

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

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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:

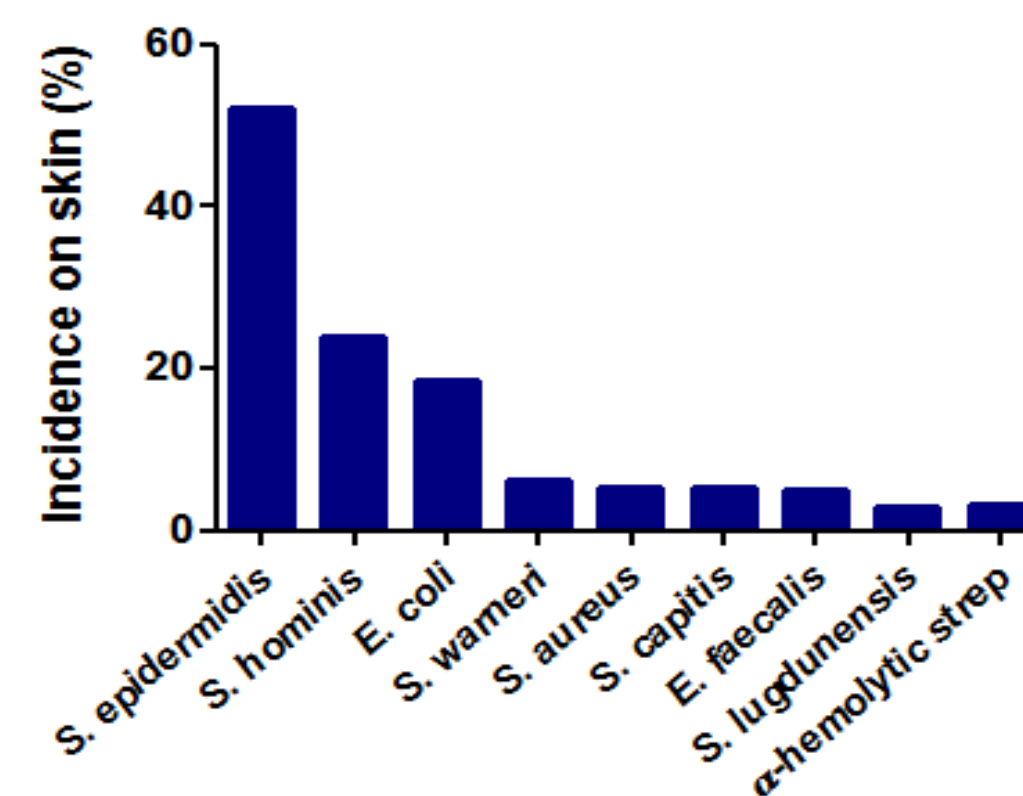
Incidence and density of skin colonization by *S. aureus* was significantly higher at 3 months of age in infants developing AD within 6 months of age. In contrast, infants developing AD later had no significant difference in *S. aureus* skin colonization at 6 and 12 months compared to controls. Colonization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

