IMMUNE EPITOPE DATABASE AND ANALYSIS RESOURCE

Accessing the Data: Query, Reporting and Examples

www.iedb.org

Presented by: Randi Vita, M.D. Lead Ontology and Quality Manager

Home Page Query

See our latest homology analysis of SARS-CoV-2 spike sequences to myocarditis-associated antigens here.

Welcome

The Immune Epitope Database (IEDB) is a freely available resource funded by NIAID. It catalogs experimental data on antibody and T cell epitopes studied in humans, non-human primates, and other animal species in the context of infectious disease, allergy, autoimmunity and transplantation. The IEDB also hosts tools to assist in the prediction and analysis of epitopes.

Learn More

Upcoming Events & News

Virtual User Workshops — Oct 28-29 & Nov 3-4, 2021

* register here

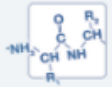
IEDB SARS-CoV-2 Epitope Analysis Videos

Summary Metrics

Peptidic Epitopes	1,141,006
Non-Peptidic Epitopes	3,123
T Cell Assays	416,504
B Cell Assays	1,146,166
MHC Ligand Assays	3,235,577
Epitope Source Organisms	4,079
Restricting MHC Alleles	941
References	22,357

START YOUR SEARCH HERE

Epitope



- (•) Any
- ( ) Linear peptide — Exact M — Ex: SIINFEKL
- ( ) Discontinuous
- ( ) Non-peptidic

Assay

- [x] T Cell
- [x] B Cell
- [x] MHC Ligand

Ex: neutralization — Find

Outcome: [x] Positive [ ] Negative

Epitope Source

Organism

Ex: influenza, peanut — Find

Antigen

Ex: core, capsid, myos — Find

MHC Restriction

- (•) Any
- ( ) Class I
- ( ) Class II
- ( ) Non-classical
- ( ) Ex: HLA-A*02:01 — Find

Host

- (•) Any
- ( ) Human
- ( ) Mouse
- ( ) Non-human primate
- ( ) Ex: dog, camel — Find

Disease

- (•) Any
- ( ) Infectious
- ( ) Allergic
- ( ) Autoimmune
- ( ) Ex: asthma — Find

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,TAP)
- 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:

- Discotope
- ElliPro

Epitope Analysis Tools

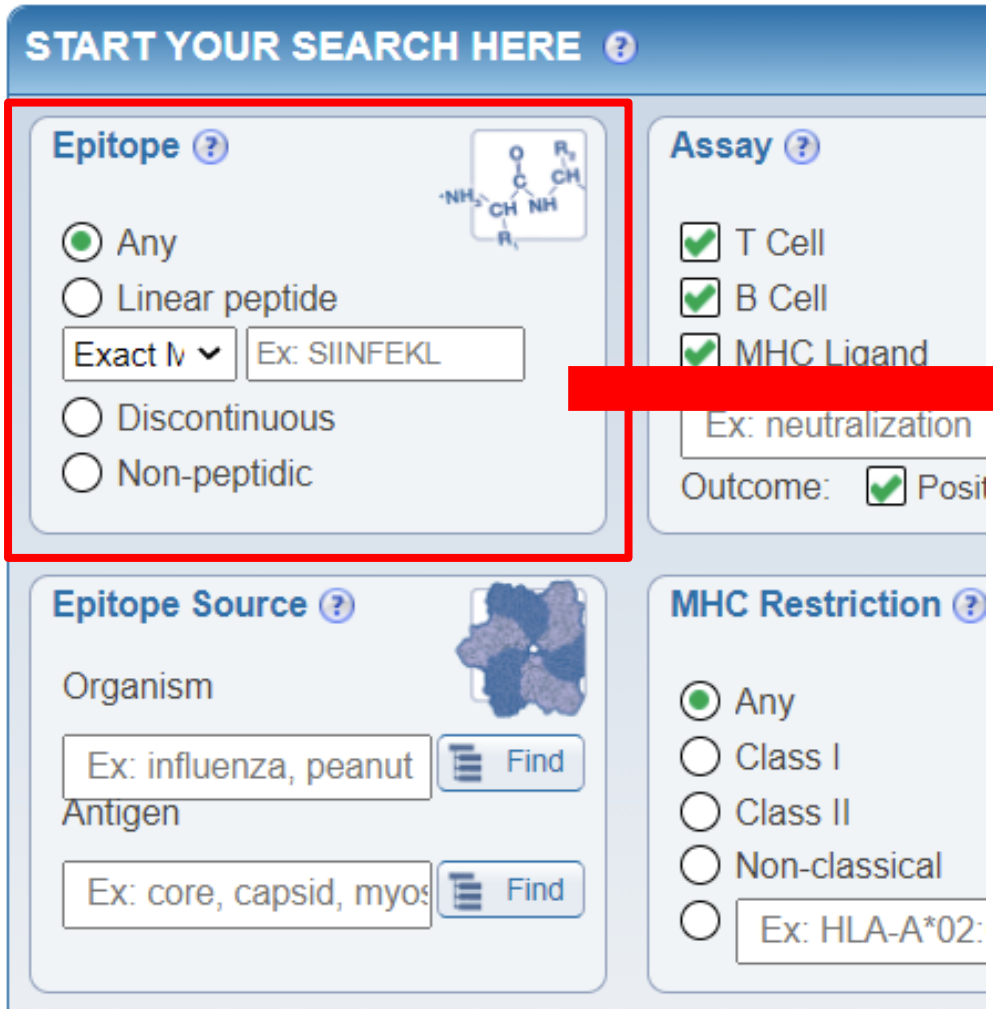
Analyze epitope sets of:

