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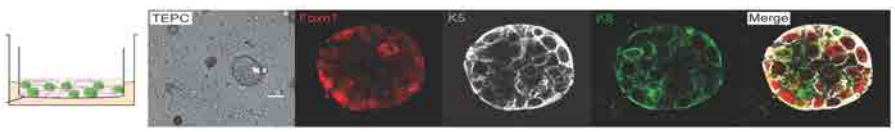
The major site of T cell production, the thymus, undergoes significant loss of function by mid-life, caused by the gradual loss of thymic epithelial cells from an early age by an as yet unresolved mechanism. This translates to a declining immune responsiveness to neoantigens and increased susceptibility to infections, cancer and autoimmunity. Of great clinical relevance, it also leads to a reduced capacity for T cell-mediated recovery following cytoablative therapies used in cancer treatments. We recently identified the organ specific thymic epithelial progenitor cell (TEPC) population in the adult thymus, raising the intriguing possibility that compromised TEPC function is the basis for thymic ageing. In this project, we will use mouse models of ageing, chemotherapy-induced damage and immune regeneration, to explore alterations in TEPC differentiation and function.

Research Projects

1. **Thymic epithelial stem cells and the nature of their niche**
2. **Thymic epithelial stem cells in development and aging**
3. **Generating ex vivo thymus organoids using defined biomatrices and growth factors**
4. **Generating functional thymic epithelial cells from pluripotent stem cells**
5. **Effects of chemotherapy on the thymus and bone marrow**
6. **Clinically relevant approaches for thymus regeneration, to replenish the T cell repertoire**



Images of TEPC colony in 3D culture stained with Foxn1 (red), Keratin-5(white), Keratin-8 (green) and a composite image.

Selected significant publications:

1. Khong DM, Dudakov JA, Hammett MV, Jurblum MI, Khong SI, Goldberg GL, Ueno T, Spyroglou L, Young LF, Van den Brink MRM, Boyd RL, **Chidgey AP**. 2015. Enhanced hematopoietic stem cell function mediates immune regeneration following sex steroid blockade. *Stem Cell Reports* 4, 445-458
2. Wong K, Seach N, Barsanti M, Lim JMC, Hammett MV, Khong DM, Siatskas C, Gray DH, Boyd RL, **Chidgey AP**. 2014. Multilineage potential and self-renewal define an epithelial progenitor cell population in the adult thymus. *Cell Reports* 8, 1198-1209.
3. Goldberg GL, Dudakov JA, Seach N, Reiseger J, Ueno T, Vlahos K, Hammett M, Young L, Boyd RL, **Chidgey AP**. 2010. Sex steroid ablation enhances thymic recovery following anti-neoplastic therapy in young mice. *J. Immunology*, 184: 6014-6024
4. Fletcher AL, Lowen TE, Sakkal S, Reiseger JJ, Hammett MV, Seach N, Scott HS, Boyd RL, **Chidgey AP**. 2009. Ablation and regeneration of tolerance-inducing medullary thymic epithelial cells after cyclosporine, cyclophosphamide and dexamethasone treatment. *J. Immunology* 183, 823-831.
5. **Chidgey AP**, Layton DS, Trounson AO, Boyd RL. 2008. Tolerance inducing strategies for stem-cell-based therapies. *Nature* 453, 330-337.