



HAL
open science

Escherichia/Shigella at 1 month impact epithelial cells which expressed higher calprotectin and cathelicidin

Constance Patin, Karine Le Roux, Pierre-Yves Ancel, Marie-José Butel, Jean-Christophe Rozé, Patricia Lepage

► To cite this version:

Constance Patin, Karine Le Roux, Pierre-Yves Ancel, Marie-José Butel, Jean-Christophe Rozé, et al.. Escherichia/Shigella at 1 month impact epithelial cells which expressed higher calprotectin and cathelicidin. Journée école doctorale, May 2023, Orsay, France. hal-04285288

HAL Id: hal-04285288

<https://hal.science/hal-04285288>

Submitted on 14 Nov 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Constance Patin¹, Karine Le Roux¹, Pierre-Yves Ancel^{2,3}, Marie-José Butel^{2,4}, Jean-Christophe Rozé⁵, Patricia Lepage¹

¹ Université Paris-Saclay, INRAE, AgroParisTech, Micalis Institute, Domaine de Vilvert, Jouy-en-Josas, 78350, France ; ² FHU PREMA « Fighting prematurity », 75006, Paris, France ; ³ Université de Paris Cité, Center for Epidemiology and Statistics/CRESS U1153/EPOPé Team, Paris, France & Clinical Investigation Center P1419, Assistance Publique-Hôpitaux de Paris, Paris, France ; ⁴ UMR-S INSERM U1139, 3PHM, Faculté de Pharmacie, Université de Paris Cité, 75006, Paris, France ; ⁵ Neonatal Department, INSERM-CHU Clinical Investigation Center 1413, et UMR-INRA1280, Physiologie des Adaptations Nutritionnelles, Nantes University Hospital, Nantes, France

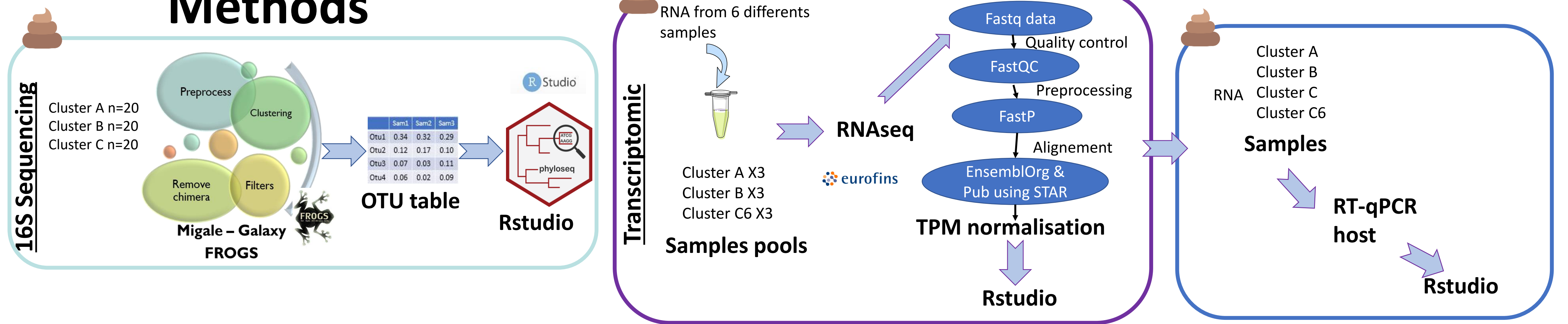
Background

- Preterm birth are 1st cause of death in children under 5 years of age in the world
- Serious psychological and physiological consequences in the short and long term [1]
- High level of fecal calprotectin in healthy infants. Calprotectin is involved in inflammation and is a marker of leucocytes which produces antimicrobial peptides (alpha-defensins and cathelicidin) [2-3]
- Need to develop analyses on non invasive approach