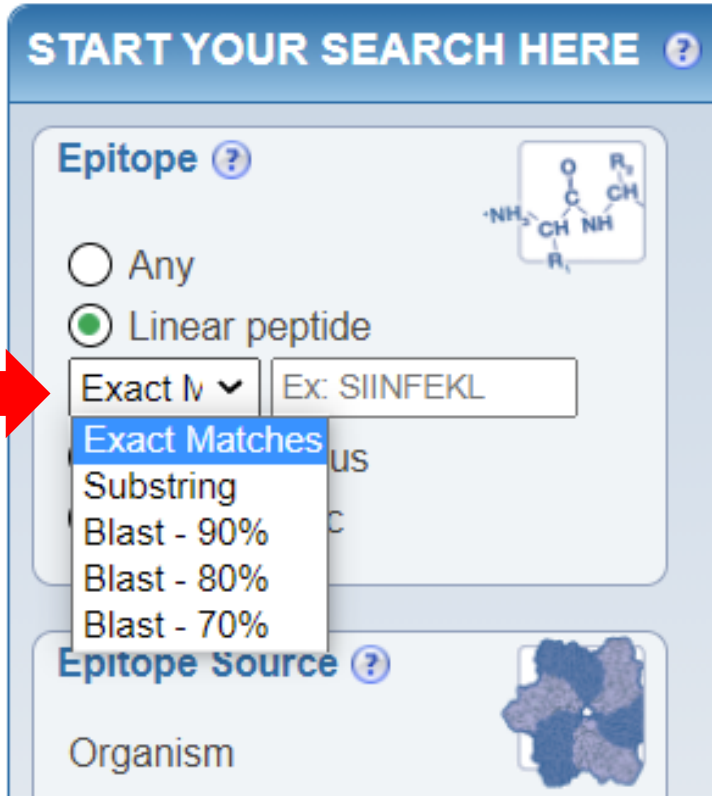
- Population Coverage
- Conservation Across Antigens
- Clusters with Similar Sequences

Supported by a contract from the National Institute of Allergy and Infectious Diseases, a component of the National Institutes of Health in the Department of Health and Human Services.

