

The Role of Immature CD71+ Erythrocytes on Gut Bacteria During Pregnancy

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Introduction

- CD71+ erythrocytes, immature red blood cells have immunosuppressive properties and are enriched during infancy of mice and human cord blood.^{1,2}
- CD71+ cells increase during pregnancy and play a role in the maternal-fetal tolerance. Our group recently showed that depletion of CD71+ cells during pregnancy results in fetal resorption.³
- These immature red blood cells can also impact the digestive system by preventing excessive inflammation in response to the early gut colonizers during the infancy period.^{1,2}
- In addition, maternal health conditions during pregnancy can affect the gut bacterial community of the offspring.⁴ However, to our knowledge, no studies have examined the impact of CD71+ cells on the gut bacterial composition during pregnancy.

PURPOSE: To study the effect of CD71+ erythroid cells on gut bacterial composition during pregnancy.

Methods

- Pregnant mice were treated with anti-CD71 antibody or not for the *in vivo* depletion of CD71+ cells (Figure 1)
- Spleen samples were collected for flow cytometric analysis and fecal contents were obtained to study gut bacterial composition
- Total bacterial DNA was extracted from the cecal samples
- Quantitative PCR (qPCR) was used to quantify dominant bacterial groups in each sample
- Cells obtained from spleens of treated and control pregnant mice were stained with anti-CD71 and TER119 antibodies to determine the percentage of CD71+ cells from total immune cells in the spleen.



Figure 1: Schematic representation of experimental design.

Results

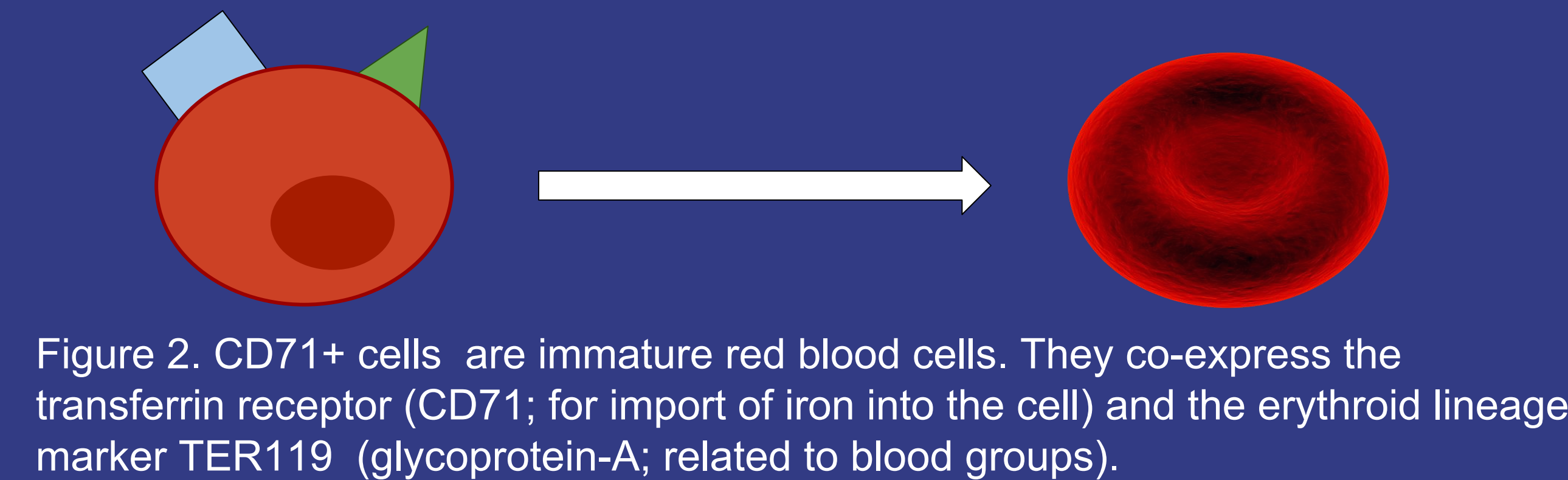


Figure 2. CD71+ cells are immature red blood cells. They co-express the transferrin receptor (CD71; for import of iron into the cell) and the erythroid lineage marker TER119 (glycoprotein-A; related to blood groups).