Demographic data of study population

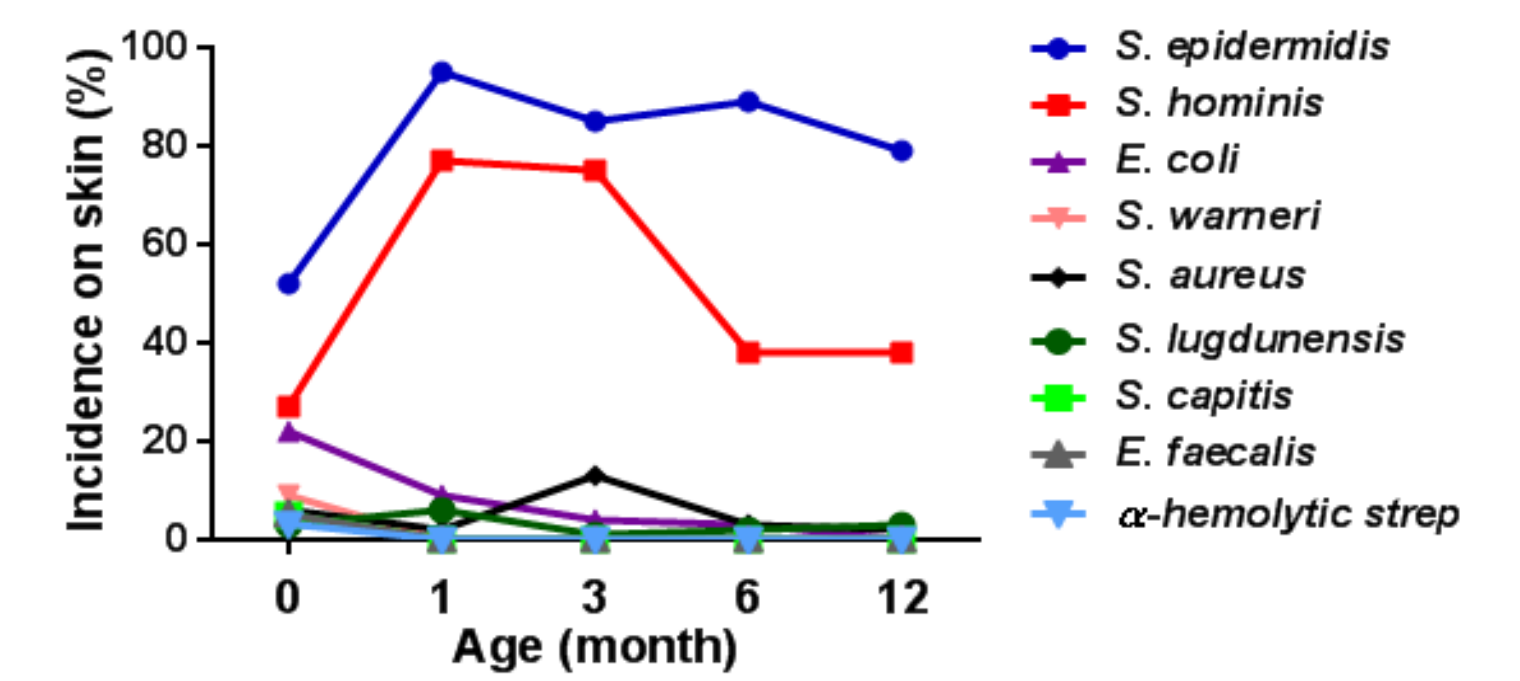
	Total	At Risk Group		Control Group		
		No AD	AD	No AD	AD	
Total number of infants	132	64	21	44	3	
Gender	Female	61	31	9	20	1
	Male	71	33	12	24	2
Birth mode	Vaginal delivery	103	46	19	35	3
	Cesarean section	29	18	2	9	0
Age at AD onset	0-6 months	20	-	17	-	3
	7-12 months	4	-	4	-	0
Season of birth	Spring	22	12	3	7	0
	Summer	29	17	5	6	1
	Autumn	48	20	8	19	1
	Winter	33	15	5	12	1

