# Local and systemic immune responses in pig

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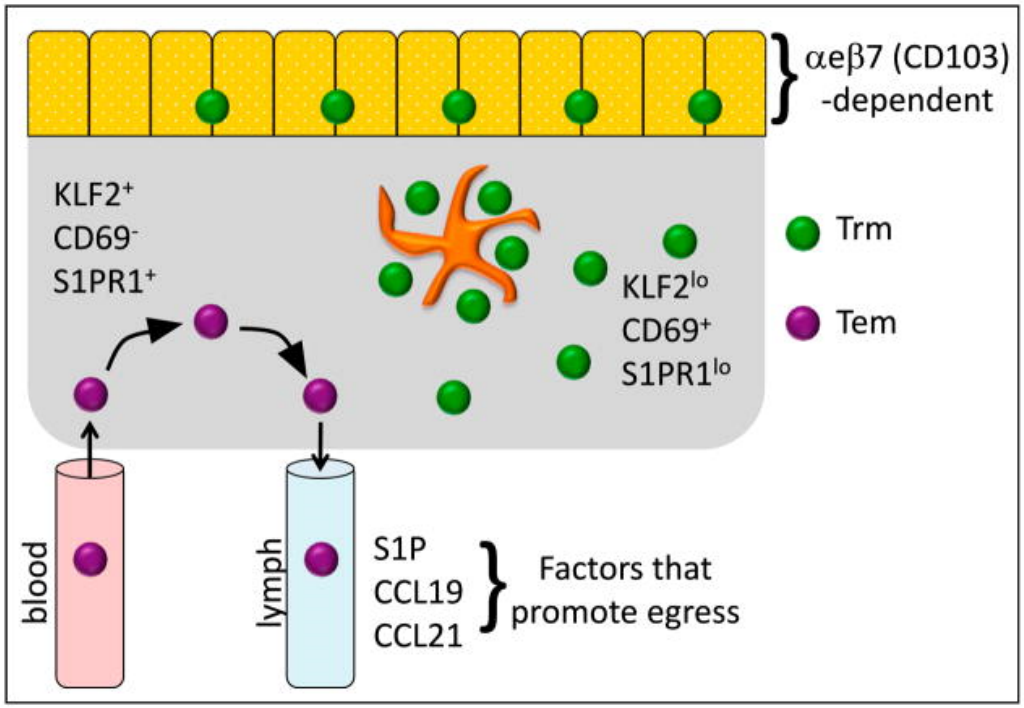
BBSRC bioscience for the future

The Pirbright Institute receives strategic funding from BBSRC.

# Advances in our understanding and analysis of pig immune responses

1. **Tissue Resident Memory T cells**
2. **Babraham pig model**
3. **Genetic programming of B cells**

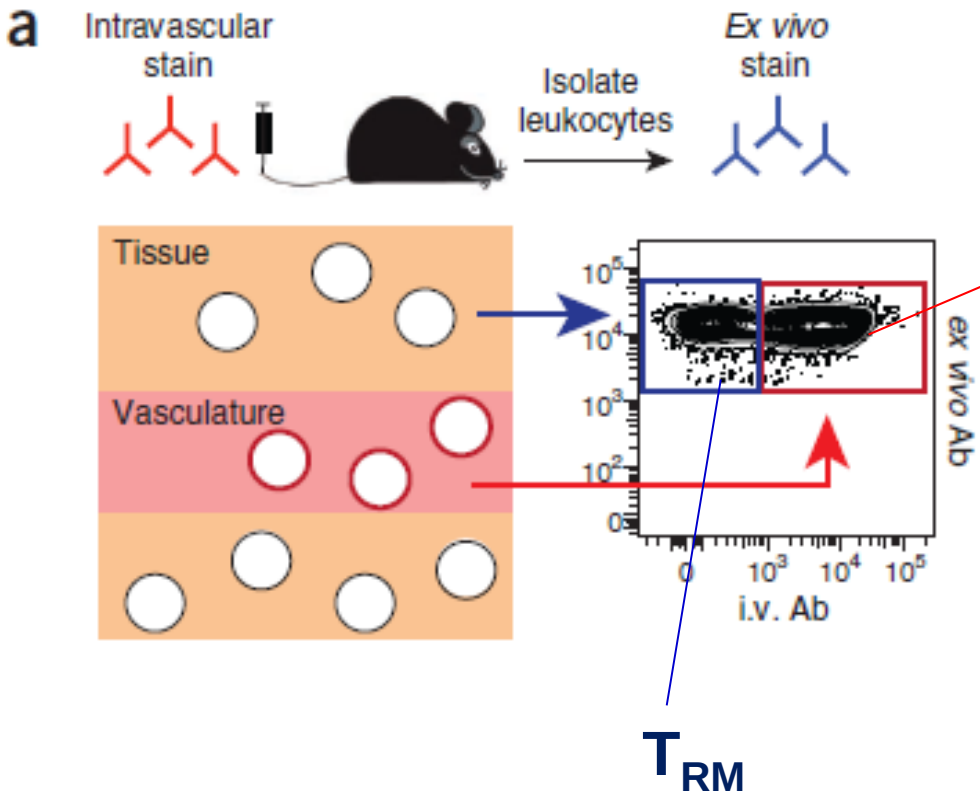
# T cell resident memory cells ($T_{RM}$)