Objective

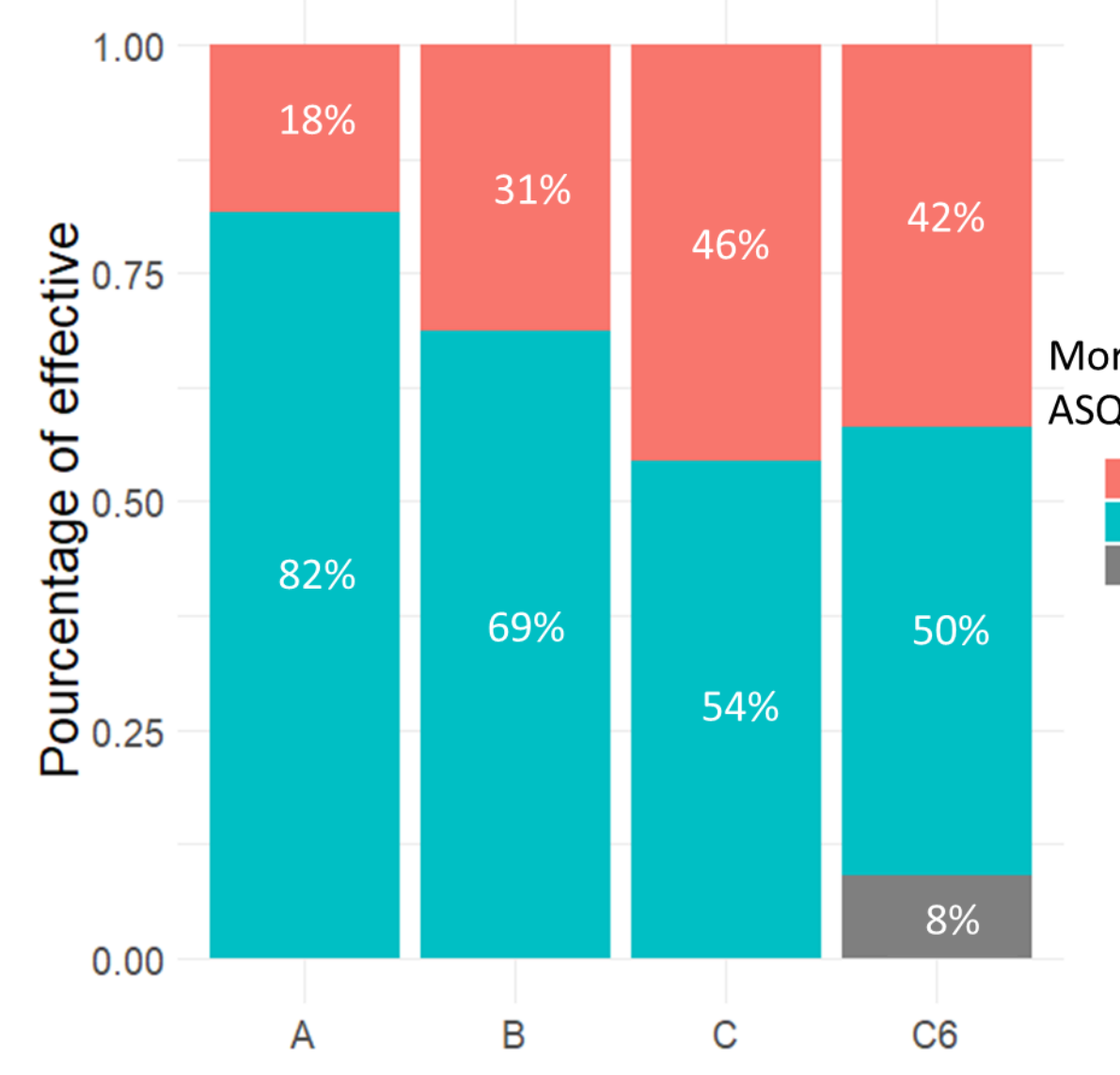
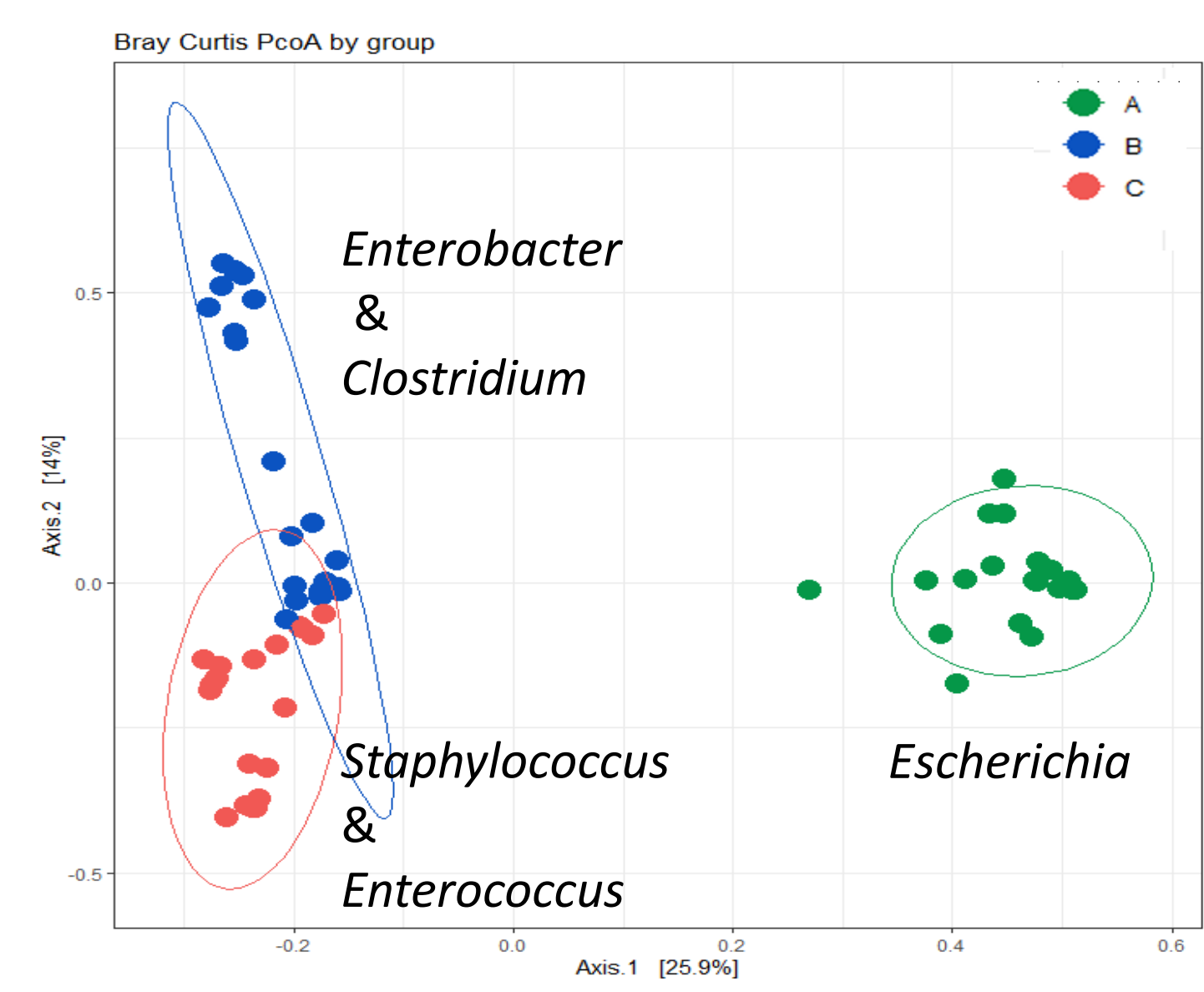
Evaluate impact of gut microbiome colonization at 1 month on calprotectin-mediated physiological inflammation