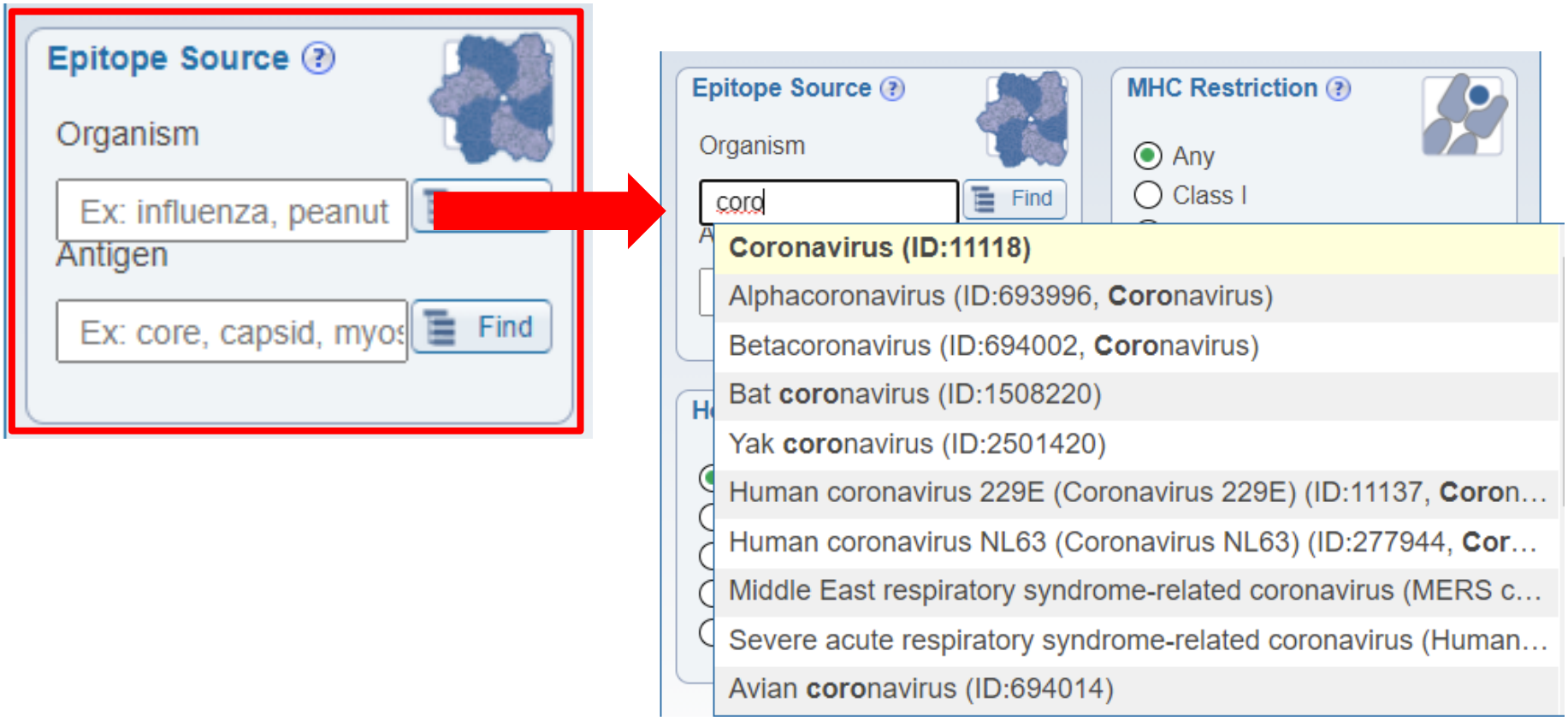
Epitope Search Pane

Search by epitope sequence

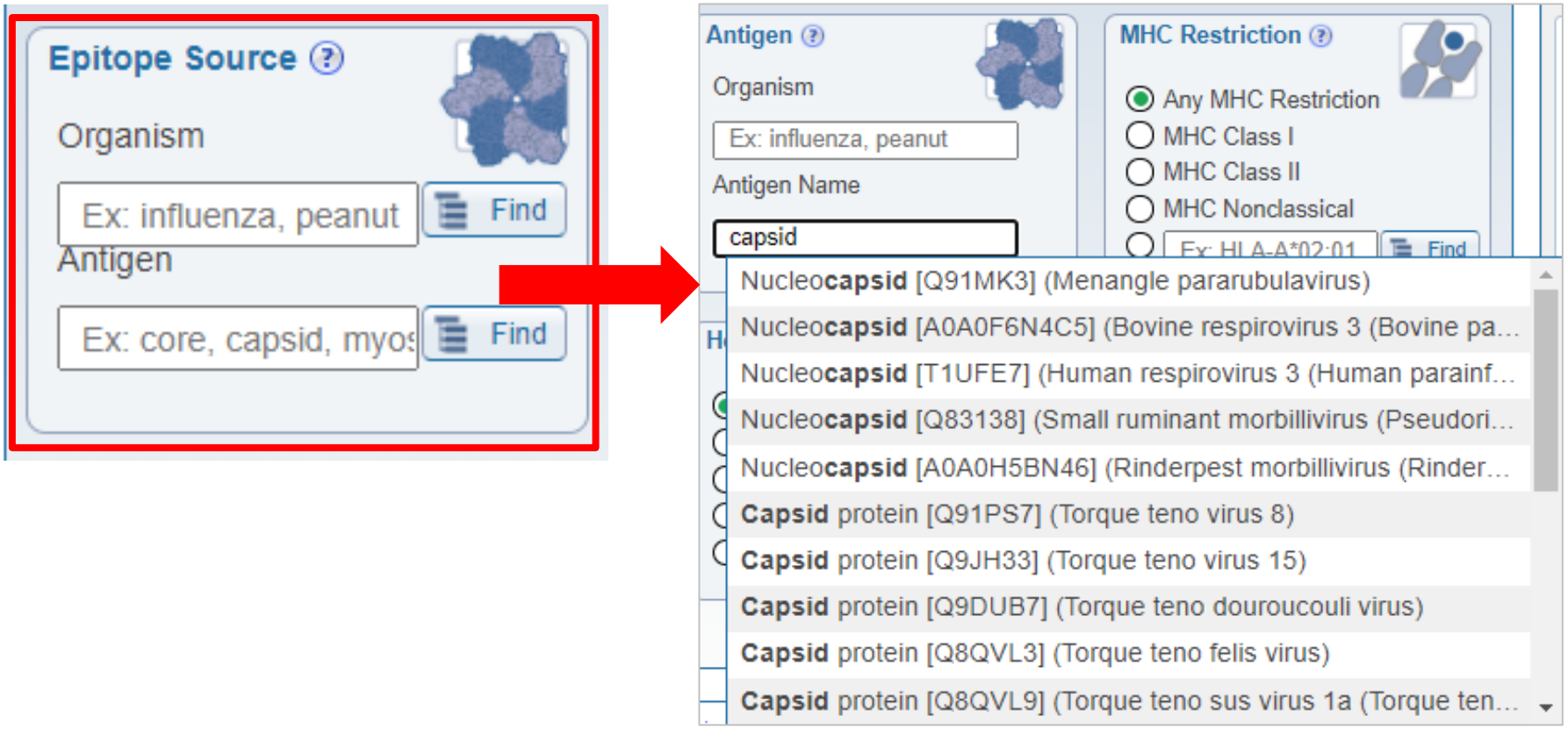




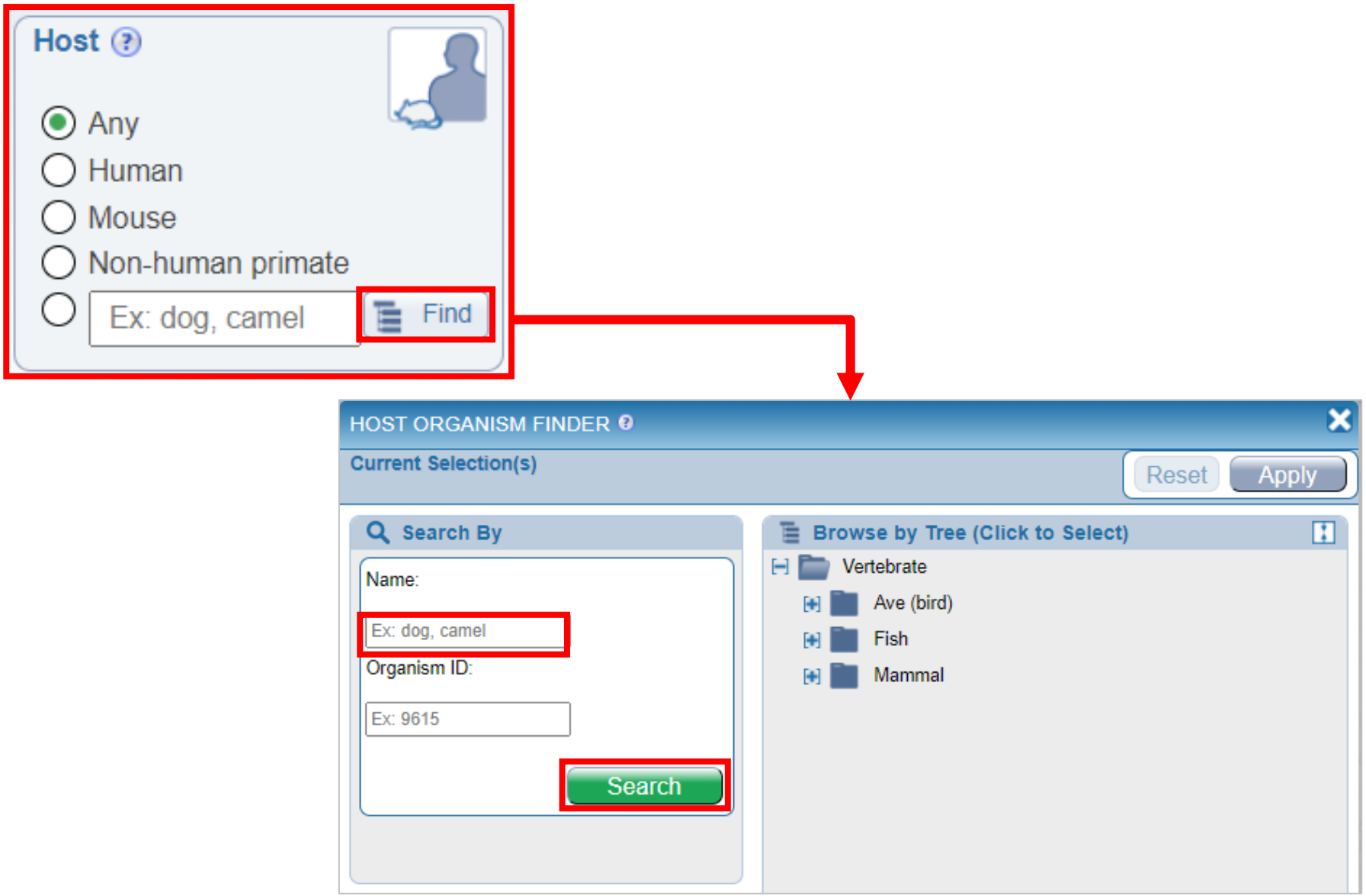
