Skin colonization in the first year of life & its link to atopic dermatitis

A. Johansson¹, C. Lang¹, S. Mermoud¹, M. Kypriotou¹, D. Hohl¹, Y. Vial², G. Prod'hom³, G. Greub³, S. Christen-Zäch¹,⁴

¹contribution equally

Departments of ¹Dermatology & Venereology, ²Gynecology & Obstetrics, ³Microbiology and ⁴Pediatrics
University Hospital CHUV, Lausanne, Switzerland

Background:
A defective skin barrier and abnormal immune response predispose atopic dermatitis (AD) patients to a skin colonization with a much higher number of S. aureus and Malassezia than controls. To the best of our knowledge, the skin colonization has never been assessed prospectively in infants with a positive family history of atopy (≥ at risk) of developing AD.

Objective:
(1) to analyze prospectively, during the first year of life the skin colonization in infants with and without family history of atopy.
(2) to determine which microorganisms correlate with AD development and onset.

Methods:
We conducted a prospective cohort study of Caucasian infants with and without a family history of atopy. Beginning at birth and at seven time points during the first year of life, cutaneous colonization, daily skin care, life style and clinical signs of AD were monitored according validated criteria. Bacterial swabs were taken from the right elbow and axilla, cultured on agar, quantified and identified using MALDI-TOF mass spectrometry. "Skin-tapes" were taken from the sternal area, stained with Blankophor® and Malassezia was quantified using fluorescence microscopy.

Results:
Incidence and density of skin colonization by S. aureus was significantly higher at 3 months of age in infants developing AD within 6 months of age. In contrast, infants developing AD later had no significant difference in S. aureus skin colonization at 6 and 12 months compared to controls. Colonization by Malassezia showed no significant difference between the groups over time and at the time point of AD onset.

Demographic data of study population

<table>
<thead>
<tr>
<th>Age at onset</th>
<th>At Risk Group</th>
<th>AD</th>
<th>No AD</th>
<th>Control Group</th>
<th>AD</th>
<th>No AD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 months</td>
<td>10</td>
<td>1</td>
<td>9</td>
<td>20</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>7-11 months</td>
<td>15</td>
<td>3</td>
<td>12</td>
<td>30</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>12-17 months</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>20</td>
<td>4</td>
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<tr>
<td>18-23 months</td>
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<td>2</td>
<td>8</td>
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<td>16</td>
</tr>
</tbody>
</table>

Cutaneous colonization of all infants

Skin colonization at day one of life

Comparing incidence & kinetics of S.aureus and S.epidermidis

AD onset before and after 6 months of life

Discussion:
Skin colonization by S. aureus was shown to be more prominent in AD patients. However, it is not clear whether this colonization is a cause or a consequence of skin inflammation. Our results suggest that infants who develop AD within six months of age have a previous "priming" by S. aureus, that may activate skin immunity and cause inflammation, which is clinically detected later. On the other hand, infants who developed AD after 6 months of age did not show the same pattern. It may indicate that the factors initiating AD may be different depending of the onset age.

Conclusion:
Our study reveals a strong relationship between previous skin colonization by Staphylococcus aureus and AD onset during the first 6 months of life.