- **more abundant than circulating Teff and Tcm**
- **most important for protective immunity**
- **most efficiently induced by local immunisation**

**Schenkel and Masopust, Immunity 2014**

# Identification of $T_{RM}$

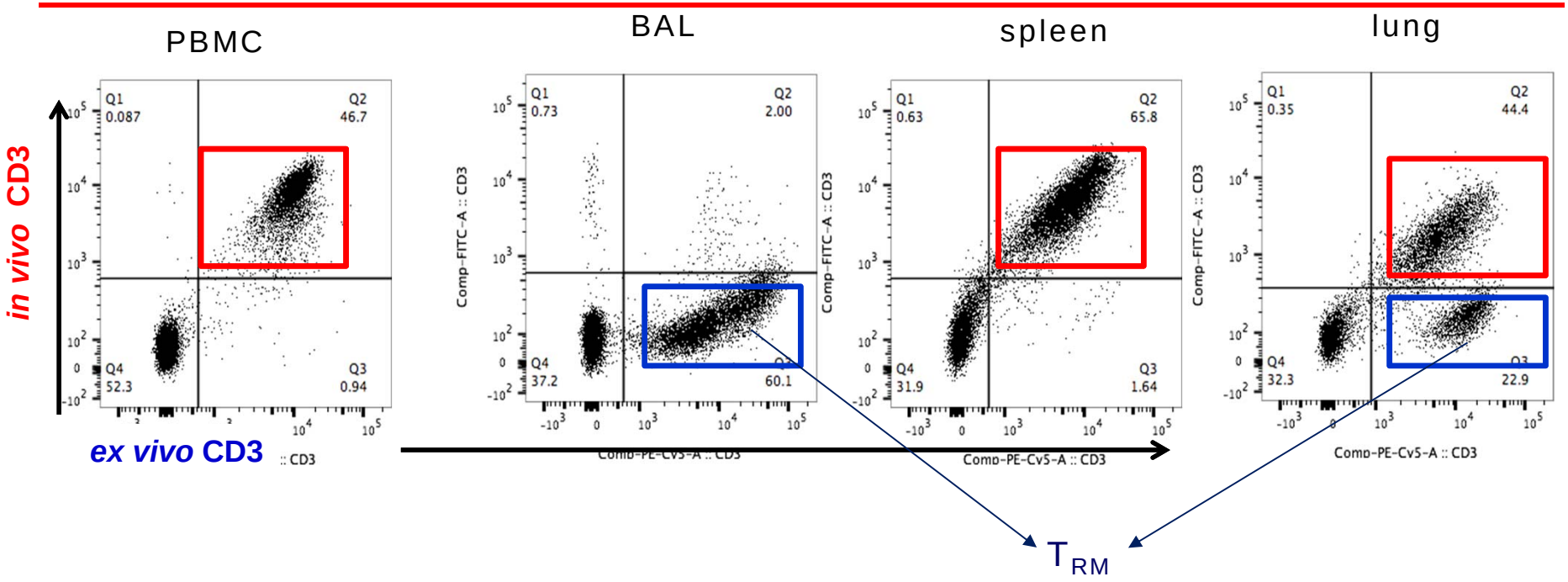



**Intravascular – *in vivo* antibody**

**$T_{RM}$**

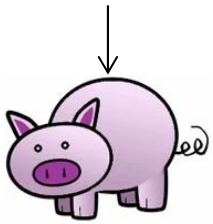
***Anderson et al.*, Nature Protocols 2014**

# Porcine lung $T_{RM}$



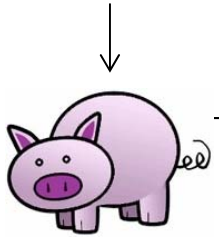
# Aerosol delivery is the most efficient way to induce lung $T_{RM}$