Methods

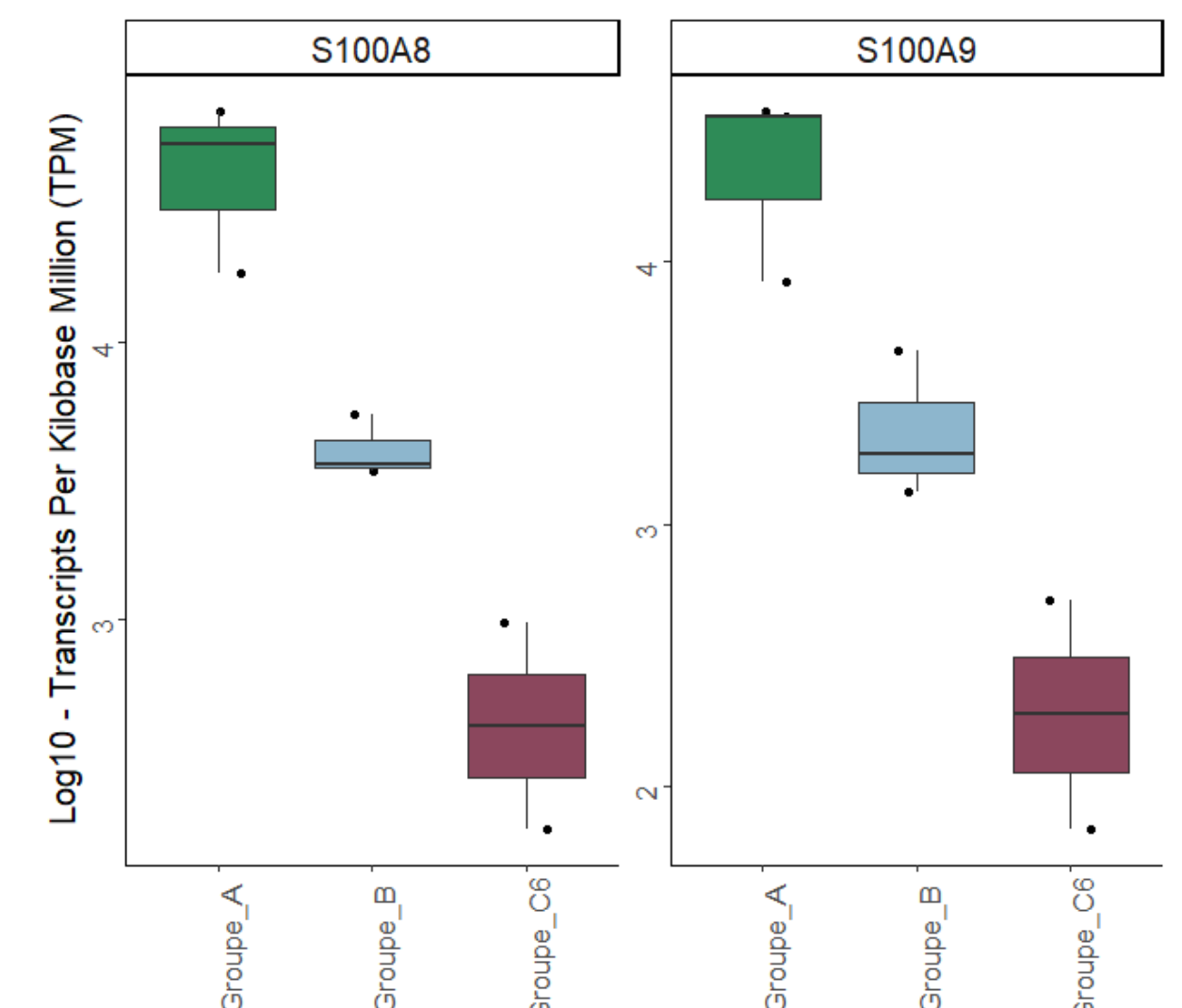
