FIGURE LEGENDS

Figure 1. Fecal extraction protocol.

Schematic representation of the protocol from stool protein extraction to evaluation of mediators and cytokines.

Figure 2. Comparison of meconial calprotectin concentration according to the later occurrence of asthma or cow's milk allergy.

Results are expressed as median and interquartile range. Statistical test: Kruskal-Wallis.

Figure 3. Principal component analysis of neonatal immune and archaeal biomarkers as a function of later occurrence of atopic conditions.

(**A**) Negative and significant (p<0.001) correlation (r = -0.64) between the occurrence of atopic dermatitis with calprotectin, EDN and IL-1β. Strong positive and significant correlation (p<0.01) between calprotectin (r=0.79), EDN (0.53) and IL-1β (0.51). No correlation between Archaea CTs and other parameters. (**B**) Correlation between allergic events (asthma or cow's milk allergy) and atopic dermatitis. Strong positive and significant (p<0.001) correlation between IL-1β (r= 0.88) and calprotectin (r=0.82), positive correlation between IL-6 (r=0.62) and EDN (r=0.59) significantly (p<0.001). Low positive (r<0.5) and significant correlation between Archaea CTs and biomarkers IL-1β, calprotectin, IL-6 and EDN. (**C**) Positive and significant correlation (p<0.001) between atopic dermatitis, allergic events with the markers calprotectin (r=0.61), IL-1β (r=0.58), EDN (r=0.57) and TGF-β (r=0.57). Negative correlation between IL-6 (r=-0.71), and IL-10 (r=-0.61) with atopic dermatitis and allergic events. Positive and significant correlation between Archaea CTs with calprotectin, IL-1β, IL-6 and EDN. Negative correlation between Archaea Ct and allergic events. (**D**) Negative correlation between IL-6 (r=-0.51) with other biomarkers and allergic events. Strong positive and significant correlation (p<0.001) between IL-1β (r=0.68), IL-10 (r=0.67) and atopic dermatitis (r=0.58). Low correlation (r<0.5) between Archaea CTs with

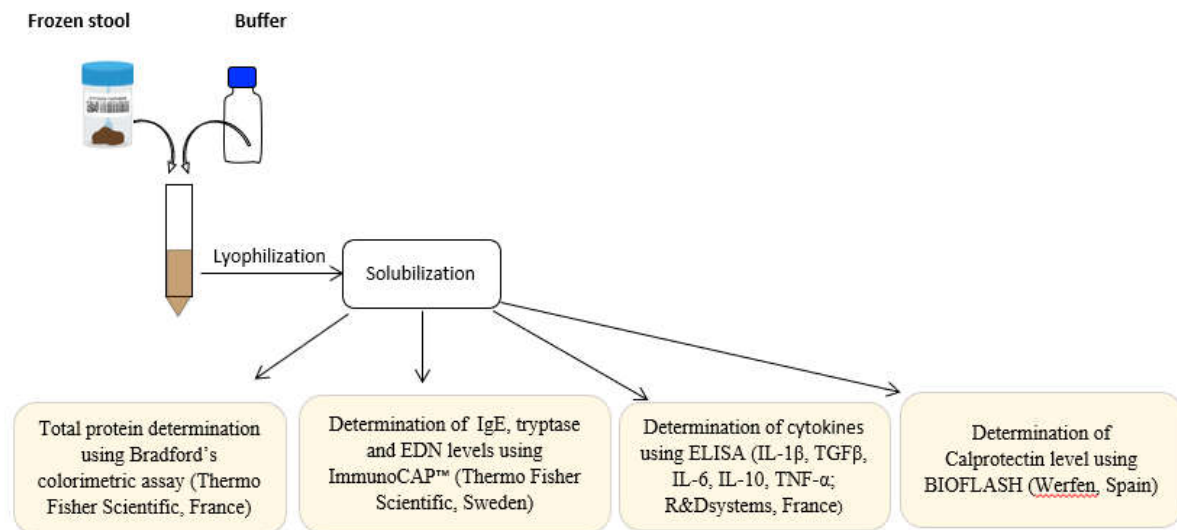IL-1β, calprotectin, IL-6 and EDN. Negative correlation between allergic events and CTs of Archaea.
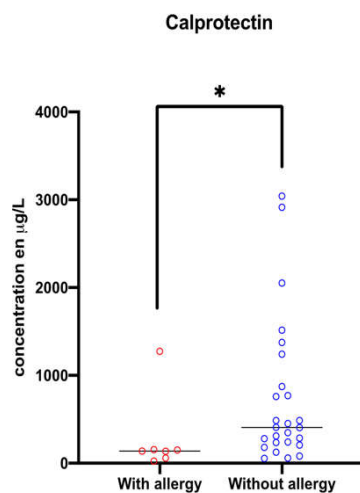