Antigen Search Pane: Organism



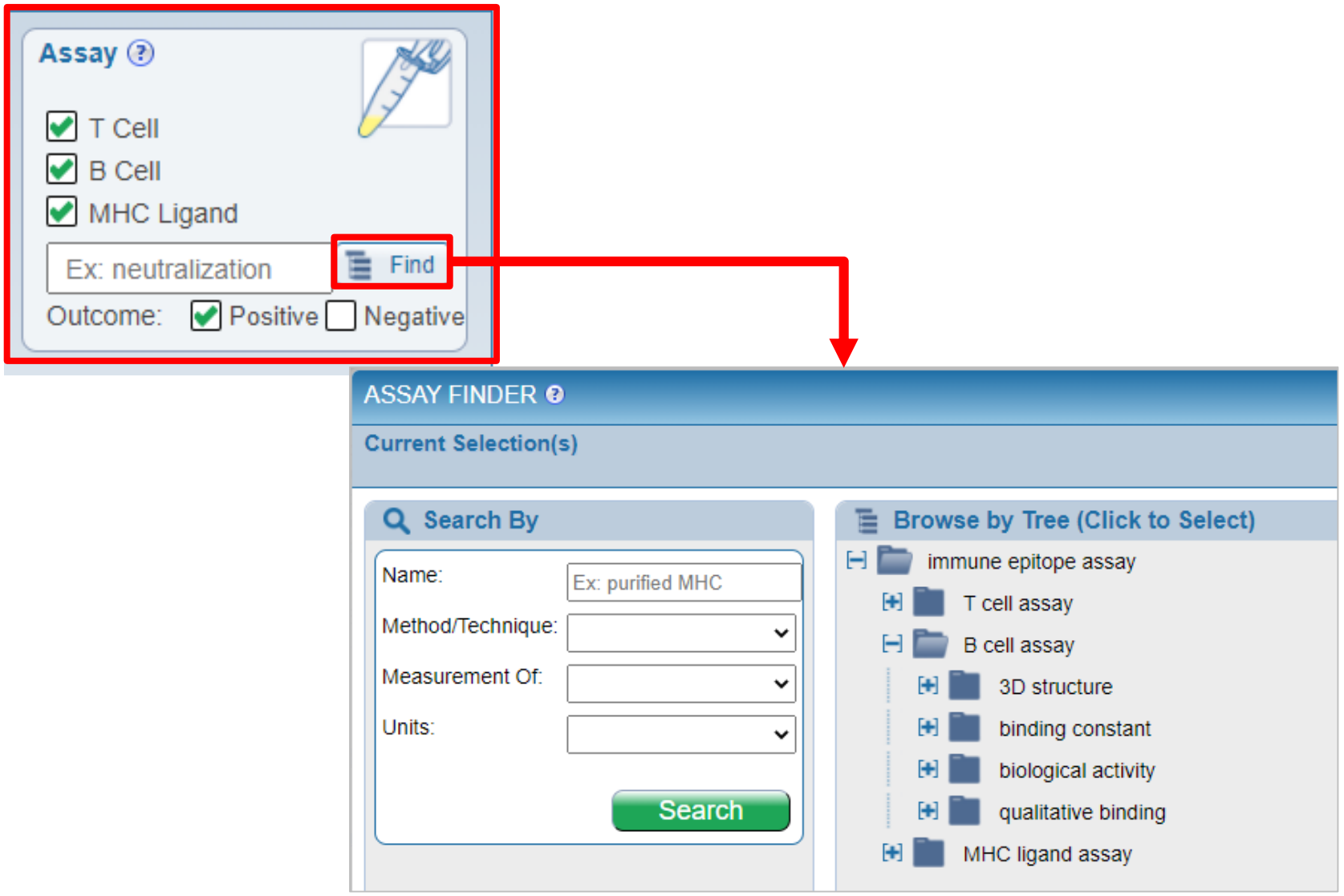
Antigen Search Pane: Antigen



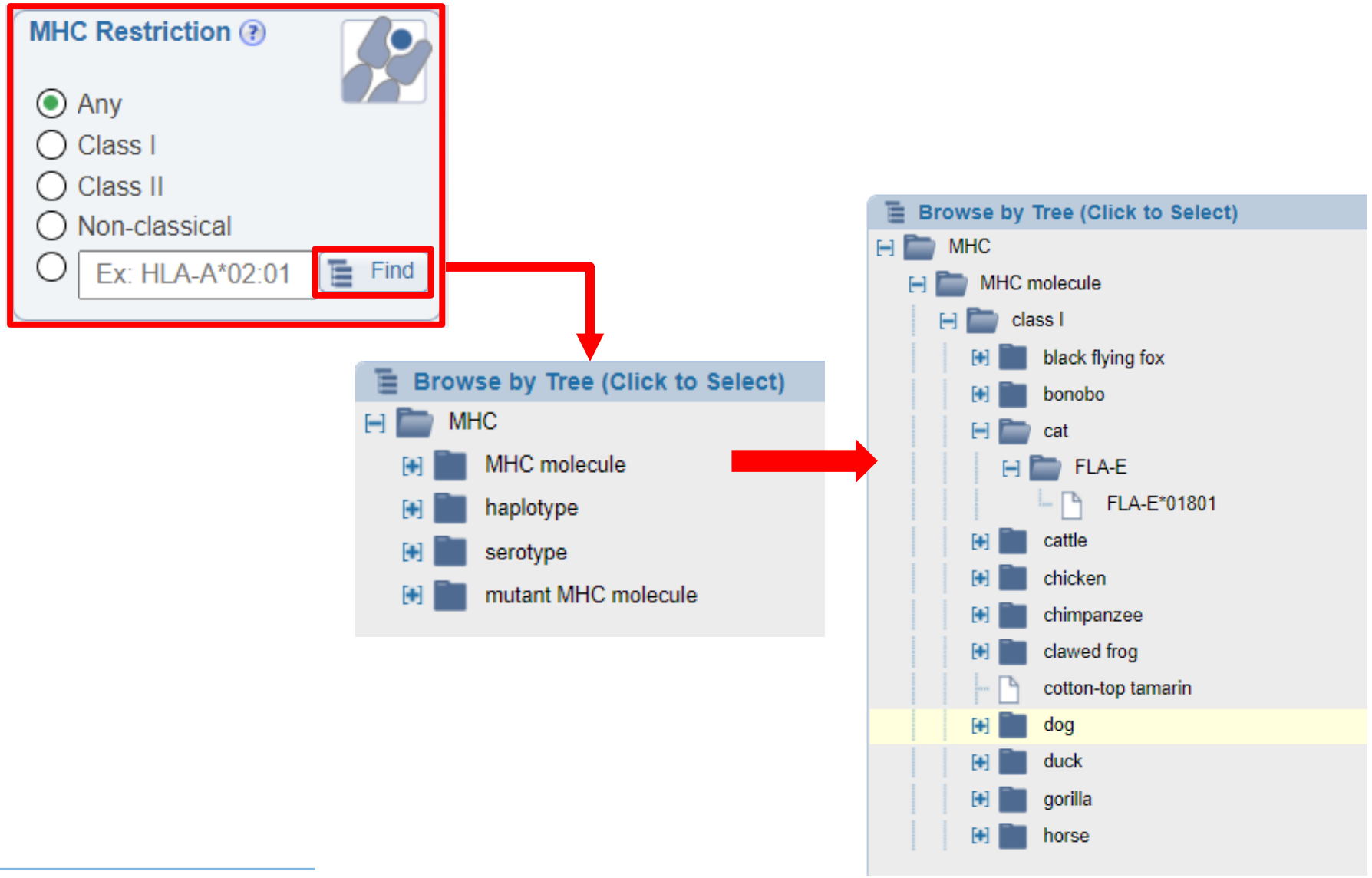
Host Search Pane