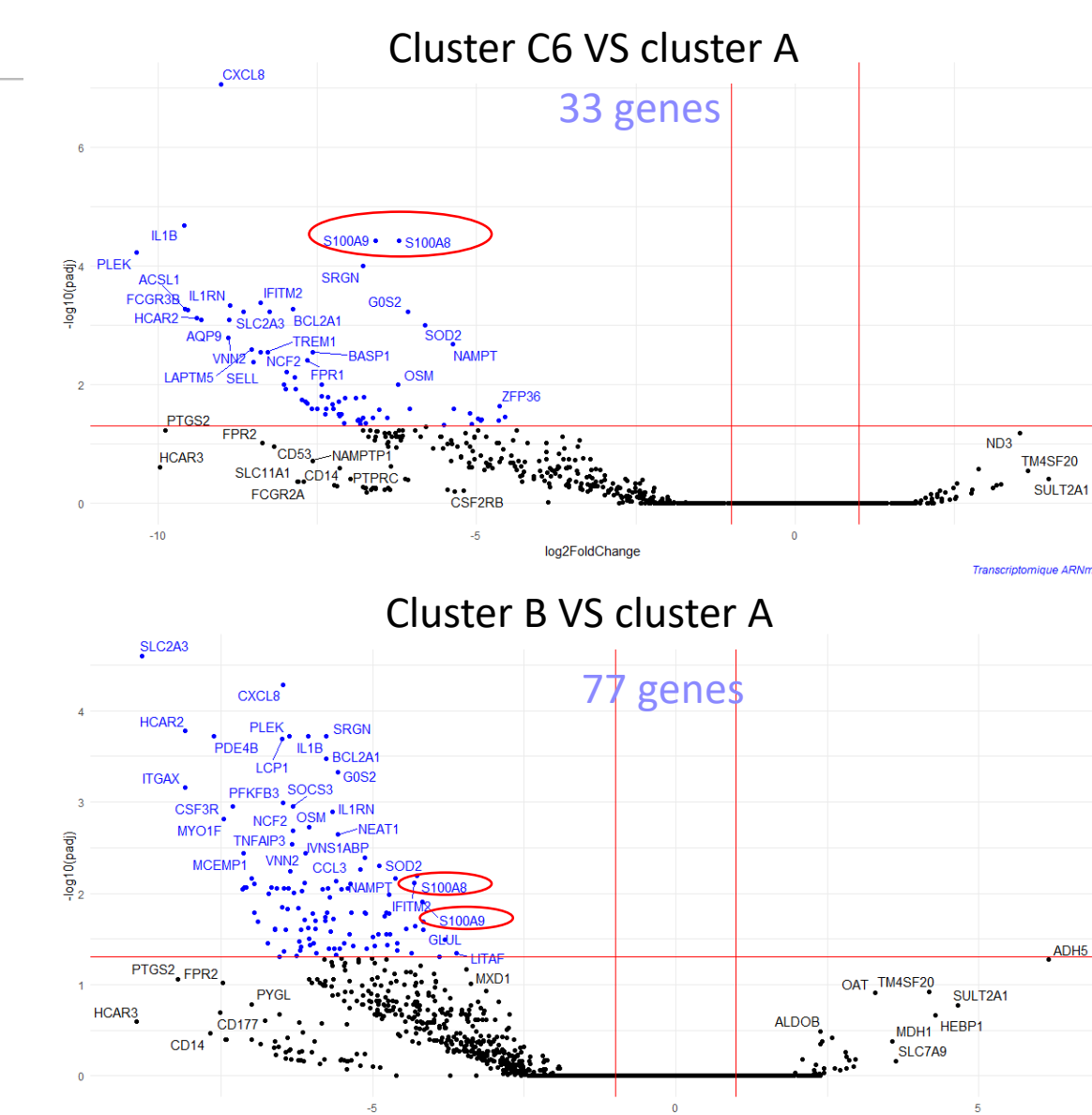
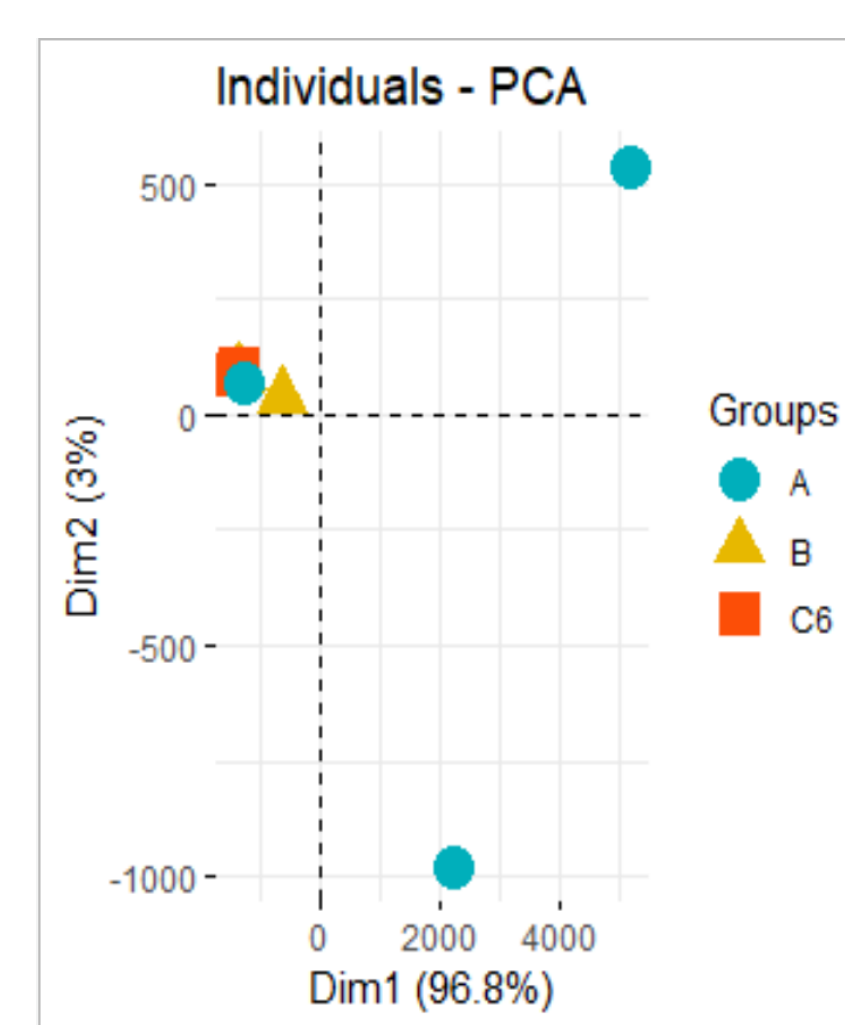


