

Breast Milk Factors Related to Maturation of Barrier Function in Infant Skin

Longitudinal Correlations Between Stratum Corneum Factors and Breast Milk Factors During Infancy

Pigeon Corporation (Headquarters: Tokyo, President: Norimasa Kitazawa), in collaboration with the National Center for Child Health and Development (Location: Tokyo, President: Takashi Igarashi), has revealed that maturation of the barrier function* in infants' skin is related to immune factors in breast milk (TGF- β 1, TGF- β 2, IgA, LF**).

The results of this study have been published online in the international journal *Nutrients*.

* One of the protective functions of skin. The water content, natural moisturizing factor, and ceramide found in skin are known skin barrier factors. It is known that a decrease in skin barrier function is related to skin problems.

**TGF- β 1: Transforming Growth Factor- β 1, TGF- β 2: Transforming Growth Factor- β 2, IgA: Immunoglobulin A, LF: Lactoferrin

Summary of the Study

Background

Breast milk contains many factors involved in the maturation of the immune system and the development of gut microbiota in infants. In recent years, it has become clear that immune factors in breast milk affect epidermal differentiation and the barrier function in infant skin, but how those relationships changed over time was unknown. This study used longitudinal measurement to explore this issue.

Method

The components of the stratum corneum(SC) which were in sample from 39 infants at 0,1,2,6, and 12months born at National Center for Child Health and Development were measured by Confocal Raman spectroscopy.

Breast milk was provided by mothers at the same time for infants 6 months and under, and its immune factors (TGF- β 1, TGF β -2, IgA, LF) were measured. To investigate the longitudinal correlations between SC component and breast milk factors were by statistical analysis.

Results

- The SC was thinnest at 2 months after birth. Regarding SC components during infancy (0 to 12 months), at 0 months, water content is at its lowest level, but natural moisturizing factor(NMF) and ceramide are at their highest, and these subsequently change over time. NMF was observed to reach its lowest level at 2 months of age before steadily increasing with age. (Figure 1)
- The concentrations of all breast milk factors were highest in colostrum and decreased as breast milk matured. (Figure 2)
- Analyzing correlations by SC depth and infant age revealed a positive correlation tendency between breast milk immune factors and NMF factor throughout the entire period under investigation, along with a weak negative correlation tendency between water content and breast milk immune factors. Correlations with ceramide were weak overall. (Table 1)

Discussion

Breast milk and developing infant skin both exhibit changes over time, and the partial correlations between them suggest the possibility that immune factors in breast milk play an important role in the maturation of the skin barrier function during infancy.

Comment from Pigeon

This is the first study to investigate the longitudinal correlation between the molecular components of the SC and breast milk factors during infancy. The results of this study suggest that breast milk factors may be related over time to the maturation of the skin barrier function during infancy, which will be valuable information for breastfeeding support and developing new skin care products. Hopefully, this study will be useful for elucidating and preventing skin conditions related to barrier abnormalities in the skin, such as atopic dermatitis.

Figure 1: Changes over time in concentration of SC components (water content, natural moisturizing factor, ceramide) during infancy (extracted from Figure 2 of original paper)