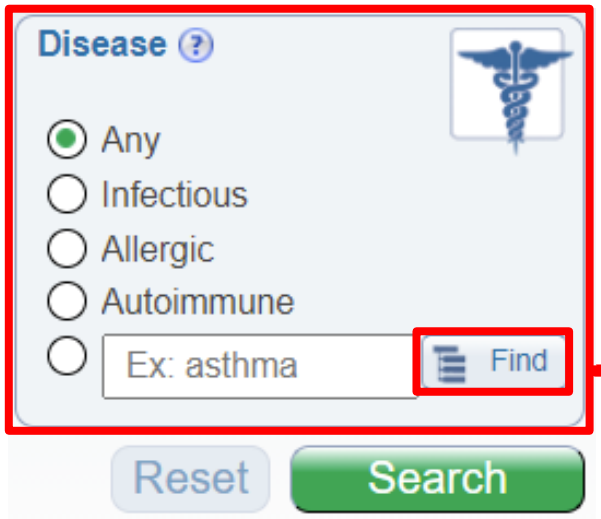
Assay Search Pane

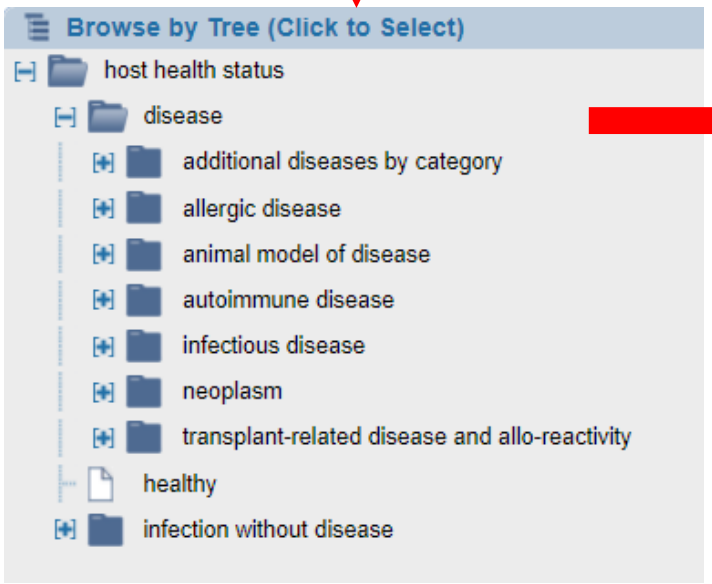


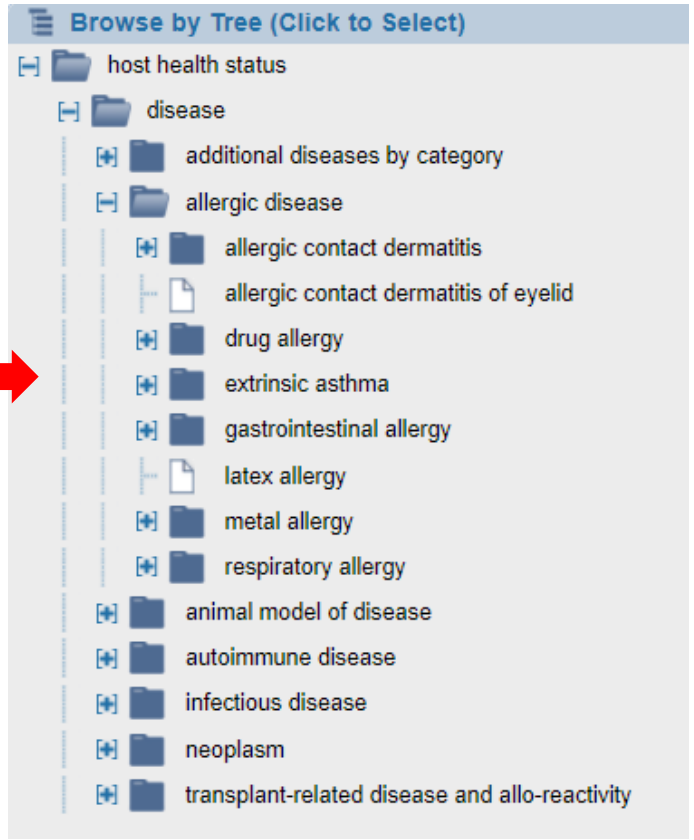
MHC Restriction Search Pane



Disease Search Pane