Control
S-FLU I.T.
S-FLU I.N.
S-FLU aerosol



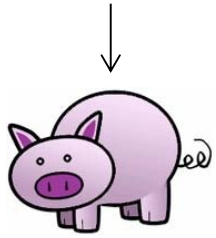
3 wks

Control
S-FLU I.T.
S-FLU I.N.
S-FLU aerosol



4 wks

Challenge
H1N1pdm09



5 d

virus titer in lungs and NS
pathology
immune responses

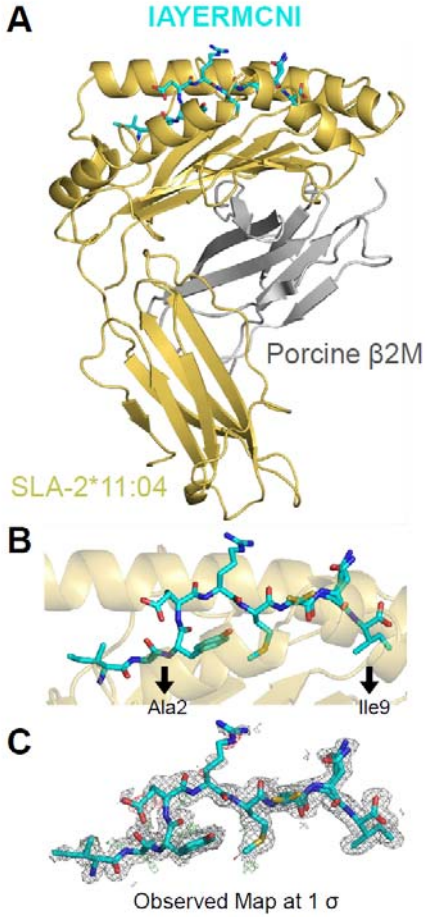
# Babraham pig model to study immune responses

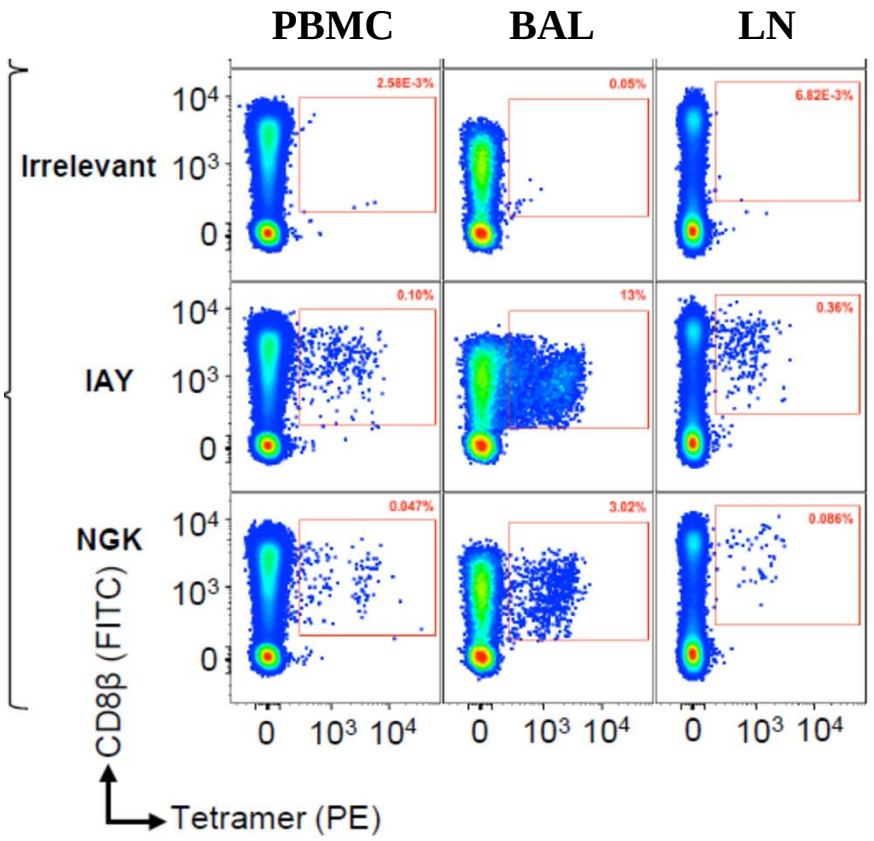
- **Large white inbred pig line**
- **85% identical by genome wide SNP**
- **Matched for MHC class I and II**

- **Grew pig T cell lines**
- **Defined CD8β cytotoxic T cell epitopes**
- **Established pSLA tetramer staining in Babrahams**
- **Defined the SLA structure**
- **Provided epitope prediction motifs for both SLA-I molecules**