Cutaneous colonization of all infants

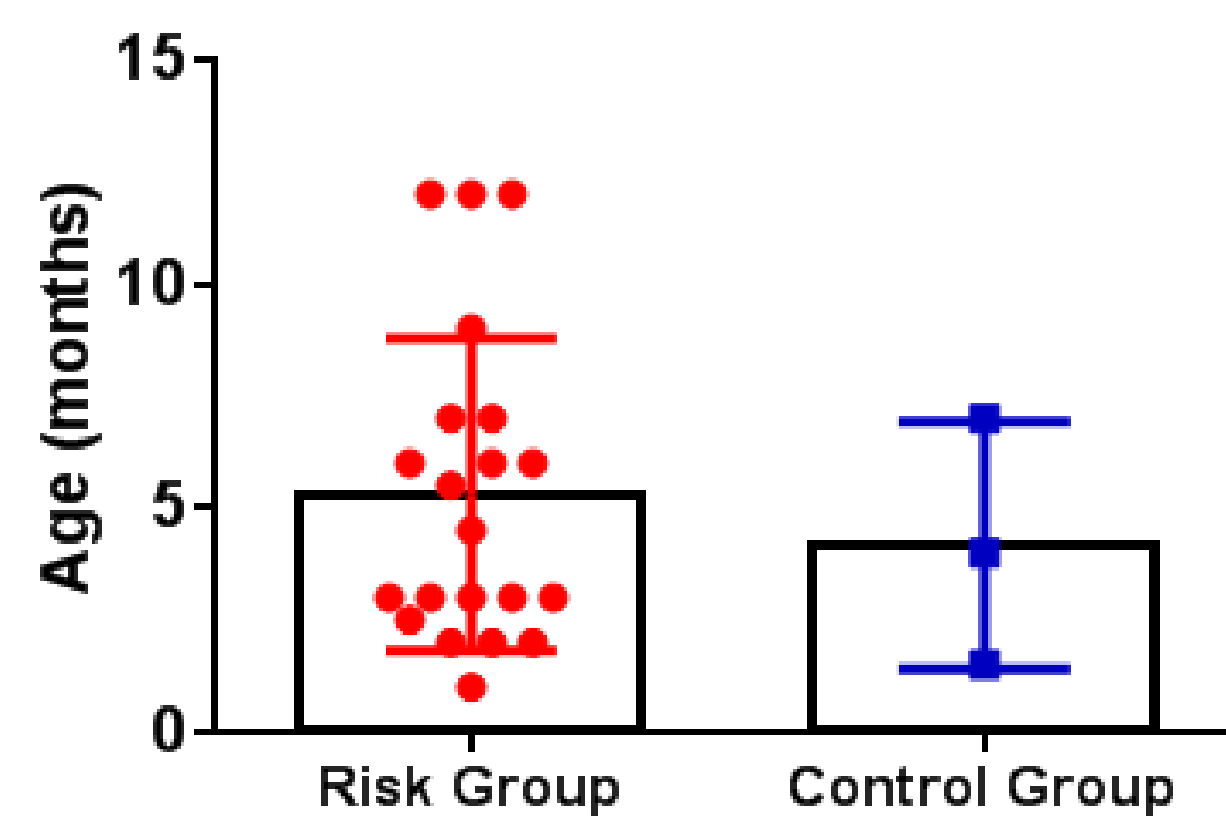
Skin colonization at day one of life



Kinetics of skin flora over the first year of life



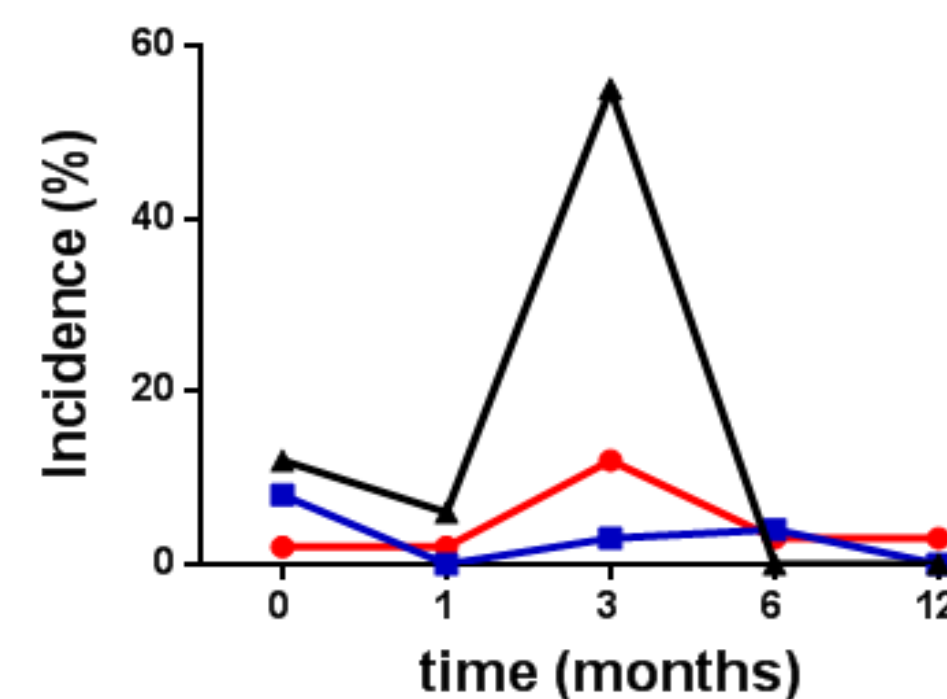
Age of atopic dermatitis onset



