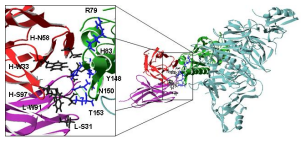
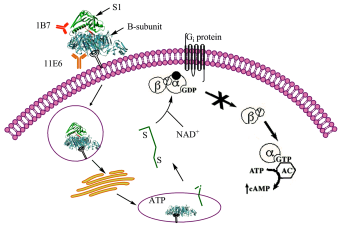
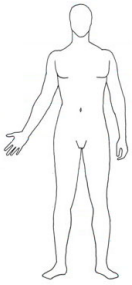
Lab for protein & immuno-engineering

Professor Jennifer Maynard,
Chemical Engineering, UT Austin

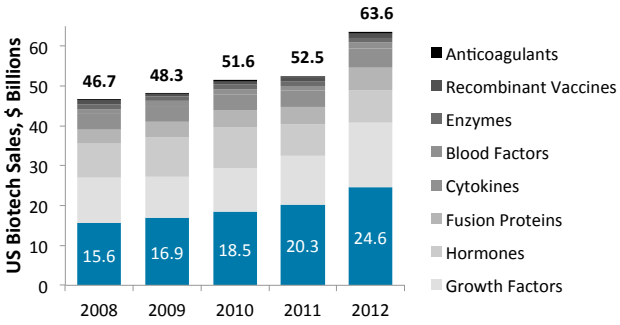






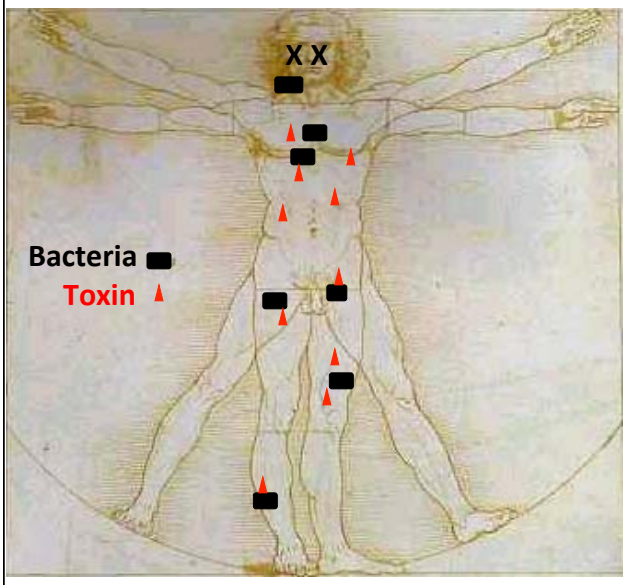
Biologics drive biotech & pharma industries

- Antibody drugs generate > $25 Billion in US sales[1]
  - 38 approved mAbs, 8 under review[2]



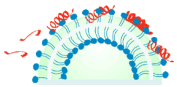
1. Aggarwal, S. (2014). *Nature Biotechnology*
2. Reichert, J. (2014). www.antibodysociety.org/news/approved_mabs.php

Bacterial infectious diseases



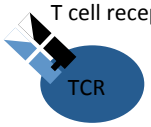
Immune responses

Innate immunity

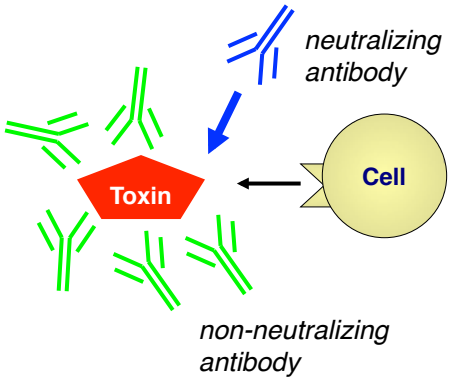


Antibodies

T cell receptors

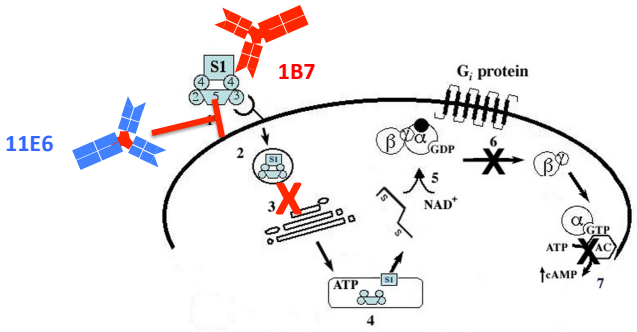


Antibody-antigen interactions



1. Antibodies to pertussis toxin

Goal – Antibody therapy to prevent & treat pertussis



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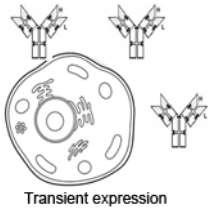
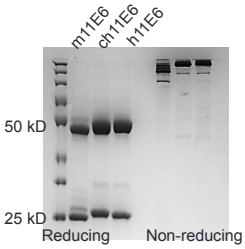
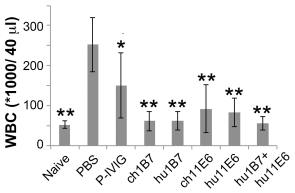
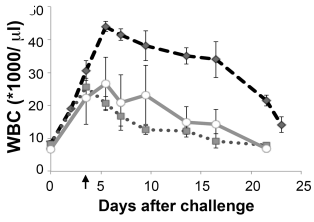
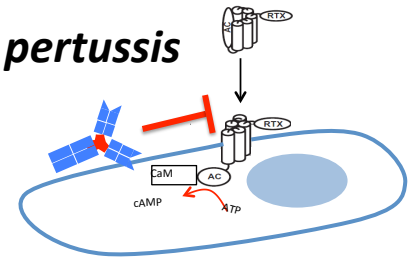


