An analysis of systems that modify red blood cell antigens and their role in red blood cell maturation, lifespan and disease resistance.

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Mice have long been used as models of human biology and disease states, including in the field of hematology. However, there are key differences between the hematopoiesis of mice and humans (Parekh & Crooks 2013). In mice, the TER-119 antibody is used as the canonical marker of murine red blood cells (RBCs) in the final stages of erythropoiesis (Kina *et al.* 2000). The present study illustrates the key findings of an extended body of work focused on the study of such murine RBC markers. In particular, a colony of N-ethyl-N-nitrosourea (ENU) mutagenized mice have developed a novel blood group that results in a loss of binding of the TER-119 erythroid marker. The loss of this cell-surface marker, with no other scorable phenotypes present in the mice, suggests a restructuring of the RBC surface in a manner that maintains function. The mutations responsible for this phenotype are present in genes for both carbohydrate-modifying enzymesand also erythroid-lineage specific transcription factors (Perkins *et al.* 1995). Although both mutations lead to loss of binding of the TER-119 antibody, only one confers resistance to blood pathogens, further indicating a subtle and complex pathway involved in RBC surface maturation and decoration. By examining the difference between tissues from animals with these TER-119 negative mutations, both with each other and with their respective wild types, a picture of the unique RBC cell-surface decoration creating the TER-119 phenotype can be drawn. Thus, the present study aims to characterise the role of these mutations in RBC surface modifications and gain an understanding in how these modifications impact disease resistance.

References

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