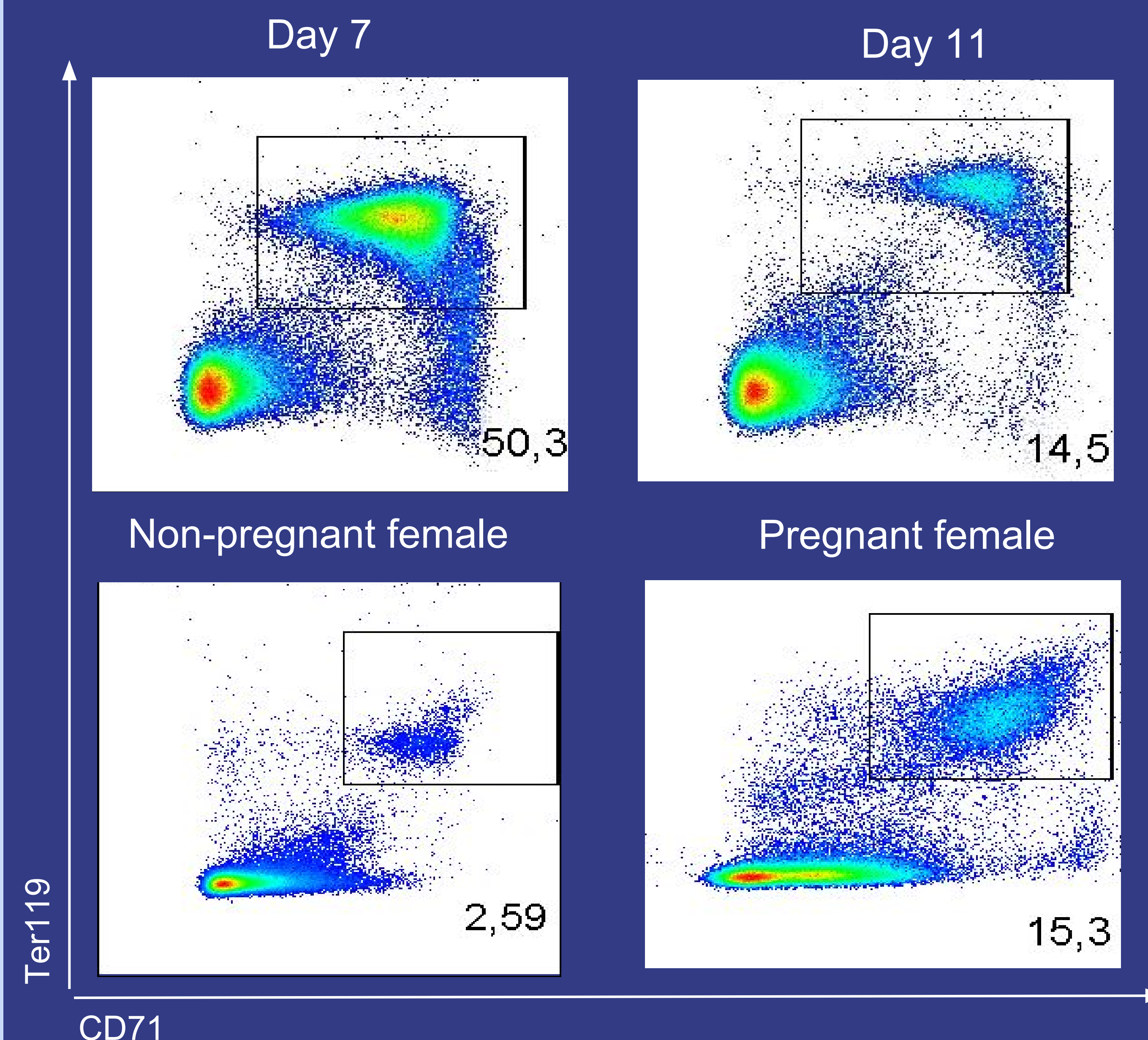


Figure 3: Flow cytometric analysis showing the percentage of CD71+ immature cells in neonatal spleen and adult nonpregnant and pregnant mice. Numbers indicate the percentage of the immature CD71+ red blood cells in the adjacent boxed areas.