Results

Microbiome of very preterm infants can be stratified in 4 clusters with different outcome



Cluster A genes library have a different gene expression pattern than the other two groups

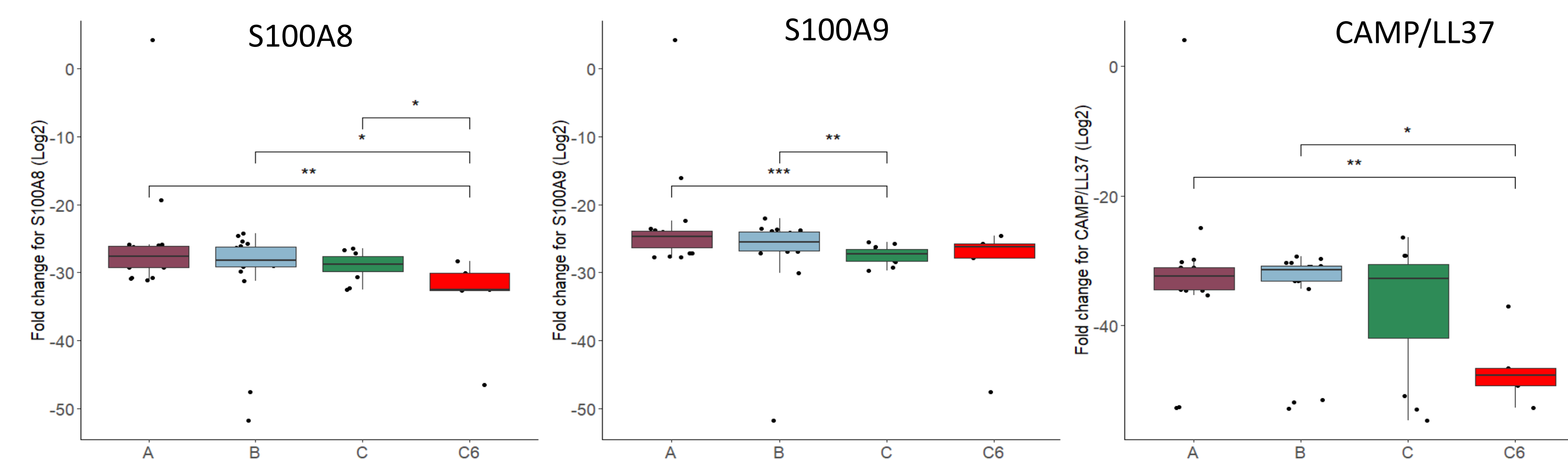


- ✓ Clusters are driven by 3 groups of dominant genus
- ✓ Cluster C6 has a lower abundance of bacteria to be detected
- ✓ Cluster A and B at 1 month have better prognosis at 2 years

- ✓ Up-regulation of many genes for the cluster A against B and C6
- ✓ Calprotectin subunits (S100A8 and S100A9) are up regulated in cluster A.

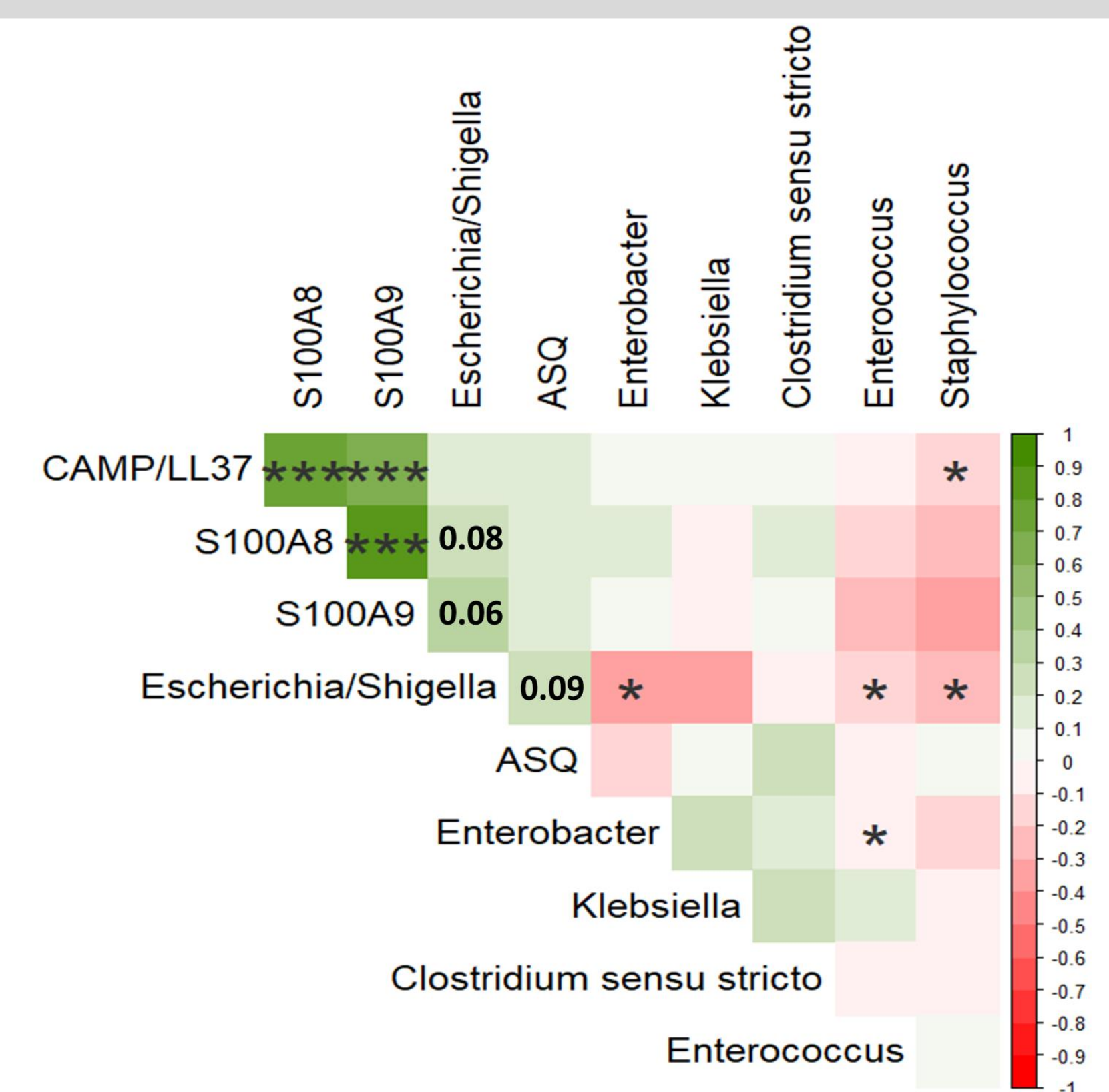
- ✓ An increasing trend is observed for expression of calprotectin in group A.

