

IEDB Overview

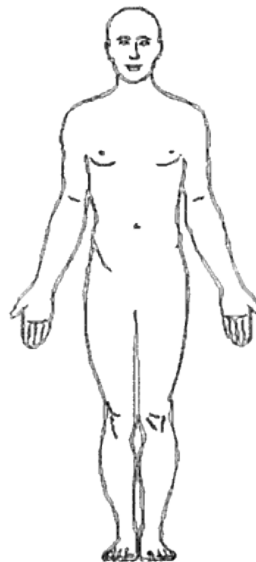
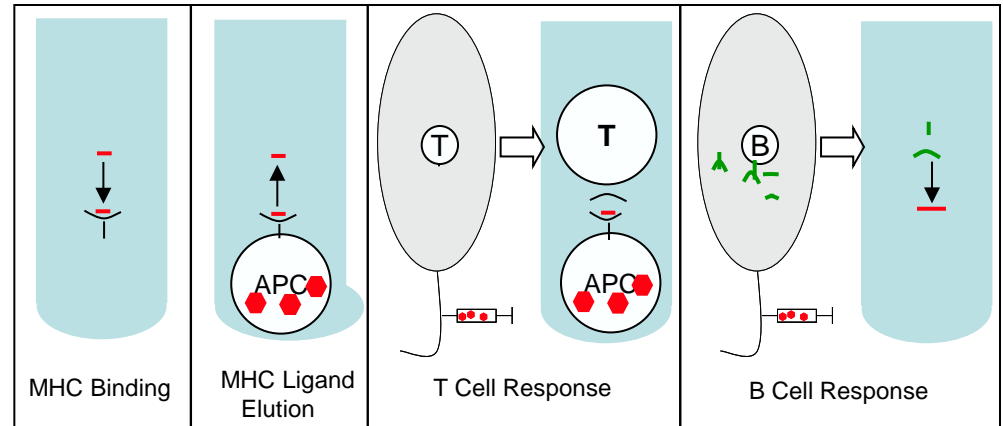
Bjoern Peters, Ph.D.

Associate Professor

IEDB Co-Principal Investigator

The Immune Epitope Database

- Free online resource of experimentally-derived epitope information
 - Allergens
 - Infectious diseases
 - Autoimmune diseases
 - Transplant/alloantigens
- Over 17,000 curated articles + direct submissions
 - 150,000 unique epitopes
 - Over 975,000 assays



An Assay-centric, Context Dependent View

- Scientists have different definitions for epitopes
- IEDB captures the actual experimental assays in which epitopes were determined and characterized
- Users can search for epitopes based on these characteristics

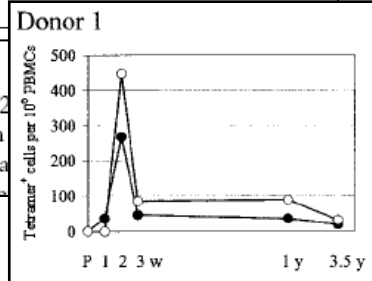
Consistent Data Entry Requires Well Defined Data Structure

Quantitation of CD8⁺ T Cell Responses to Newly Identified HLA-A*0201-restricted T Cell Epitopes Conserved Among Vaccinia and Variola (Smallpox) Viruses

Masanori Terajima, John Cruz, Gregory Raines, Elizabeth D. Kilpatrick, Jeffrey S. Kennedy, Alan L. Rothman, and Francis A. Ennis

