



**HAL**  
open science

## Neutrophils encompass a regulatory subset suppressing T cells at steady state in cattle

Marion Rambault, Emilie Doz-Deblauwe, Yves Le Vern, Florence Carreras,  
Patricia Cunha, Pierre Germon, Pascal Rainard, Nathalie Winter, Aude  
Remot

### ► To cite this version:

Marion Rambault, Emilie Doz-Deblauwe, Yves Le Vern, Florence Carreras, Patricia Cunha, et al.. Neutrophils encompass a regulatory subset suppressing T cells at steady state in cattle. 7. European Veterinary Immunology Workshop (EVIW), Aug 2021, Online, Serbia. . hal-03382738

**HAL Id: hal-03382738**

**<https://hal.inrae.fr/hal-03382738v1>**

Submitted on 18 Oct 2021

**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.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0  
International License

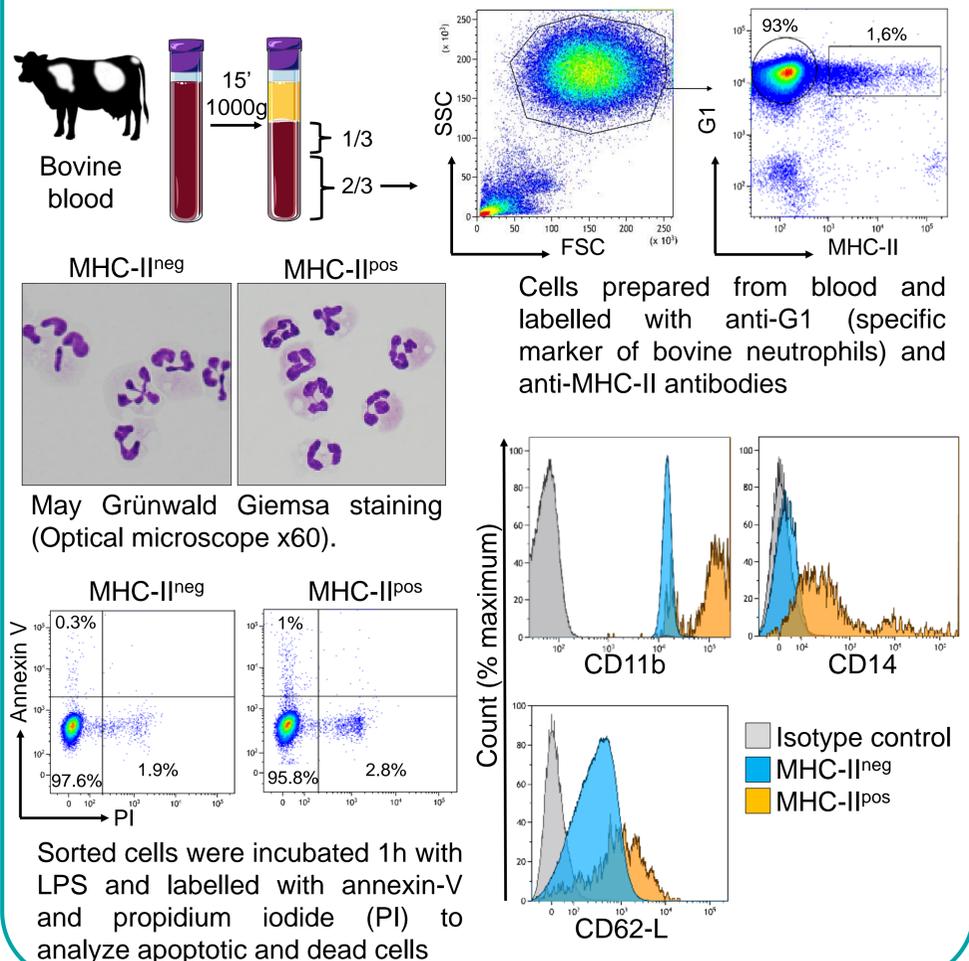
## Neutrophils in cattle

Neutrophils are major partners of the innate immune system and are considered the first line of defense against microbes. These phagocytes recognize invading microbes and produce large amounts of reactive oxygen species into phagocytic vacuoles to kill microbes. New roles for neutrophils bridging innate and adaptive immunity have also emerged. Neutrophils play an essential role in the control of infectious diseases in cattle, especially mastitis. As a biomarker, they are also the major indicator of inflammation during subclinical mastitis. Neutrophils are the main cell type responsible for the rise of milk somatic cell count during mammary infection.

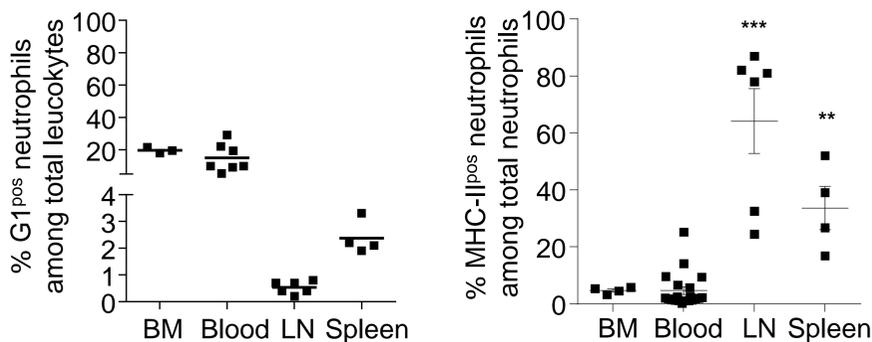
## Plasticity of neutrophils

Despite the major importance of neutrophils in bovine infectious diseases, neutrophils are also a double-edged sword. If their recruitment is not controlled, they can cause tissue damage. New populations of neutrophils have been recently described with role in regulation of inflammation and adaptive immune response. Although neutrophils diversity and plasticity are now well documented for mouse and human neutrophils, they remain unknown for domestic species including cattle. Here, we discovered and characterized a new population of regulatory neutrophils that displayed suppressive activity on T-cells at steady state in cattle.