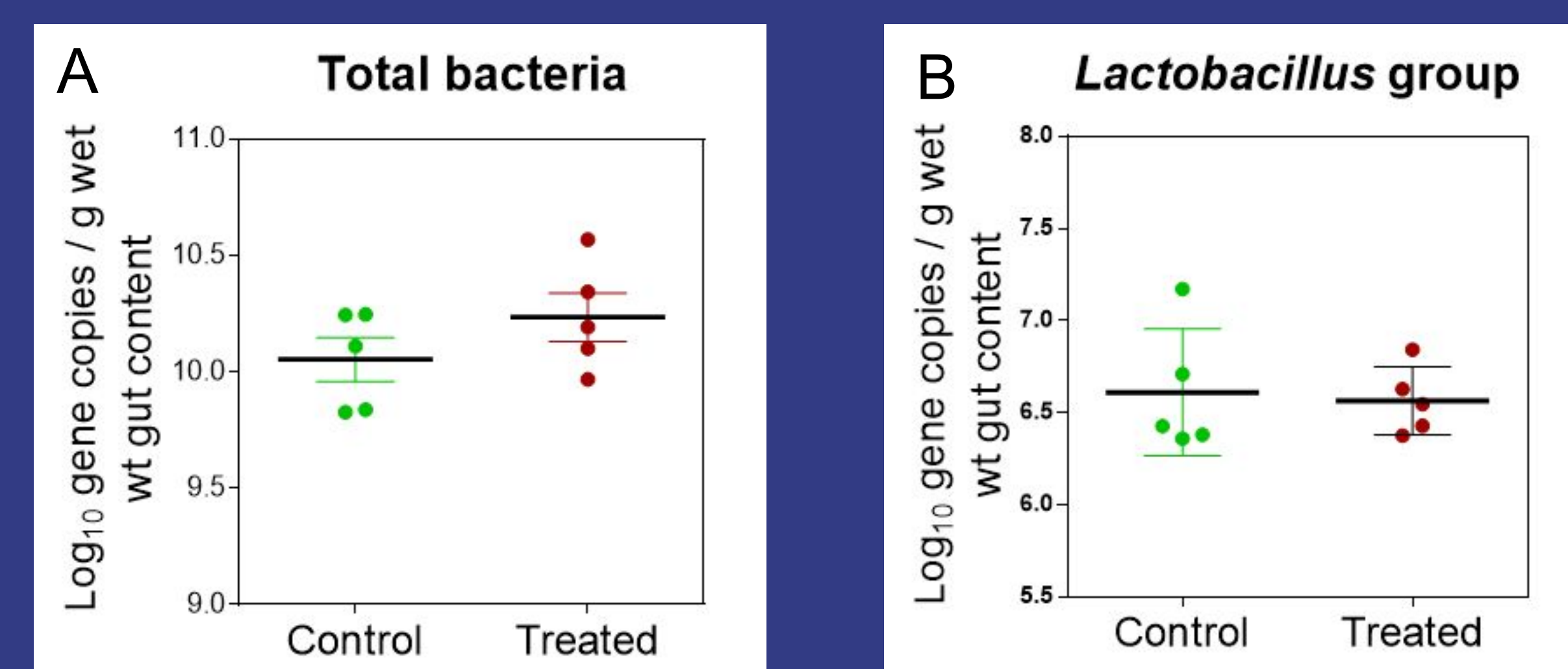


Figure 4: Quantification of total bacteria (A) and *Lactobacillus* group (B) in cecal samples collected from pregnant mice treated or not with anti-CD71 antibody.