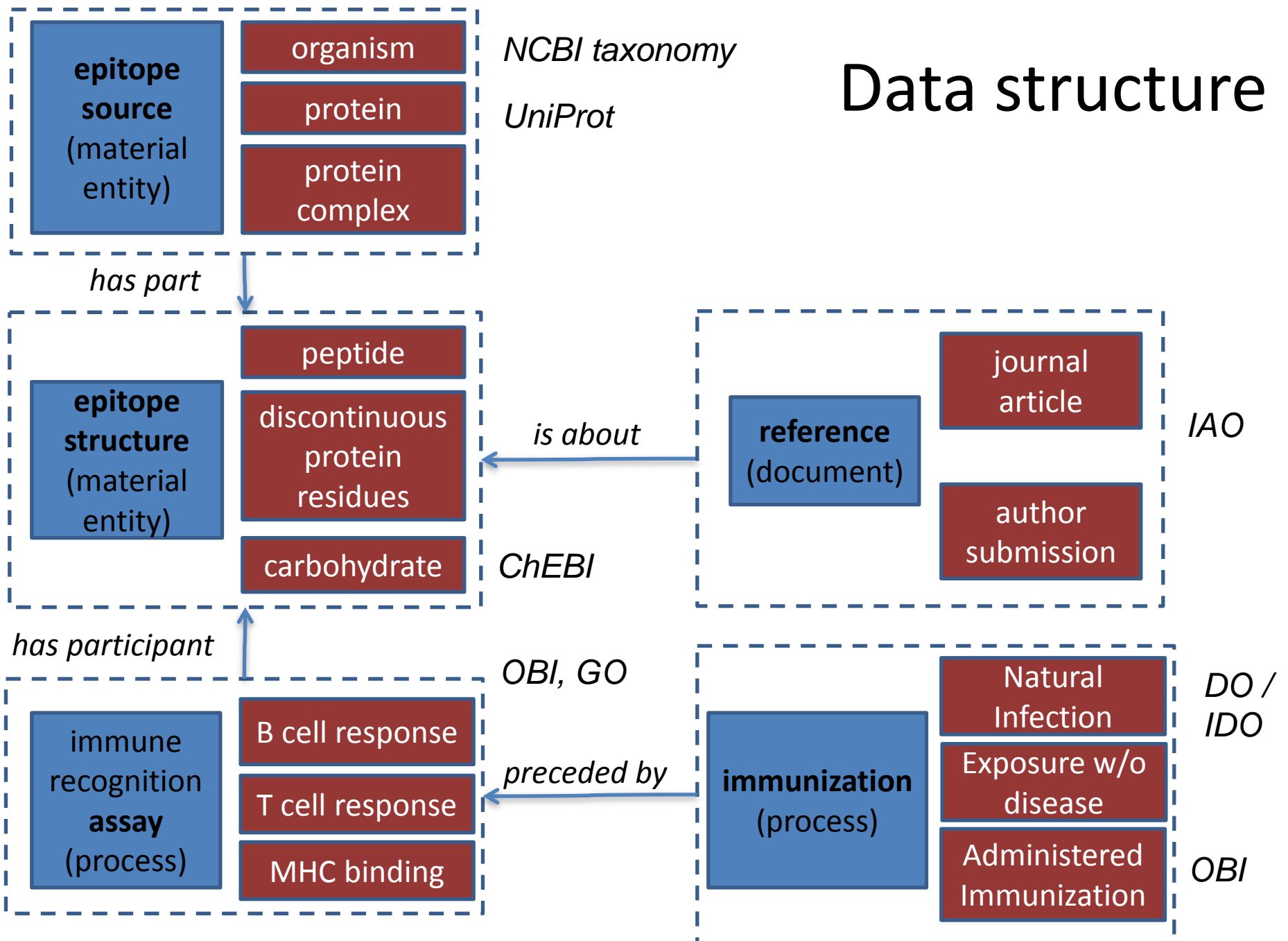
Materials and Methods

Donors. Donors in this study were three HLA-A*0201 transgenic laboratory workers received primary immunization with the licensed smallpox vaccine, *Imvax*[®], administered by the Centers for Disease Control and Prevention.