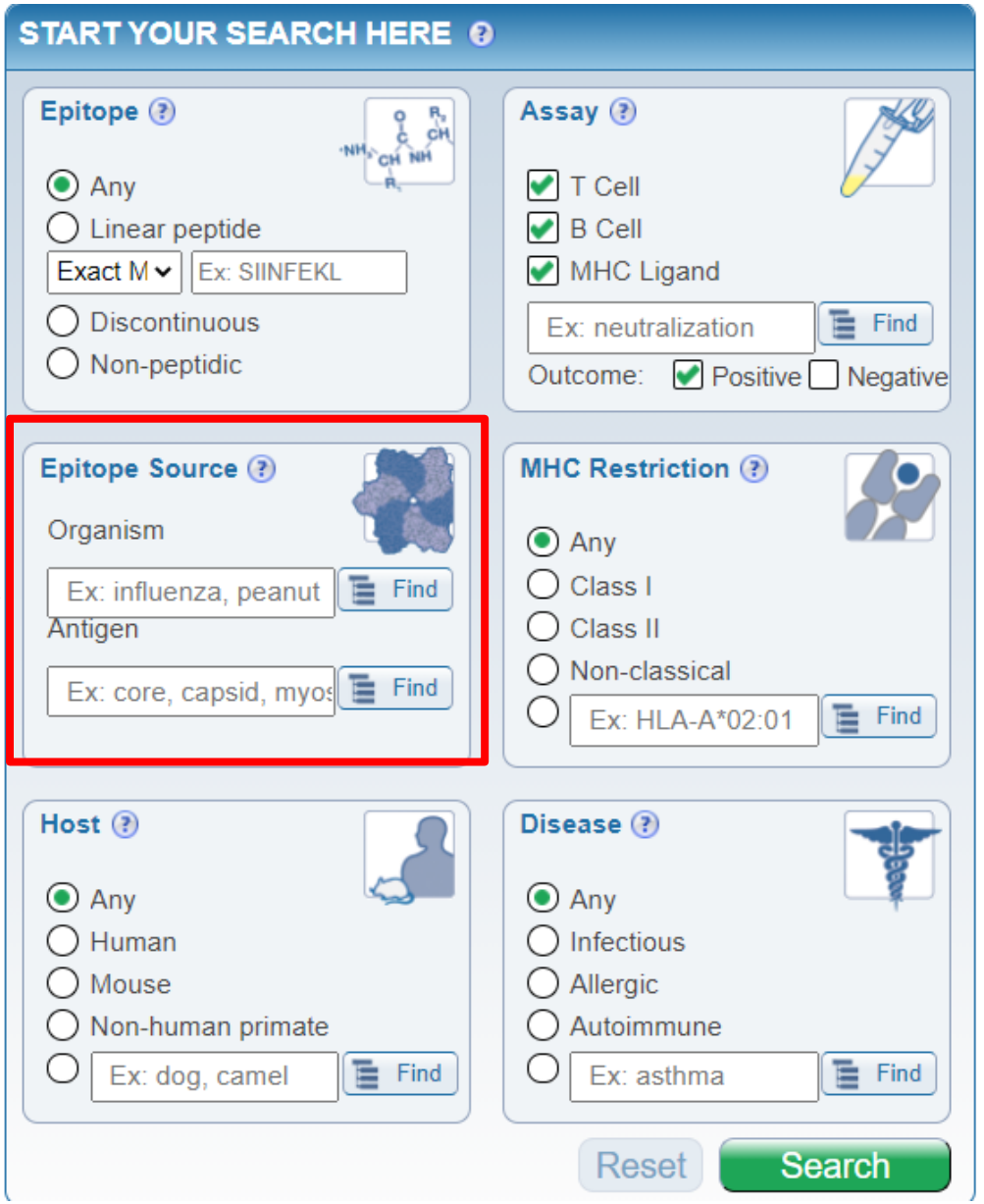






User Queries: How to see the differences between B and T cell responses AND identify SARS-CoV2 CD4 and CD8 T cell epitopes