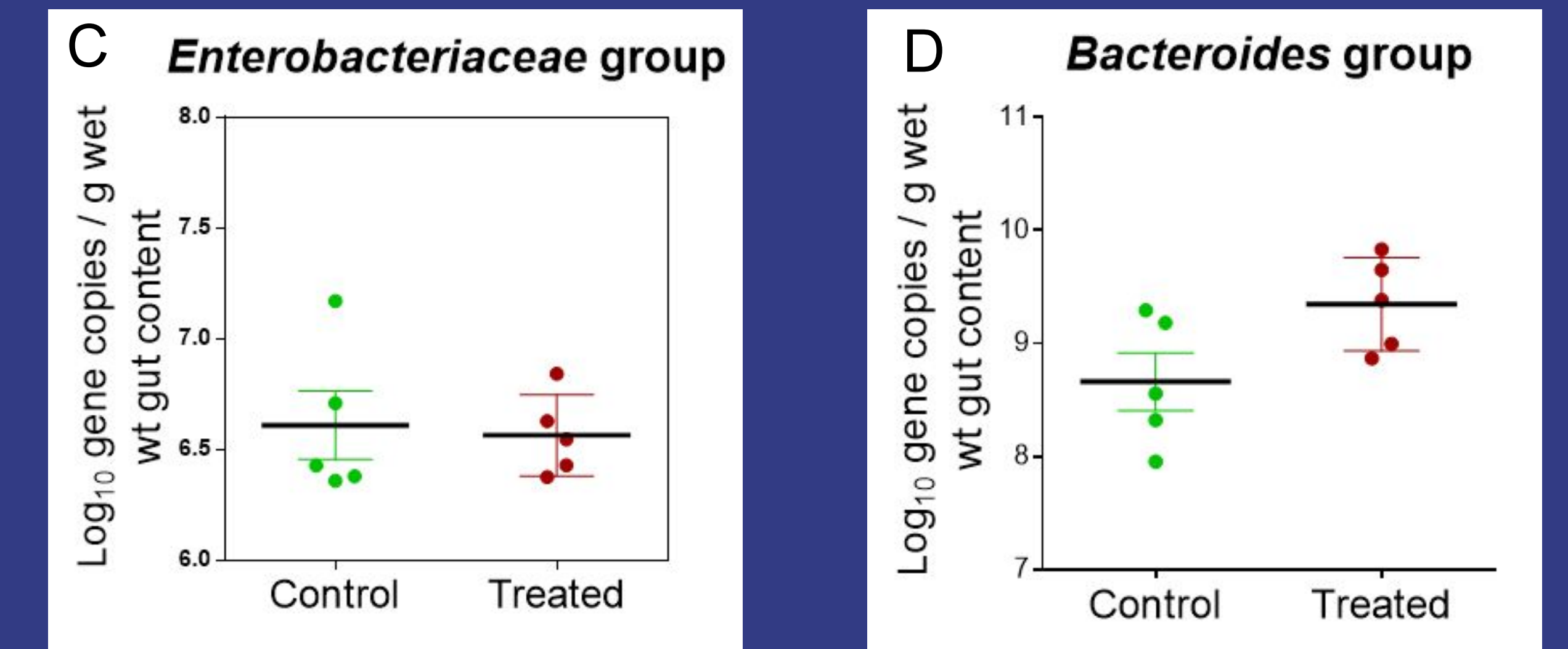


Figure 6: Quantification of *Enterobacteriaceae* (C) and *Bacteroides* group (D) in cecal samples collected from pregnant mice treated or not with anti-CD71 antibody.

Key Findings

- CD71+ immature cells are highly abundant during pregnancy and neonatal period in rodent animal model.
- Quantification of total bacteria, *Lactobacillus* group and *Enterobacteriaceae* group did not reveal differences between treated and control group.
- Differences in gene copy numbers of *Bacteroides* group were observed in cecal contents obtained from anti-CD71 treated mice versus control mice.

Relevance

- We have contributed new evidence that the CD71+ cells may influence the composition of gut bacteria during pregnancy.
- Safety precautions gained from a more elaborate understanding of the relationship between CD71+ cells and gut bacteria can be taken into consideration when developing immune therapies involving CD71+ cells.

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