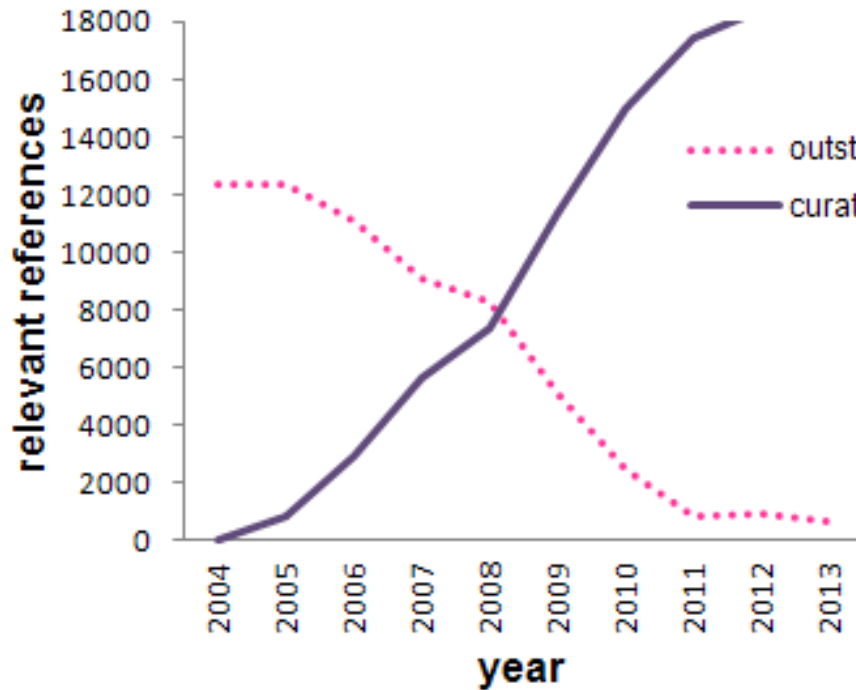


Epitope	Structure	Name	74A
		Chemical Type	Peptide/Protein
		Sequence	CLTEYILWV
		Domain / Region	Defined Epitope
	Source	Species	Vaccinia virus Ankara
		Strain	Ankara (MVA)
		Antigen	putative 21.7k protein
		Antigen Accession	2772819
Context	Immunization	Antigen Positions	79-87
		Immunized Species	Homo sapiens
		Immunogen Type	Source Species
	Assay	Administration	Scarification
		Antigen Type	Epitope
		Assay Type	ELISPOT
		Response Measured	Cytokine Release-IFN-g
		MHC Allele	HLA-A*0201

Data structure



Curation of historic articles is completed



infectious disease

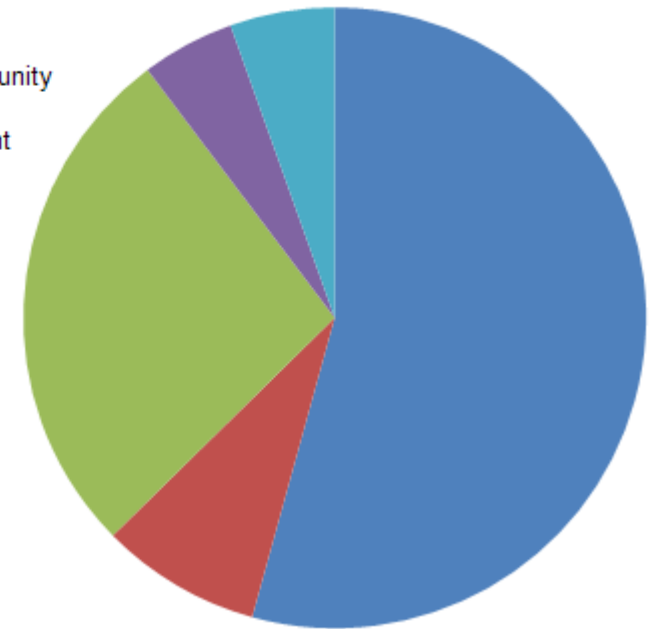
allergy

autoimmunity

transplant

other

references



- 975,000 assays
- 151,000 epitopes
- 17,242 papers

IEDB 3.0

- Major redesign of query interface based on community feedback
- Focus on making common requests easy
- IEDB 3.0 replaced IEDB 2.13 in February 2015 as the main website
- We appreciate your feedback as we continue to enhance the IEDB!