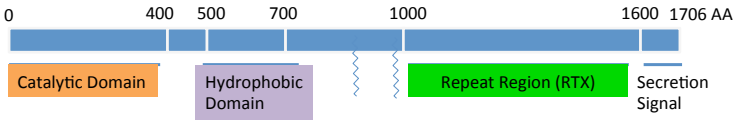






2. Antigen engineering for pertussis vaccines (ACT)





2% antibodies

98% antibodies, Block receptor binding

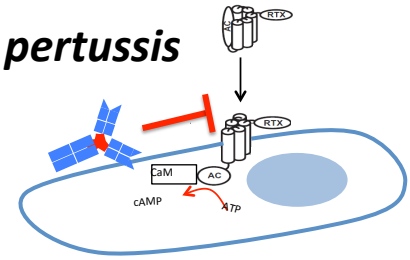
Immunize with **ACT**

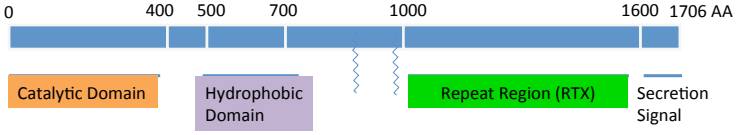
Induce similar Antibodies, protection

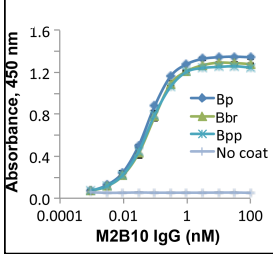
Immunize with **RTX**

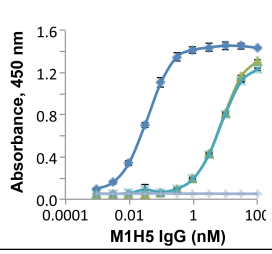
Goal – Design antigen variants with enhanced expression levels &, stabilities that induce high levels of protective antibodies

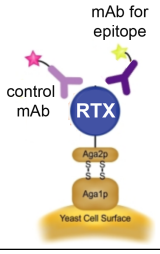
2. Antigen engineering for pertussis vaccines

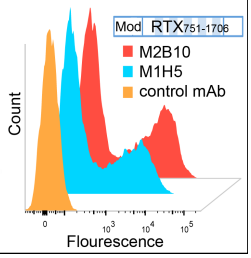




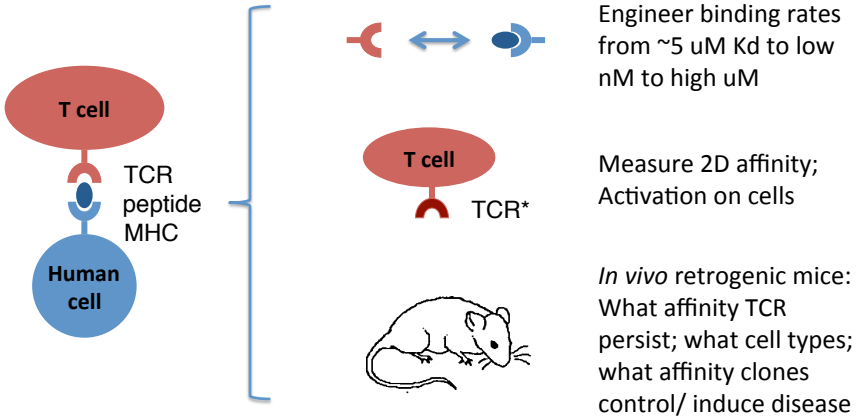








3. T cell receptor (TCR) responses: CMV



Engineer binding rates from ~5 uM Kd to low nM to high uM

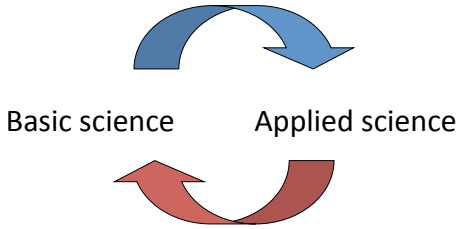
Measure 2D affinity; Activation on cells

In vivo retrogenic mice: What affinity TCR persist; what cell types; what affinity clones control/ induce disease

Goal – Understand role of TCR affinity in disease and protection
(UT collaborator: Lauren Ehrlich, Molecular Biosci)

Power of engineering

Understand underlying biology such that we can develop design rules to predictably manipulate systems



Skills in protein engineering using the following techniques:

- *Recombinant Techniques*
- *Protein Expression in Eukaryotes, insect cells and Bacteria (E. Coli)*
- *Protein Characterization*
- *Protein Crystallization*
- *Cell Culture*

Job opportunities: academics, biotechnology, pharmaceutical industries

The ***Maynard laboratory*** is offering **1 graduate research assistant** position in in the areas of vaccine design

Contact: maynard@che.utexas.edu

Members of the lab (not pictured: Sr. Scientist Dr. Annalee Nguyen)
Row 1: Liz Bogardus, Ellisa Leonard, Jeong-min Hyun, Edith Acquaye, Ellen Wagner.
Row 2: Josh Laber, Chris Stevens, Zach Frye, Kevin Entzminger, Xian-zhe Wang.