

Defining age- and disease- related epigenetic changes in $\gamma\delta$ T cells in cattle

Background: Key to successful control strategies for zoonotic infections is to reduce the burden of disease at source, and enormous potential exists for research impact on bovine immunology to enhance sustainable livestock production and also to protect the food chain & human health. Dr Kieran Meade, Principal Scientist in Animal Health, Teagasc and adjunct Assistant Professor in Immunology, Trinity College Dublin has been funded by Science Foundation Ireland to investigate the role of epigenetics in regulating **immune cell metabolism and phenotype, disease susceptibility and diagnostic detection of infected cattle**.

Project specifics: $\gamma\delta$ T cells are the first T cells to develop and one notable evolutionary feature of the bovine immune system is that these cells can represent up to 60% of circulating lymphocytes in neonates. These important effector cells link the innate and adaptive arms of the immune response but the role of epigenetics in determining their phenotype and function not been previously explored in cattle.

Building on exciting preliminary data¹, this project has two overarching objectives:

- (a) To assess the role of metabolite availability on the epigenetic regulation of $\gamma\delta$ cell differentiation and phenotype in neonates.
- (b) To understand the role of epigenetics on the developmental plasticity and immunoresponsiveness of $\gamma\delta$ cells to mycobacteria. Both components will involve *in vitro* stimulation with mycobacterial antigens as well as comparative analysis using cells from naturally infected (bovine tuberculosis and Johne's infected) cattle.

Combining state of the art techniques in immunometabolism, transcriptional and epigenetic profiling, this project will form an important foundation for improved understanding of the immune response in cattle.

The Team: The successful candidate will be primarily based in the Bioscience Research Facility in Co. Meath, which is a major initiative to expand Teagasc's capacity for advanced and translational research in animal bioscience. Specific tasks will also be undertaken in both Trinity College Dublin and in Harvard Medical School, Boston under the tutelage of Professor Lydia Lynch. Collaboration with Professors David MacHugh, Stephen Gordon and Eamonn Gormley in UCD add significant mycobacterial expertise to the team.

Requirements: A PhD in Immunology or cell biology with proven publication record and excellent communication skills. Expertise in cell culture and/or bioinformatics would also be advantageous.

Applications: Applications (cover letter and CV with referees) by email to: **Kieran Meade**, kieran.meade@teagasc.ie

Closing date for application is February 9th, 2018 or until a suitable candidate is chosen.

¹ **The CD4(+) T cell methylome contributes to a distinct CD4(+) T cell transcriptional signature in *Mycobacterium bovis*-infected cattle.** Doherty R, Whiston R, Cormican P, Finlay EK, Couldrey C, Brady C, O'Farrelly C, Meade KG. Sci Rep. 2016 Aug 10;6:31014. doi: 10.1038/srep31014. PMID: 27507428