Welcome

The IEDB is a free resource, funded by a contract from the National Institute of Allergy and Infectious Diseases. It offers easy searching of experimental data characterizing antibody and T cell epitopes studied in humans, non-human primates, and other animal species. Epitopes involved in infectious disease, allergy, autoimmunity, and transplant are included.

[Learn More](#)

Welcome to the newly imagined IEDB site.

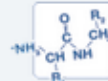
- Report any issues you find [here](#) or using the Help link at the top of the page.
- Go back to the legacy site by clicking [here](#) or following the link at the top of the page.

Summary Metrics


Peptidic Epitopes	148,817
Non-Peptidic Epitopes	2,298
T Cell Assays	275,010
B Cell Assays	357,764
MHC Ligand Assays	342,851
Epitope Source Organisms	3,449
Restricting MHC Alleles	713
References	17,242

START YOUR SEARCH HERE


Epitope ?

- Any Epitopes 
- Linear Epitope
- Exact
- Discontinuous Epitopes
- Non-peptidic Epitopes

Assay ?


- Positive Assays Only 
- T Cell Assays
- B Cell Assays
- MHC Ligand Assays

Antigen ?


Organism 

Antigen Name


MHC Restriction ?

- Any MHC Restriction 
- MHC Class I
- MHC Class II
- MHC Nonclassical

Host ?

- Any Host 
- Humans
- Rodents
- Non-human Primates
- Other Common Hosts

Disease ?

- Any Disease 
- Infectious Disease
- Allergic Disease
- Autoimmune Disease
- Transplant Disease

Reset

Search

Epitope Analysis Resource

T Cell Epitope Prediction ?

Scan an antigen sequence for amino acid patterns indicative of:

- MHC I Binding
- MHC II Binding
- MHC I Processing (Proteasome, TA)
- MHC I Immunogenicity

B Cell Epitope Prediction ?

Predict linear B cell epitopes using:

[Antigen Sequence Properties](#)

Predict discontinuous B cell epitopes using antigen structure via:

- [Solvent-accessibility \(Discotope\)](#)
- [Protrusion \(ElliPro\)](#)


Epitope Analysis Tools ?

Analyze epitope sets of:


- [Population Coverage](#)
- [Conservation Across Antigens](#)
- [Clusters with Similar Sequences](#)
- [Location in 3D Structure of Antigen](#)

Pending Filters

Reset Search


Epitope 

- Any Epitopes
- Linear Epitope
- Discontinuous Epitopes
- Non-peptidic Epitopes


Antigen 

Organism
Ex: influenza, peanut


Antigen Name
Phl p 1 ★★ [Q40967] (Phl) 1

Assay 

- Positive Assays Only
- T Cell Assays
- B Cell Assays
- MHC Ligand Assays

MHC Restriction 

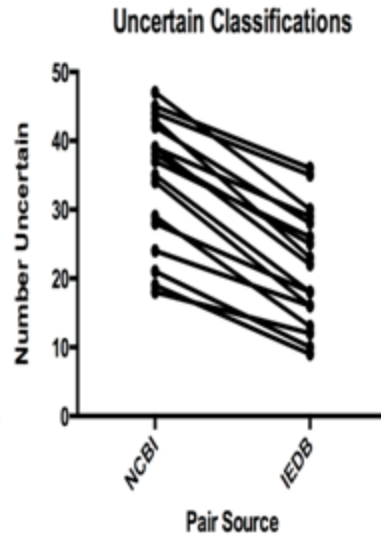
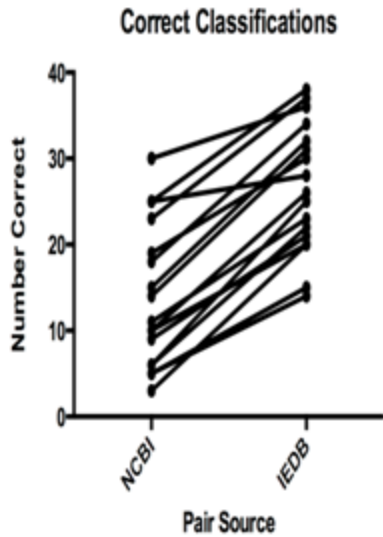
- Any MHC Restriction
- MHC Class I
- MHC Class II
- MHC Nonclassical
- Specific MHC Restriction