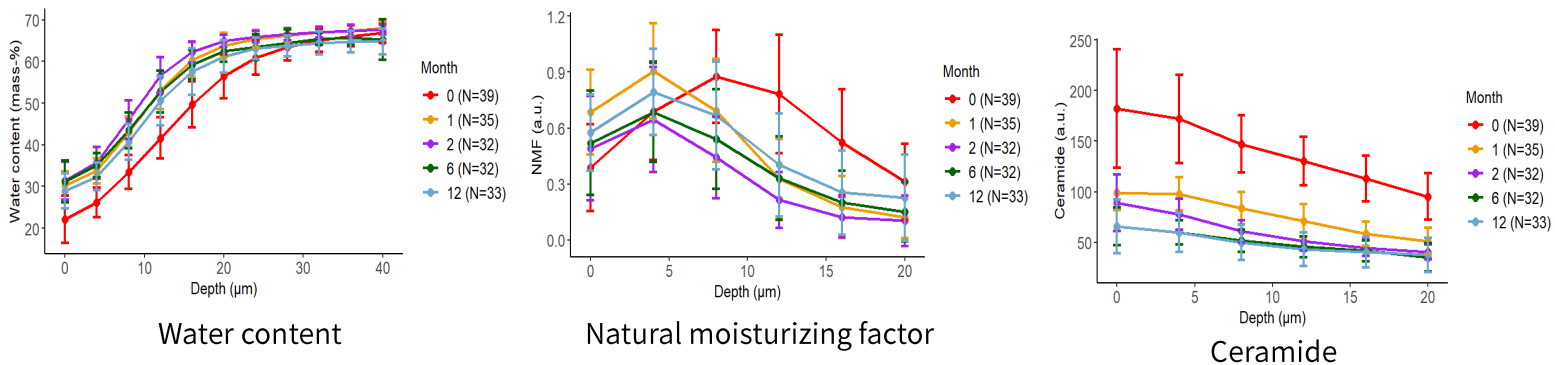


Figure 2: Changes over time in concentration of immune factors (TGF- β 1, TGF- β 2, IgA, LF) in breast milk (extracted from Figure 3 of original paper)

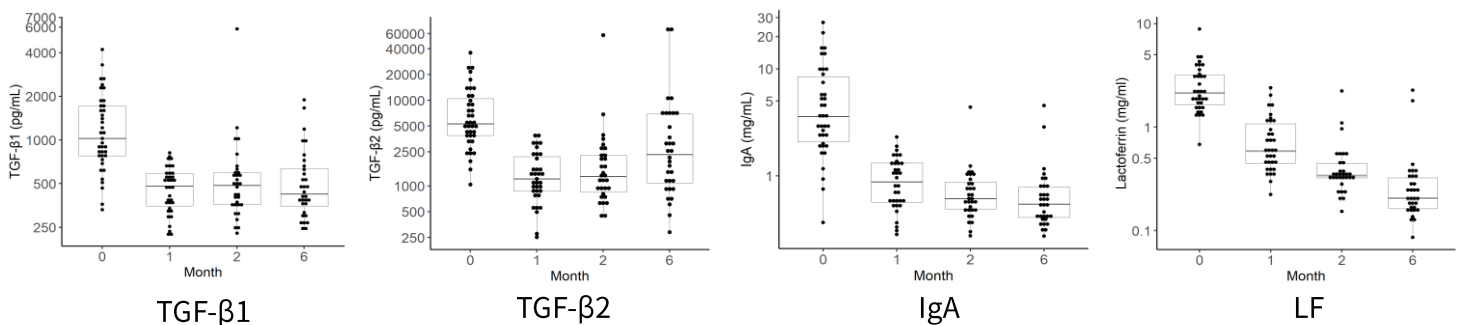
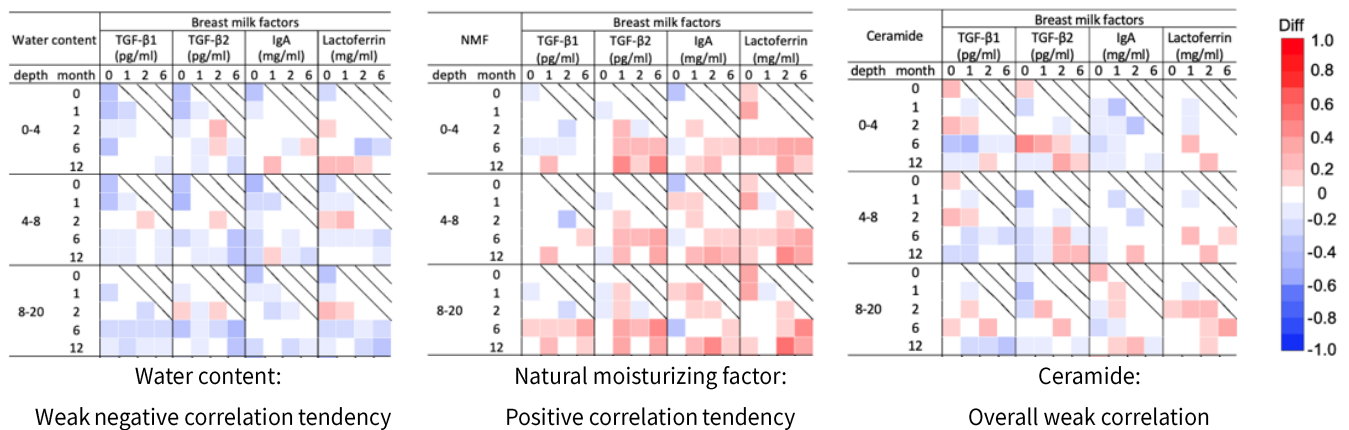


Table 1: Correlations between SC components (water content, natural moisturizing factor, ceramide) and immune factors (TGF- β 1, TGF- β 2, IgA, LF) in breast milk (extracted from Figure 4 of original paper)



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