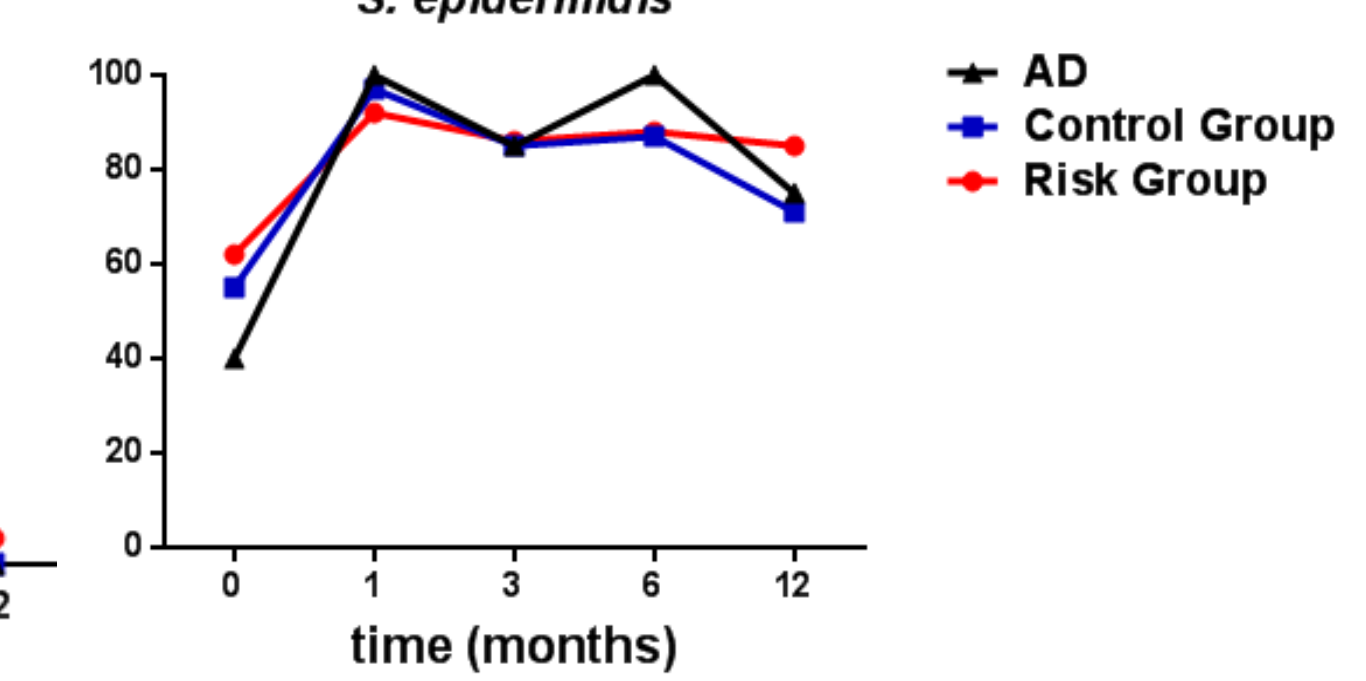
Of all infants 25% (21 of 85) in the at risk group and 6% (3 of 47) in the control group developed AD. 18% (24 of 132) of them developed AD at a mean age of 5 months. There was no significant difference of the onset age between the groups.