Host 

- Any Host
- Humans
- Rodents

Current Filters: Positive Assays Only Antigen: Phl p 1 ★★ [Q40967] (Phl p 1) (Phleum pratense (timothy grass)) Host: Homo sapiens (human)

Epitopes (126)		Antigens (1)		Assays (440)		References (13)	
Go To Records Starting At <input type="text" value="1200"/> <input checked="" type="button" value="GO"/>							
Export Epitopes Results <input checked="" type="button" value="X"/>							
126 Records Found Page 1 of 6 <input type="button" value="GO"/>							
Details	Epitope	Antigen	Organism	# References	# Assays		
15558	FEIKCTKPEACS	Phl p 1	Phleum pratense (timothy grass)	3	15		
63287	TEAEDVIPEGWKADTSYESK	Phl p 1	Phleum pratense (timothy grass)	3	7		
74106	YHFDLSGHAFGA	Phl p 1	Phleum pratense (timothy grass)	3	8		
126098	GEVEIQFRRVKCKYP	Phl p 1	Phleum pratense (timothy grass)	3	3		
127373	WGAIWRIDTDPKLTG	Phl p 1	Phleum pratense (timothy grass)	3	5		
1493	AGELELQFRRVK	Phl p 1	Phleum pratense (timothy grass)	2	10		
3912	APYHFDLSGHAFGAM	Phl p 1	Phleum pratense (timothy grass)	2	2		
10760	DVVAVDIKEKGGK	Phl p 1	Phleum pratense (timothy grass)	2	9		
12313	EGWKADTSYESK	Phl p 1	Phleum pratense (timothy grass)	2	9		
13855	EQKLRSALEL	Phl p 1	Phleum pratense (timothy grass)	2	9		
20116	GHAFGAMAKKGD	Phl p 1	Phleum pratense (timothy grass)	2	8		
24100	HITDDNEEPIAPYHFDLSGHA	Phl p 1	Phleum pratense (timothy grass)	2	2		
25389	IAPYHFDLSGHA	Phl p 1	Phleum pratense (timothy grass)	2	16		
29548	IWRIDTDPKLTG	Phl p 1	Phleum pratense (timothy grass)	2	3		
33539	KSIWYGKPTGAG	Phl p 1	Phleum pratense (timothy grass)	2	4		
35586	LELQFRRVKCKY	Phl p 1	Phleum pratense (timothy grass)	2	5		
39205	LRSAGELELQFR	Phl p 1	Phleum pratense (timothy grass)	2	9		
43602	NEEPIAPYHFDLSGHAFG	Phl p 1	Phleum pratense (timothy grass)	2	2		
47296	PEGTKVTFHVEK	Phl p 1	Phleum pratense (timothy grass)	2	5		
48043	PKDNGGACGYKD	Phl p 1	Phleum pratense (timothy grass)	2	11		
48726	PNYLALLVKYVN	Phl p 1	Phleum pratense (timothy grass)	2	10		
64696	TKVTFHVEKGSN	Phl p 1	Phleum pratense (timothy grass)	2	5		
66582	TTEGGTKTEAED	Phl p 1	Phleum pratense (timothy grass)	2	4		
69062	VIPEGWKADTSY	Phl p 1	Phleum pratense (timothy grass)	2	9		
71874	VVVHITDDNEEP	Phl p 1	Phleum pratense (timothy grass)	2	3		
126 Records Found Page 1 of 6 <input type="button" value="GO"/>							
Go To Records Starting At <input type="text" value="1200"/> <input checked="" type="button" value="GO"/>							
Export Epitopes Results <input checked="" type="button" value="X"/>							