## Neutrophils represent discrete populations in cattle blood

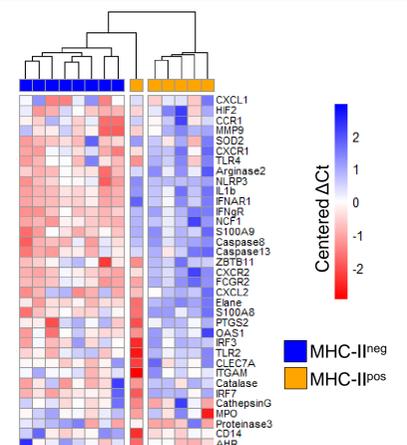


## MHC-II<sup>pos</sup> neutrophils are enriched in lymphoid organs



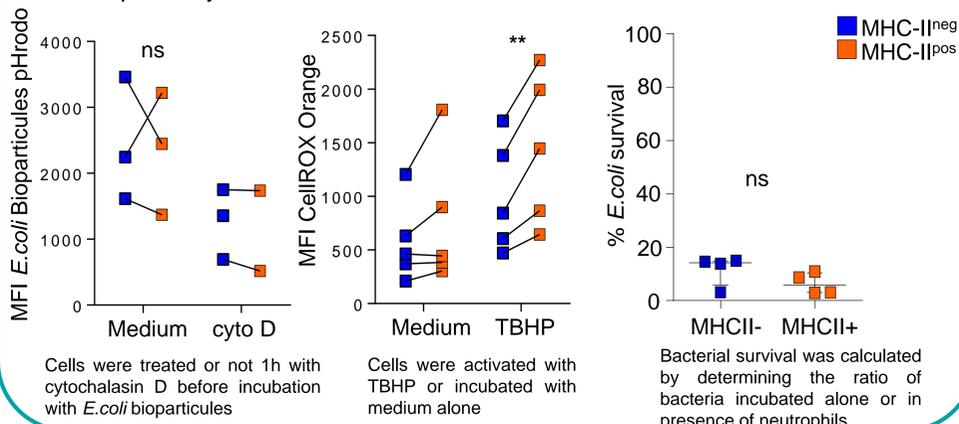
## MHC-II<sup>neg</sup> and MHC-II<sup>pos</sup> neutrophils display distinct gene expression profiles

- ✓ Real Time PCR (Fluidigm biomark)
- ✓ mRNA expression normalized to the expression of three housekeeping genes to calculate the  $\Delta C_t$  values.
- ✓ Hierarchical clustering of gene expression performed on median centered  $\Delta C_t$  values, using the ward.D2 method. For each gene,  $\Delta C_t$  values were centered to the median  $\Delta C_t$  value.

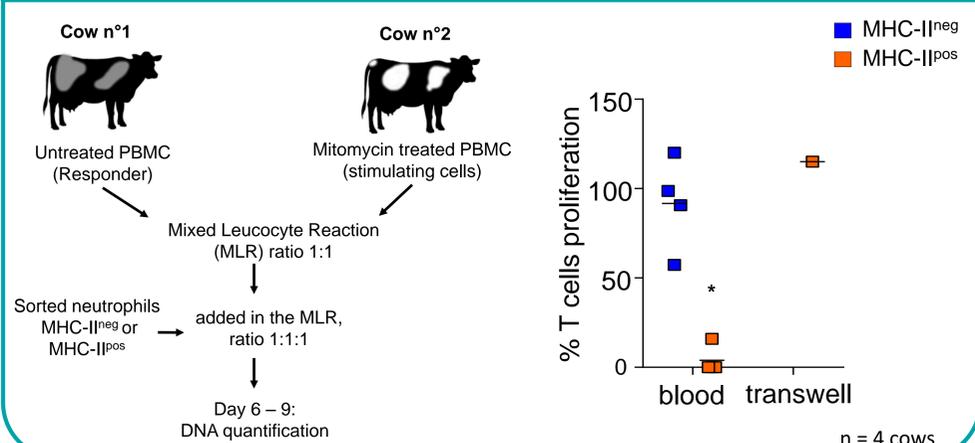


## MHC-II<sup>pos</sup> neutrophils produce higher levels of ROS than MHC-II<sup>neg</sup> but similarly phagocytose bioparticles and kill bacteria

Capacities of **phagocytosis**, **production of ROS** and **killing** of MHC-II<sup>neg</sup> and MHC-II<sup>pos</sup> neutrophils was measured after purification by cells sorting and using *E.coli* bioparticules pHrodo, CellROX detection kit (flow cytometry) and *E.coli* P4 strain respectively.



## MHC-II<sup>pos</sup> but not MHC-II<sup>neg</sup> neutrophils exert suppression on T cells at steady state



**Conclusion:** we characterized a new subset of regulatory neutrophils, able to suppress T cells. Next, we will investigate how they behave during clinical conditions such as mastitis, which remains one of the most important issue in dairy farming.