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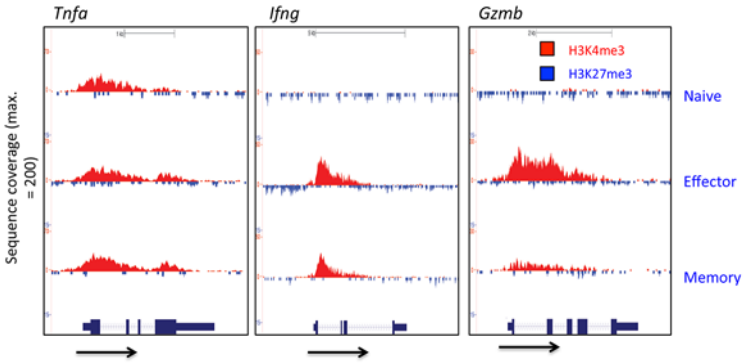
Our laboratory aims to identify novel transcriptional and epigenetic pathways and regulatory elements that regulate virus-specific killer T cell differentiation, function and the establishment of immunological memory. Such analysis will lead to the identification of molecular immune correlates of protective immunity that will serve to better understand how optimal immunity is generated. Further, this information will contribute to improvement of immunotherapies for infection (vaccines), autoimmune disease and cancer therapy. We use a multidisciplinary approach that includes the application of multiple next generation sequencing applications (RNA-seq, ChiP-seq, ATAC-seq, and HiC), small molecule inhibitor treatment of epigenetic and transcriptional regulators, novel transgenic and gene deficient mouse models, viral models of immunity and advanced bioinformatics.

Research Projects

1. **The role of chromatin remodellers in determining chromatin architecture during virus-specific T cell responses**
2. **Mapping genome wide targets and mechanisms of action of killer T cell specific transcription factors**



Mapping genome wide deposition of histone protein modifications during virus-specific T cell differentiation.
Shown is mapped ChIP-seq data for two histone modifications, H3K4me3 (red) and H3K27me3 (blue).

Selected significant publications:

1. Nguyen MLT, Hatton L, Li J, Olshansky M, Russ BE and **Turner SJ**. 2016. Dynamic regulation of permissive histone modifications and GATA3 underpin acquisition of Granzyme A expression by activated CD8+ T cells. *Eur J Immunol*. 46:307-318.
2. Harland KL, Day EB, Russ BE, Apte SH, Doherty PC, **Turner SJ** and Kelso A. 2014. Unique epigenetic signatures are associated with induction, silencing and re-expression of CD8 during T cell development and activation. *Nat Comm*, 5:3547.
3. Russ BE, Olshansky M, Li J, Smallwood HS, Denton AE, Prier JE, Stock AT, Nguyen MLT, Rowe S, Olson MR, Finkelstein DB, Kelso A, Thomas PG, Speed TP, Rao S and **Turner SJ**. 2014. Mapping histone methylation dynamics during virus-specific CD8+ T cell differentiation in response to infection. *Immunity*. 41:853-865.
4. Denton AE, Russ BE, Doherty PC, Rao S, **Turner SJ**. 2011. Differentiation-dependent functional and epigenetic landscapes for cytokine genes in virus-specific CD8+ T cells. *Proc Natl Acad Sci USA*. 108:15306-15311.
5. Day EB, Guillonneau C, Gras S, La Gruta NL, Vignali DA, Doherty PC, Purcell AW, Rossjohn J, **Turner SJ**. 2011. Structural basis for enabling T-cell receptor diversity within biased virus-specific CD8+ T-cell responses. *Proc Natl Acad Sci USA*. 108:9536-9541.