MOLECULE FINDER

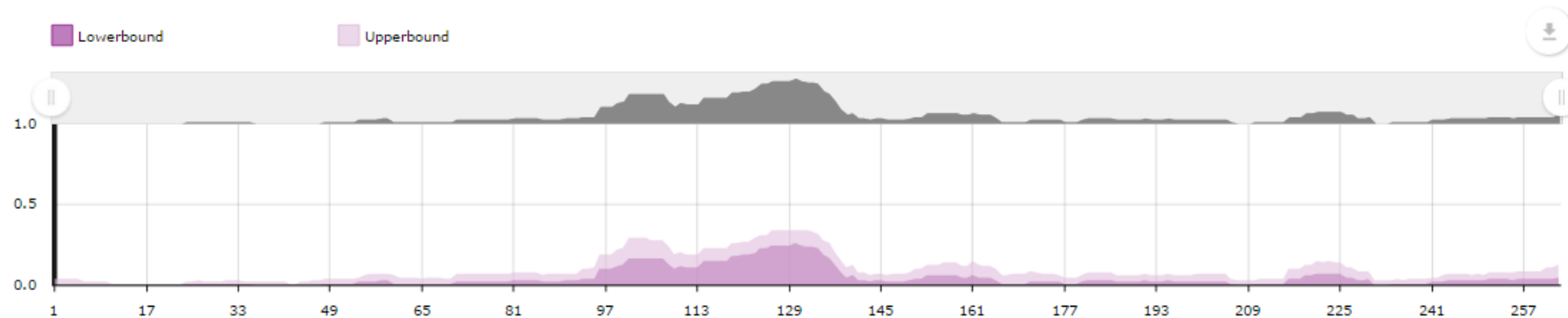
- Spermatophyte (seed plant) protein
 - Dicot protein
 - Fabaceae (pea family) protein
 - Monocot protein
 - Other spermatophyte protein
 - Pinaceae (pine family) protein
 - Poaceae (grass family) protein
 - Aegilops protein
 - Avena (oat) protein
 - Cynodon dactylon (Bermuda grass) protein **
 - Lolium perenne (perennial ryegrass) protein **
 - Other poaceae protein
 - Phleum pratense (timothy grass) protein **
 - Other Phleum pratense (timothy grass) protein * *
 - Phi p 1 **
 - Chain A, Crystal Structure Of Phi P 1, A Major Timothy Grass Pollen Allergen [28373838]
 - Pollen allergen Phi p 1 precursor [1171008]
 - Pollen allergen Phi pl precursor [75221090]
 - pollen allergen Phi pl [3901094]
 - unnamed protein product [45823012]
 - Phi p 11 **
 - Phi p 12 **
 - Phi p 13 **
 - Phi p 2 **