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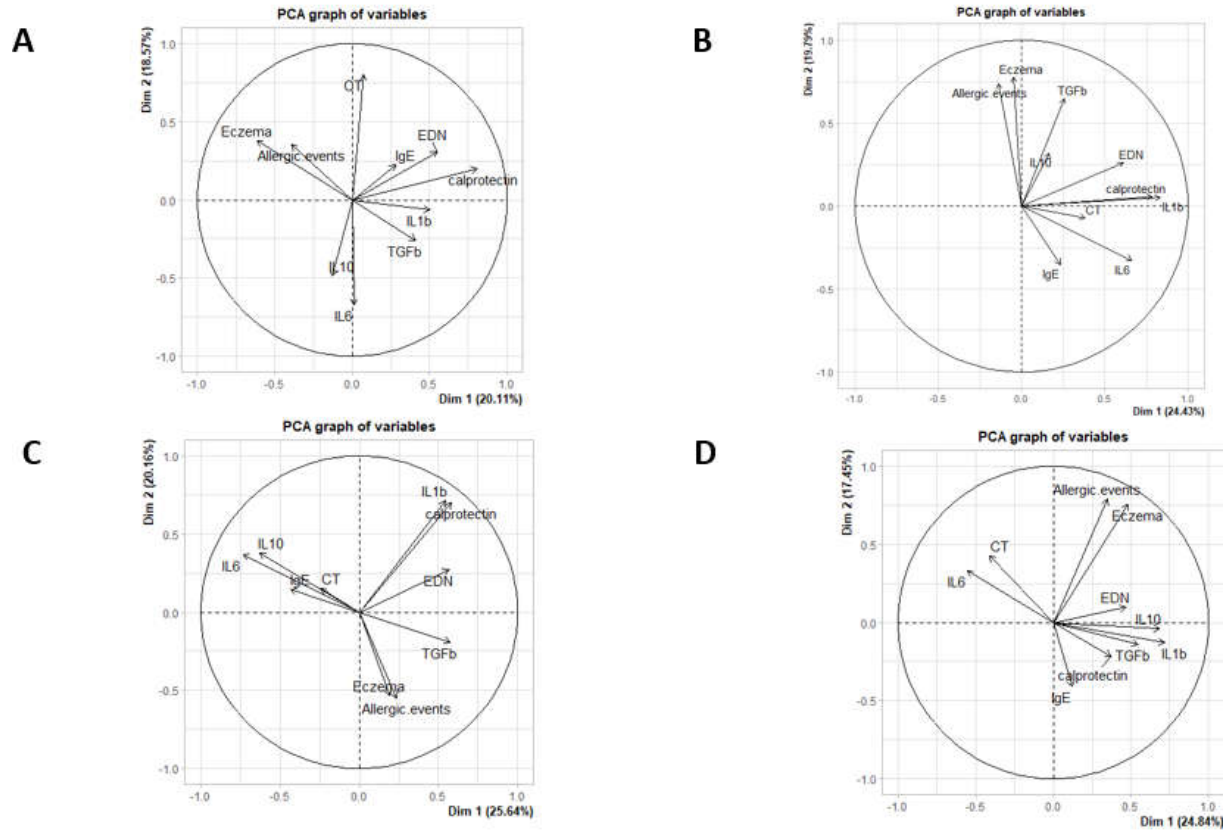
Figure 3. Principal component analysis of neonatal immune and archaeal biomarkers as a function of later occurrence of atopic conditions.