Use **Epitope Source** search pane to view epitopes from SARS-CoV2



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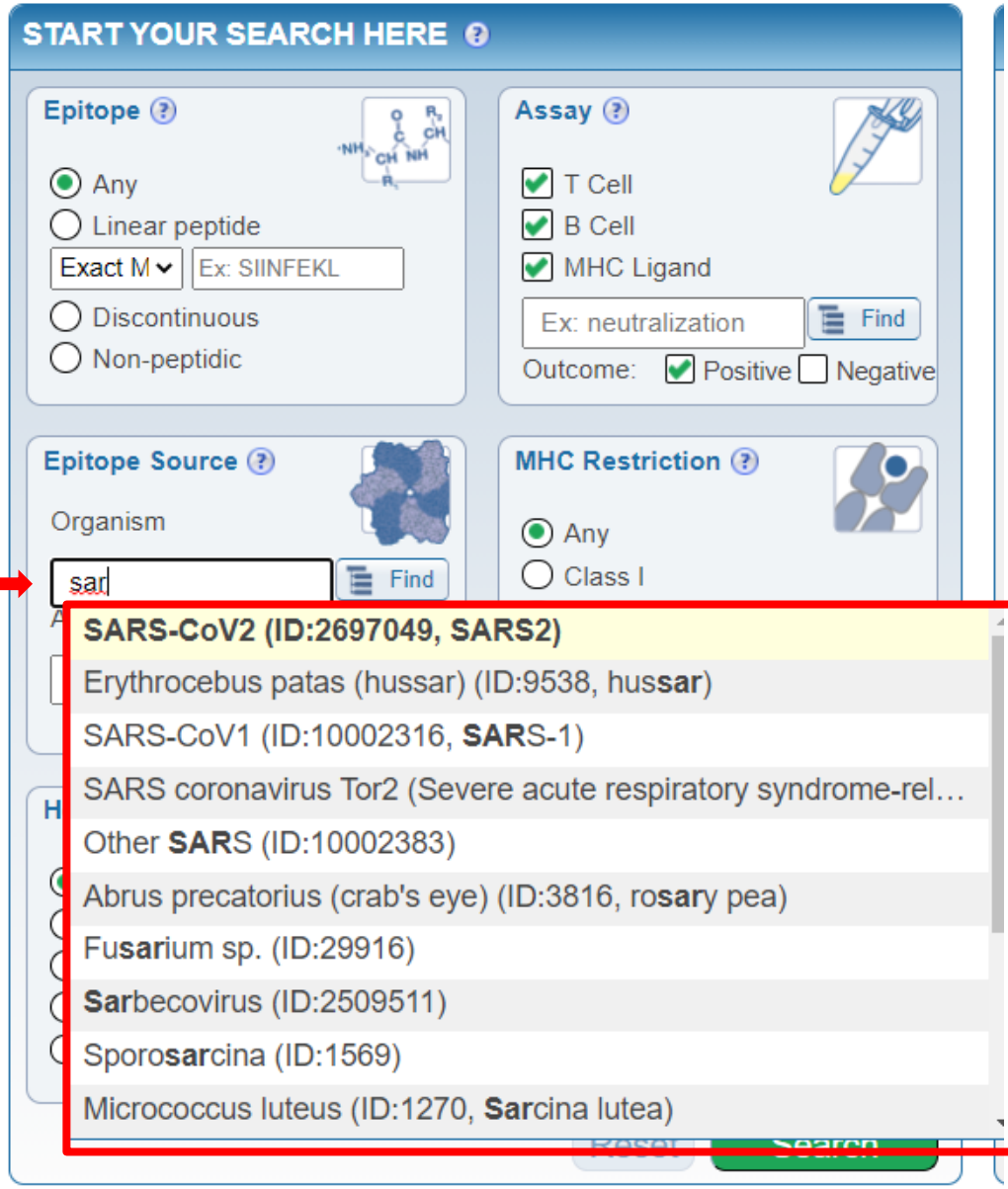
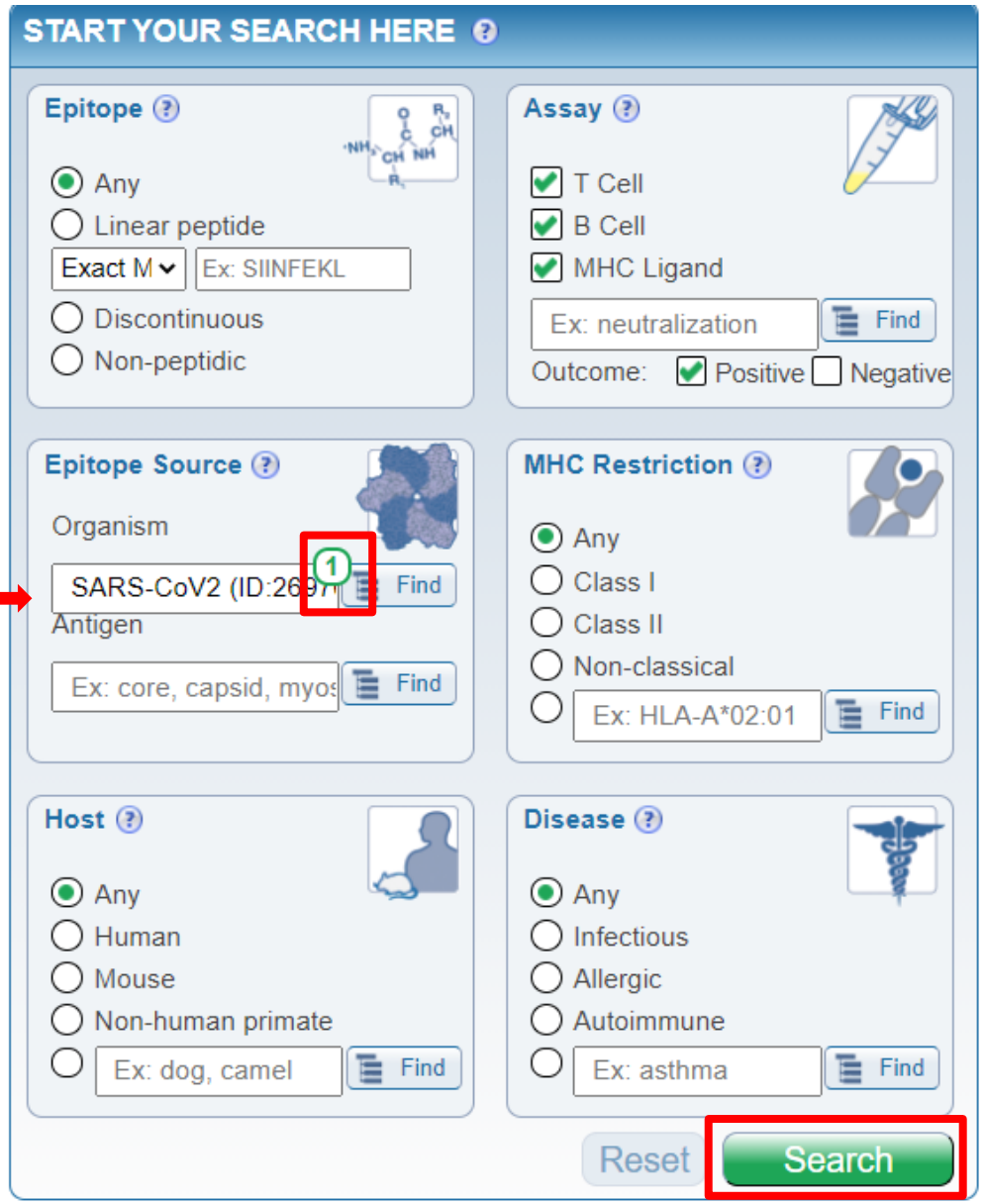
Start typing the organism name and autocomplete will provide options for which the IEDB has data