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

S. aureus

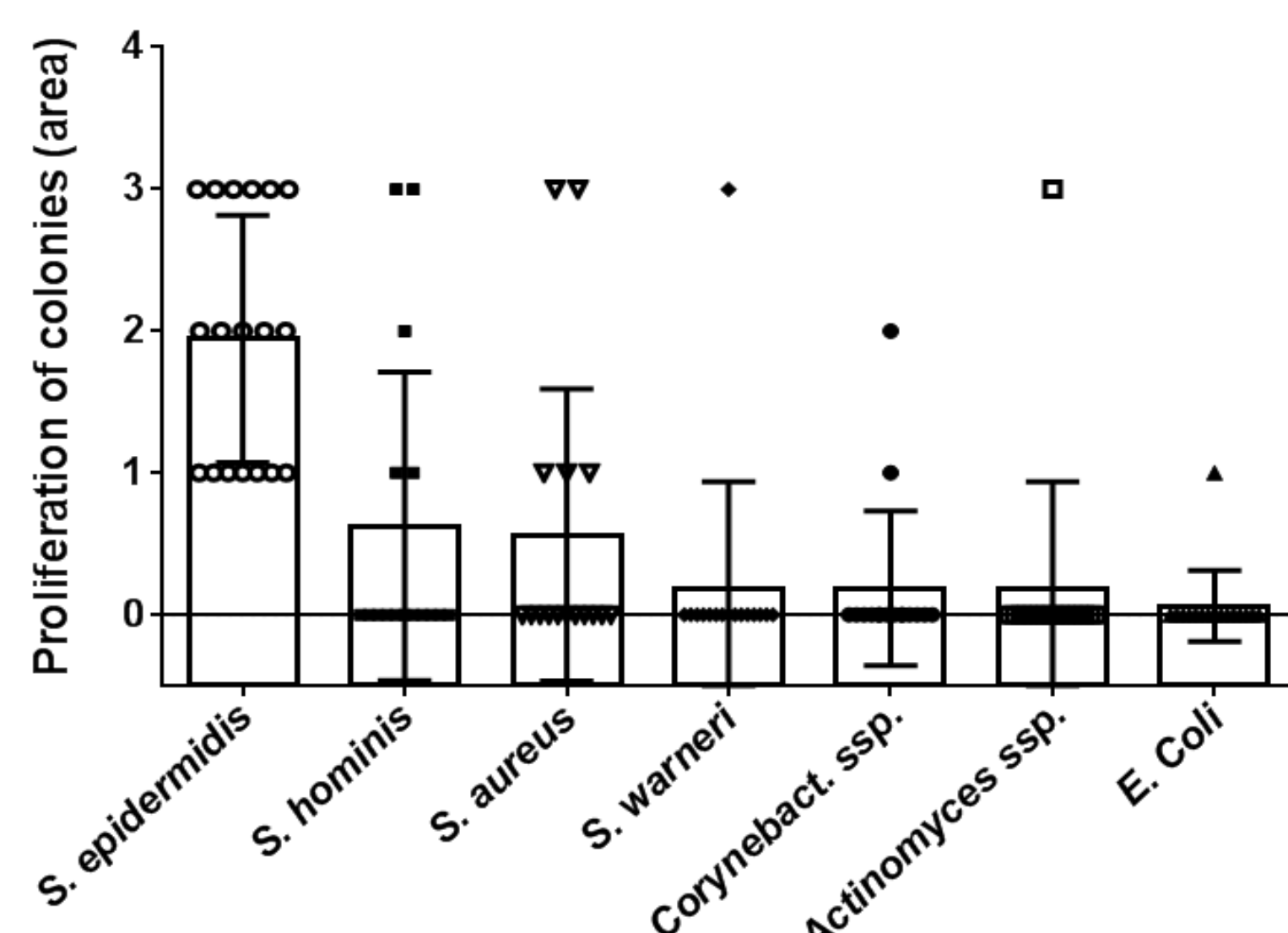


S. epidermidis



S. aureus showed a peak of incidence in the AD group at 3 months of age, while *S. epidermidis* shows no significant difference between the groups.

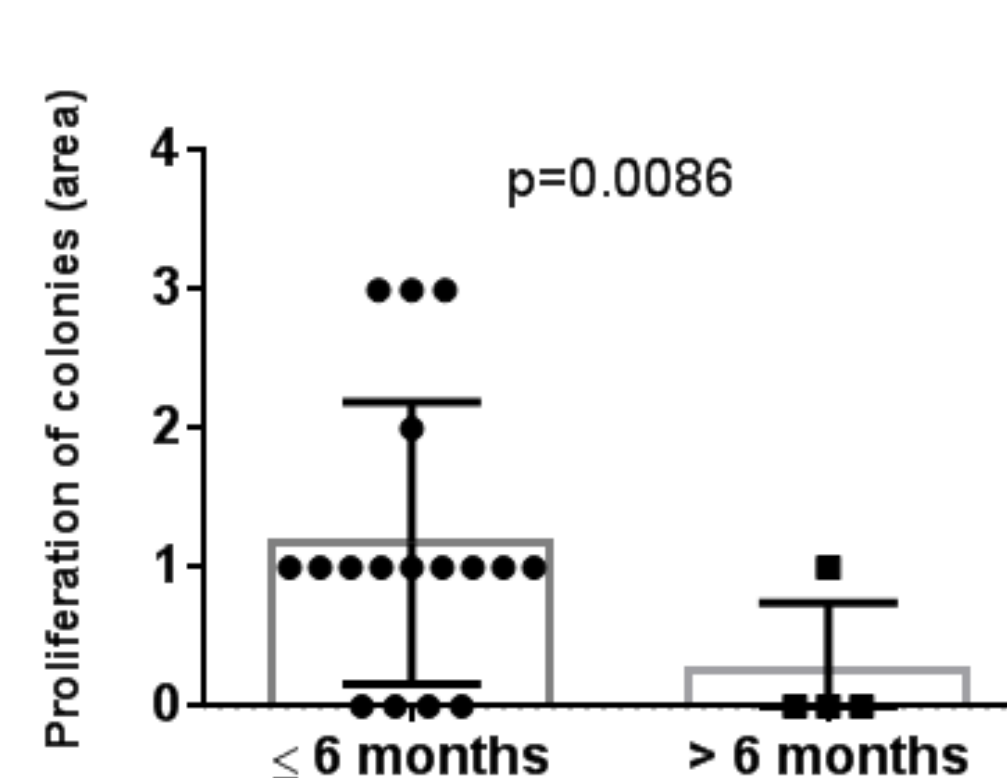
Skin colonization at the time point of AD onset