Expression of calprotectin and cathelicidin globally less expressed in children from cluster C and C6



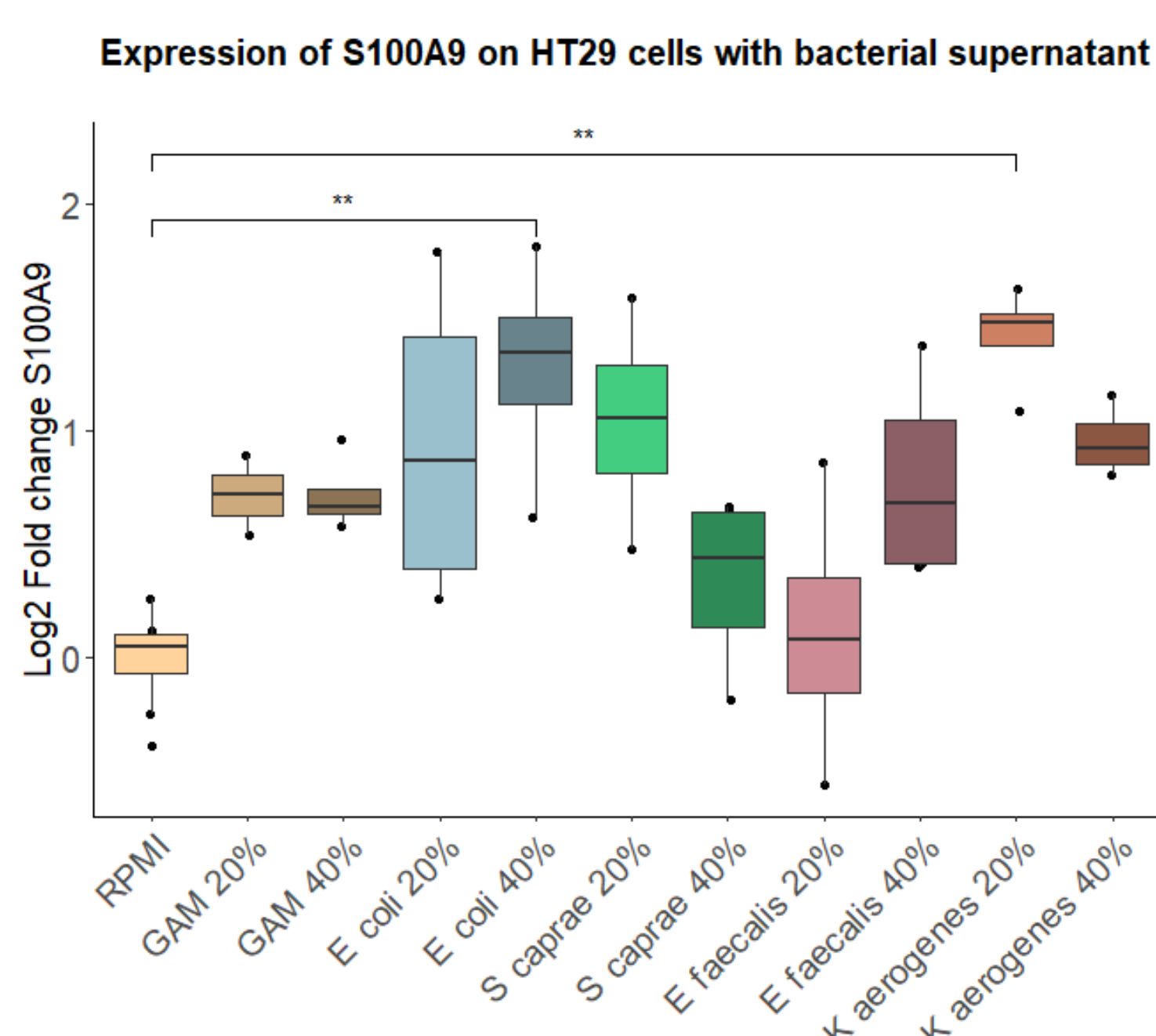
- ✓ Globally, cluster A and B have a higher expression of calprotectin and cathelicidin.
- ✓ Cluster C6, with non detectable bacteria, has the lowest expression for calprotectin and cathelicidin.

