Analyzing Antibody Repertoires for Disease Specific Epitope Identification

Rafael Smith, Joel Bozekowski, Michael Paul, Patrick Daugherty
Daugherty Group, University of California, Santa Barbara

Hypothesis

You have a unique antibody repertoire that updates as immune responses occur

Immune factors
- Pathogens
- Allergens
- Environmental

Antibody repertoire

By comparing patient’s serums, antibodies can be isolated as disease specific

Diseased
Healthy

Potential Biomarkers:
- develop therapeutics
- diagnostic tools
- understand pathogenesis

Experiment

A systematic method of obtaining disease specific and medically relevant biomarkers

Library of peptides
- 7.6 billion unique peptides
- 12 amino acid length polymers

Engineer bacteria to display peptide library
- Cells display a unique peptide

Isolate the antibody-peptide interactions via magnetic separation then sequence plasmids

Screen patient serum for antibody binding

Bacterial Display

Analysis

Using bioinformatics to determine disease specific motifs

Use pattern recognition programing to cluster the epitopes into motifs

QRHKEQOPLPLVM
APSEQPFPSTFC
FASLJQPEQLTP
PHEQAKPDJKAS
EQQPPF
PEQFPPE
PEQLaPT
PEQsKP
P(EQ)LPaP

Significant Patterns
Clumped Patterns

Assess the data by organizing patients into groups and comparing groups for unique sequences

Group 1: Diseased Patients
Group 2: Healthy Patients

Potential disease specific epitopes/antibodies

Search an antibody repertoire database for disease specific motifs

Motif 1
Motif 2

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Future work:
- Longitudinal studies with biological replicates
- Engineering a more specific peptide library

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