Phleum pratense (timothy grass) - Phl p 1

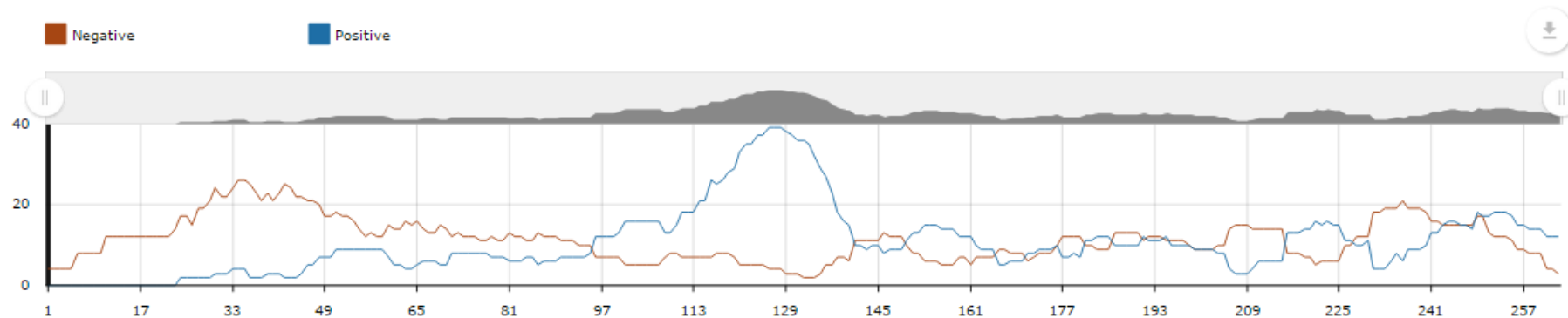
[Change Parameters](#) [?](#)

Pending Filters [Positive Assays Only](#) [Antigen: Phl p 1 ★★ \[Q40967\] \(Phl p 1\) \(Phleum pratense \(timothy grass\)\)](#) [Host: Homo sapiens \(human\)](#)

Response Frequency [?](#)



Epitope Assay Counts [?](#)



Controls

Residue Position Start End

[Reset](#)

[Update Display](#)

Recuration Efforts

- Papers curated early in the project are recurated to conform to new rules
- Further targeted revisions to
 - Improve data consistency and uniformity based on data validation checks
 - Populate newer data fields that did not exist when the reference was originally curated
- The overall result will be **increased accuracy and consistency** of the data

The Submission Community

- Currently there are over 10 epitope discovery contracts and grants
 - 10 contracts for infectious disease B and T cell epitopes
 - Other grants submit allergy epitopes
- There have been 24 epitope discovery contracts previously
- Data submission metrics:
 - 272 submissions
 - 76,137 total epitopes
 - Submitted data currently comprises 17% of epitopes in the IEDB
- Data deposition is open to the general research community on a case-by-case basis

Meta-Analysis of Immune Epitope Data

- Inventory of current epitope knowledge
 - T versus B, Chemical type, Host, Disease states, Conservancy and other variables
- Goals
 - Facilitate use, identify gaps, engage community (experts)
 - Increased data quality and confirms inclusion of critical data in the IEDB
- **Influenza:** Bui et al, PNAS 2007; Greenbaum PNAS 2009
- **TB:** Blythe et al, Immunome Res 2007; Ernst et al. Tuberculosis 2007
- **Botulinum/Anthrax toxins:** Zarebski et al, Expert Rev 2008
- **Malaria:** Vaughan et al, Parasite Immunol 2009
- **Poxviruses:** Moutaftsi et al, Future Microbiology, 2010
- **Flaviviruses:** Vaughan et al, Viral Immunology 2010
- **Allergy:** Vaughan et al, J Allergy 2011
- **HCV:** Kim et al, PLoS One 2012
- **Myasthenia gravis:** Vaughan et al, Autoimmune Dis. 2012
- **Diabetes:** Vaughan et al, Immunome Res 2013
- **Pertussis:** Vaughan et al, Hum Immunol 2014
- **Multiple Sclerosis:** Vaughan et al J Neuroimmunol 2014
- **Six More published and two in progress**

Promote Awareness of IEDB Data and Tools

- Present 4 exhibit booths per year
- Organize annual user workshop
- Perform at least 1 meta-analyses per year
- Publish IEDB related papers
- Expand help with video and written tutorials and integration of field-level help linked to ontology



Our goals for this user workshop

We want your input to make the IEDB better:

- Learn about real-life applications for the IEDB
- Identify and prioritize problems with the user interface, documentation, functionality etc.

We want to enable you to get the most out of the IEDB:

- The primary IEDB success metric is usage
- Best compliment for our program is if IEDB data & tools help in your research (citations)

How the IEDB Can Help You!