Calprotectin and cathelicidin correlated with gut microbiome



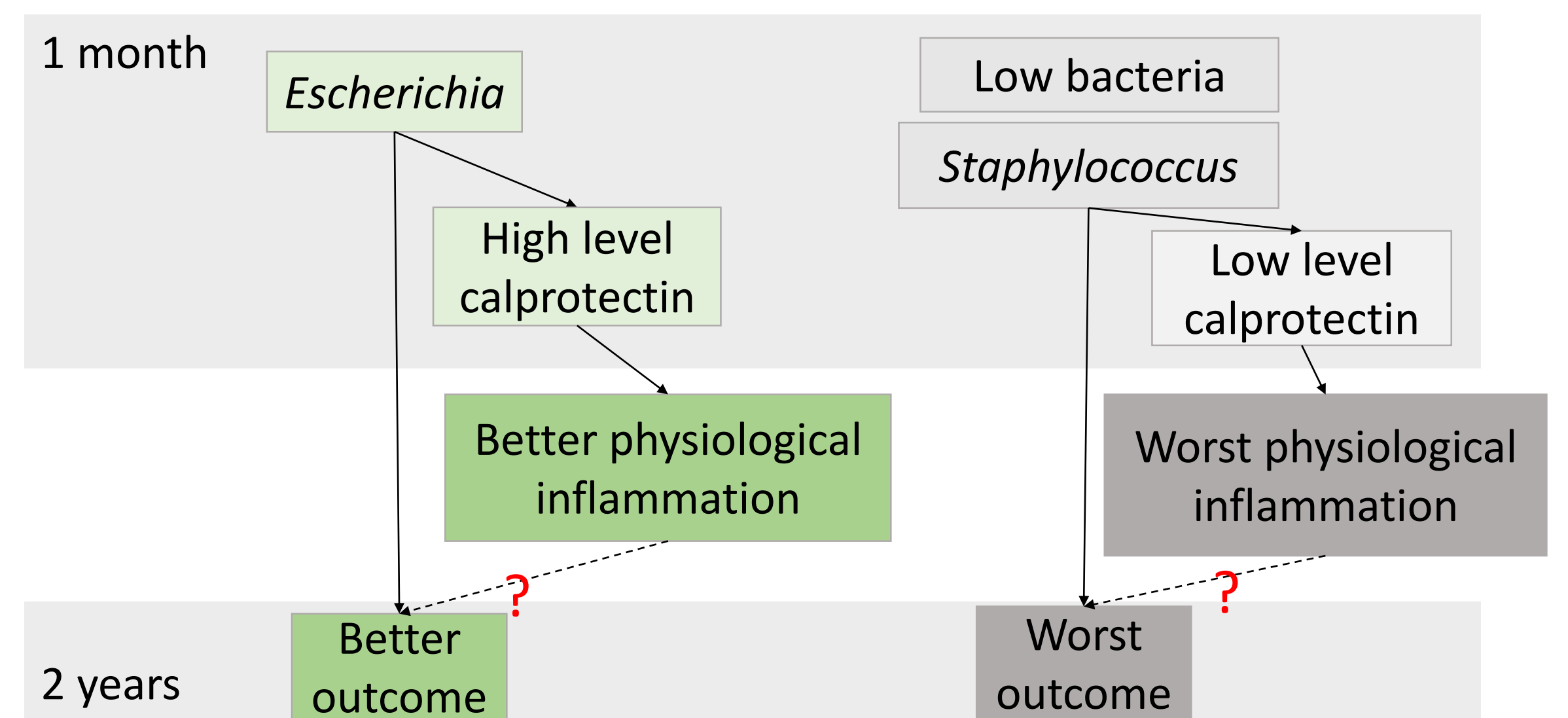
- ✓ Calprotectin and cathelicidin were positively correlated together
- ✓ Cathelicidin is negatively correlated with Staphylococcus (Driver of Cluster C)
- ✓ Escherichia/Shigella and calprotectin were positively correlated (NS)
- ✓ ASQ at 2 years and Escherichia/Shigella were positively correlated (NS)

No real impact of supernatant of bacteria on epithelial HT29 cells



- ✓ S100A8 was not detected in qPCR
- ✓ Escherichia coli and Klebsiella aerogenes increased significantly expression of S100A9

Conclusion



- ✓ Gut microbiome at 1 month impact calprotectin and cathelicidin expression.
- ✓ Having Escherichia at 1 month increased the “physiological inflammation” with calprotectin and cathelicidin.
- ✓ Meconium ? Cells CCD 841 CoN ? Supernatant of isolates ?