria circulates to the skin and exacerbates the skin condition. Furthermore, we examined the effect of prebiotics on the skin physiology in humans. Healthy females were asked to take drink containing galactooligosaccharide (3% w/w) daily for 3 weeks, and serum and skin biopsy were collected before and after the intake of prebiotics. Levels of phenols were reduced and corneocyte size and cathepsin-L like activity were elevated by prebiotics. Taken together, these results strongly suggest that improvement of gut environment by probiotics/prebiotics may make the skin condition much better.

**Key words:** gut microbiota, phenols, skin physiology, probiotics, prebiotics.