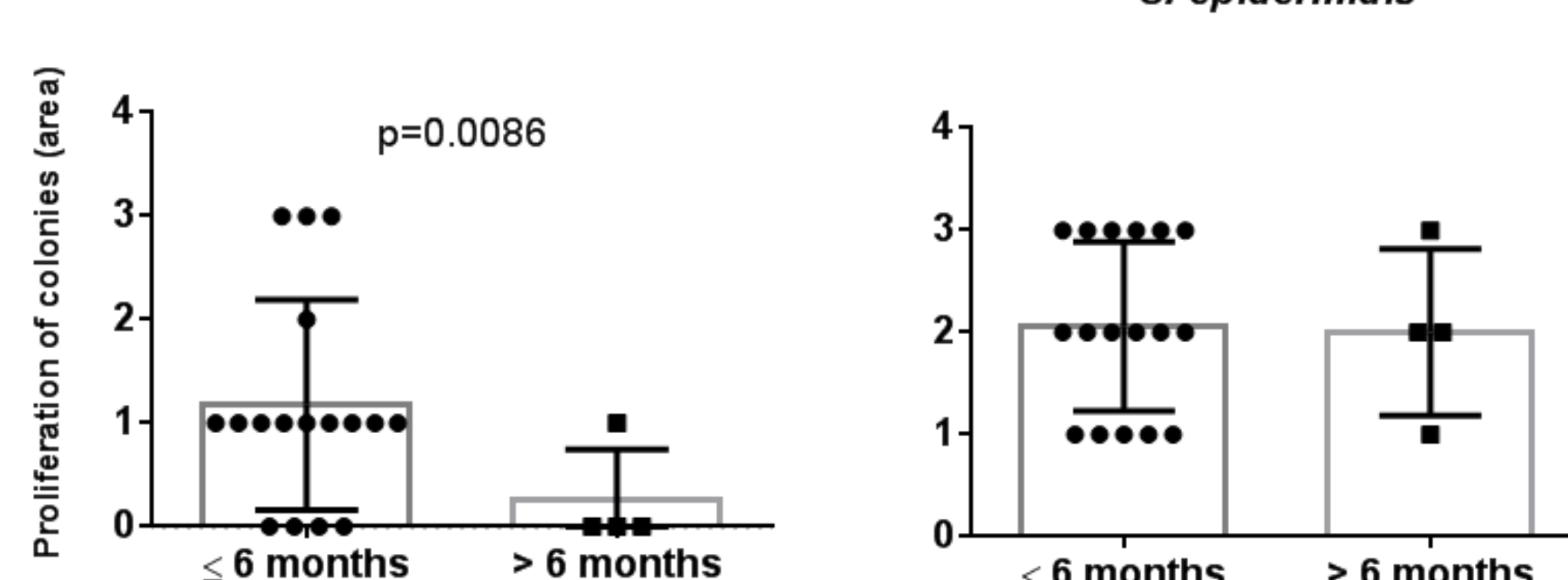
S. epidermidis is present in all infants at AD onset while *S. aureus* is observed in only 21% (5 of 24) of them.

AD onset before and after 6 months of life

S. aureus



S. epidermidis



Infants developing AD before 6 months of life have a significantly higher incidence of *S. aureus* even before the appearance of the first AD skin lesions compared to the once developing AD 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.