(A) Negative and significant (p<0.001) correlation (r =-0.64) between the occurrence of atopic dermatitis with calprotectin, EDN and IL-1β. Strong positive and significant correlation (p<0.01) between calprotectin (r=0.79), EDN (0.53) and IL-1b (0.51). No correlation between Archaea TCs and other parameters. **(B)** Correlation between allergic events (asthma or cow's milk allergy) and atopic dermatitis. Strong positive and significant (p<0.001) correlation between IL-1b (r= 0.88) and calprotectin (r=0.82), positive correlation between IL-6 (r=0.62) and EDN (r=0.59) significantly (p<0.001). Low positive (r<0.5) and significant correlation between Archaea TCs and biomarkers IL-1b, calprotectin, IL-6 and EDN. **(C)** Positive and significant correlation (p<0.001) between atopic dermatitis, allergic events with the markers Calprotectin (r=0.61), IL-1b (r=0.58), EDN (r=0.57) and TGF-β (r=0.57). Negative correlation between IL-6 (r=-0.71), and IL-10 (r=-0.61) with atopic dermatitis and allergic events. Positive and significant correlation between Archaea TCs with calprotectin, IL-1b, IL-6 and EDN. Negative correlation between Archaea Ct and allergic events. **(D)** Negative correlation between IL-6 (r=-0.51) with other biomarkers and allergic events. Strong positive and significant correlation (p<0.001) between IL-1b (r=0.68), IL-10 (r=0.67) and atopic dermatitis (r=0.58). Low correlation (r<0.5) between Archaea TCs with IL-1β, calprotectin, IL-6 and EDN. Negative correlation between allergic events and TC of Archaea.

SUPPLEMENTARY TABLES

Supplementary Table 1. Comparison of biomarkers and CT of Archaea according to the presence or absence of maternal antibiotic therapy and according to the mode of delivery.

Parameters	Peripartum maternal antibiotic therapy	p-value	Mode of delivery	p-value
CT Archaea	Yes	0.69	Cesarean section	0.90
	No		Vaginal delivery	
IgE	Yes	1	Cesarean section	0.98
	No		Vaginal delivery	
Tryptase	Yes	0.43	Cesarean section	0.48
	No		Vaginal delivery	
Calprotectin	Yes	0.70	Cesarean section	0.07
	No		Vaginal delivery	
EDN	Yes	0.83	Cesarean section	0.11
	No		Vaginal delivery	
TGF-β	Yes	0.10	Cesarean section	0.40
	No		Vaginal delivery	
IL-1β	Yes	0.06	Cesarean section	0.61
	No		Vaginal delivery	
IL-10	Yes	0.004	Cesarean section	0.16
	No		Vaginal delivery	
IL-6	Yes	071	Cesarean section	0.71

Supplementary Table 2. Comparison of median CT of Archaea in preterm infants according to the presence or absence of allergic events during the first year of life.

Periods	CT Archaea		p-value
	Allergic events		
	Yes	No	
Meconium	37.7	36.3	0.98
Two-weeks	36.2	37.2	0.28
Four-weeks	37.9	37.8	0.88
Six-week	38.3	38.2	0.69

Supplementary Table 3. Comparison of median CTs of Archaea in preterm infants according to the presence or absence of atopic dermatitis during the first year of life.

| Periods | CT Archaea | | p-value |
| | Atopic dermatitis | | |
	Yes	No	
Meconium	36.3	36.7	0.66
Two-weeks	37.2	37.1	0.89
Four-weeks	37.9	37.7	0.96
Six-week	38.2	38.3	0.83