**Andy Sewell, Cardiff University**

# Influenza vaccine induces high proportion of Ag specific T cells in the BAL of Babrahams



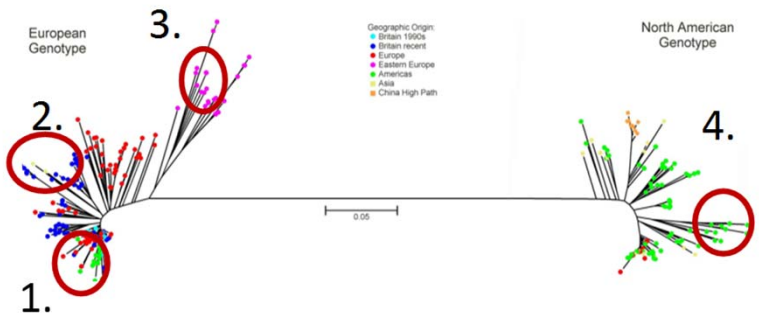




Very restricted number of epitopes particularly in BAL

**Andy Sewell, Cardiff University**

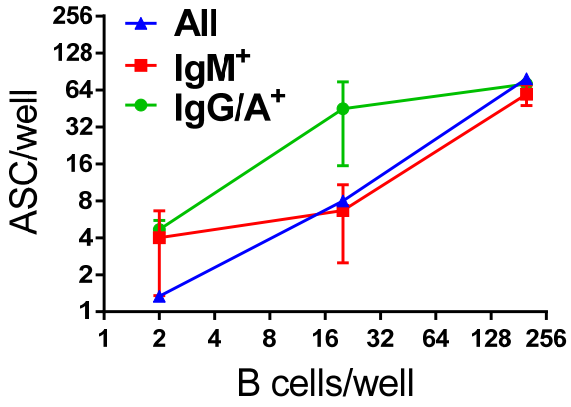
# Genetic programming of porcine memory B cells to enable the isolation of PRRSV-neutralizing monoclonal antibodies

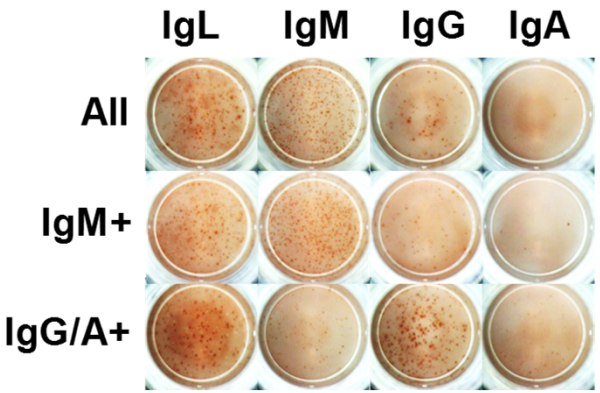
**1. Experimental PRRSV infection and heterologous re-infection protocol**



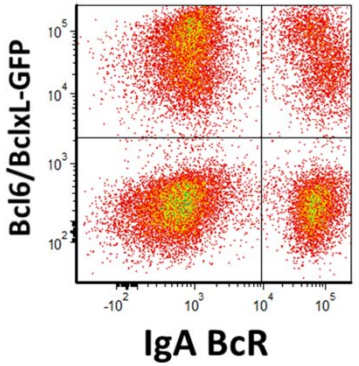
# Bcl-6/Bcl-xL transduced B cell antibody secretion & BcR expression

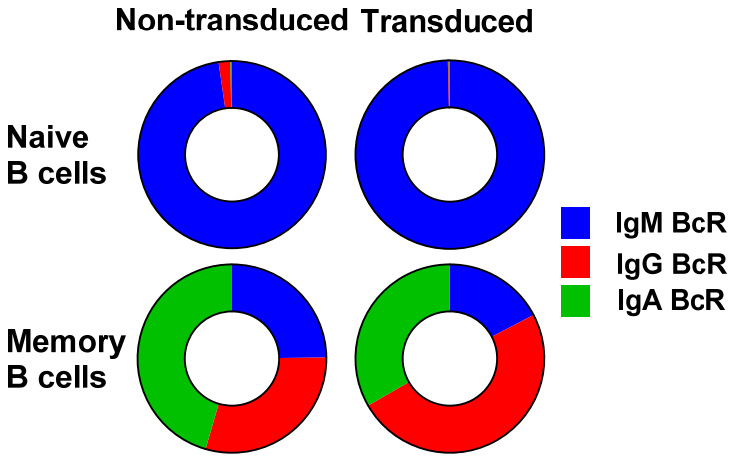
## Ab secretion




## BcR expression




Simon Graham

# Conclusions

1. **$T_{RM}$ are the main population providing local immunity**
   - **We have identified $T_{RM}$ in pigs**
   - **Vaccines should induce $T_{RM}$**

**2. Babraham inbred pigs - a large advance in the immune toolkit available for studying T cell responses in swine**

- **Identified MHC binding motifs, tetramer staining and prediction motifs**
- **Able to grow T cell clones**

3. **Established an efficient system for isolating broadly neutralising Ab from pigs.**

# Acknowledgements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