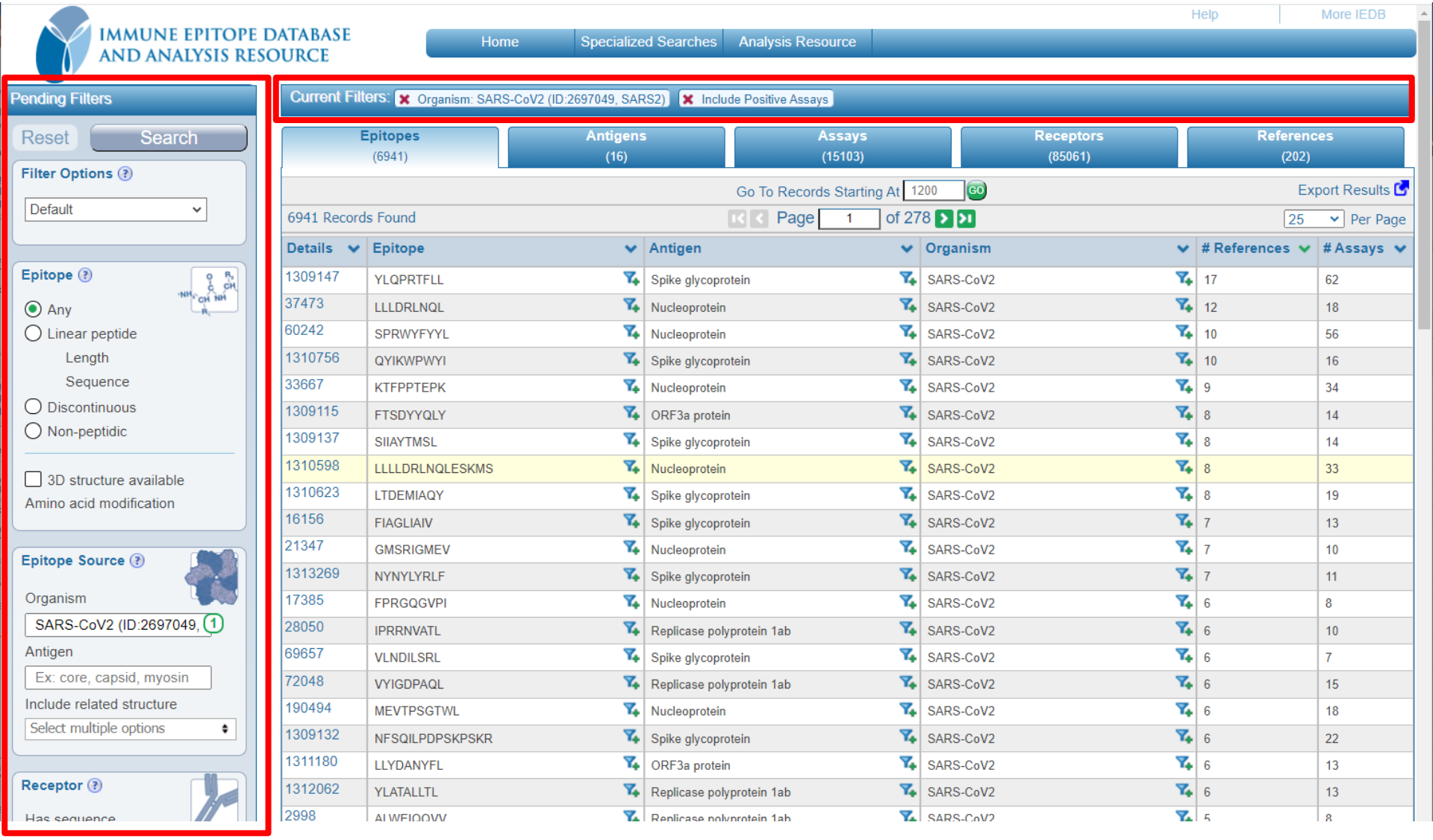
User Queries: How to see the differences between B and T cell responses AND identify SARS-CoV2 CD4 and CD8 T cell epitopes

Select SARS-CoV2
This is a multi-select field
The number displays how many selections you have made
Once your query is built, click "Search"

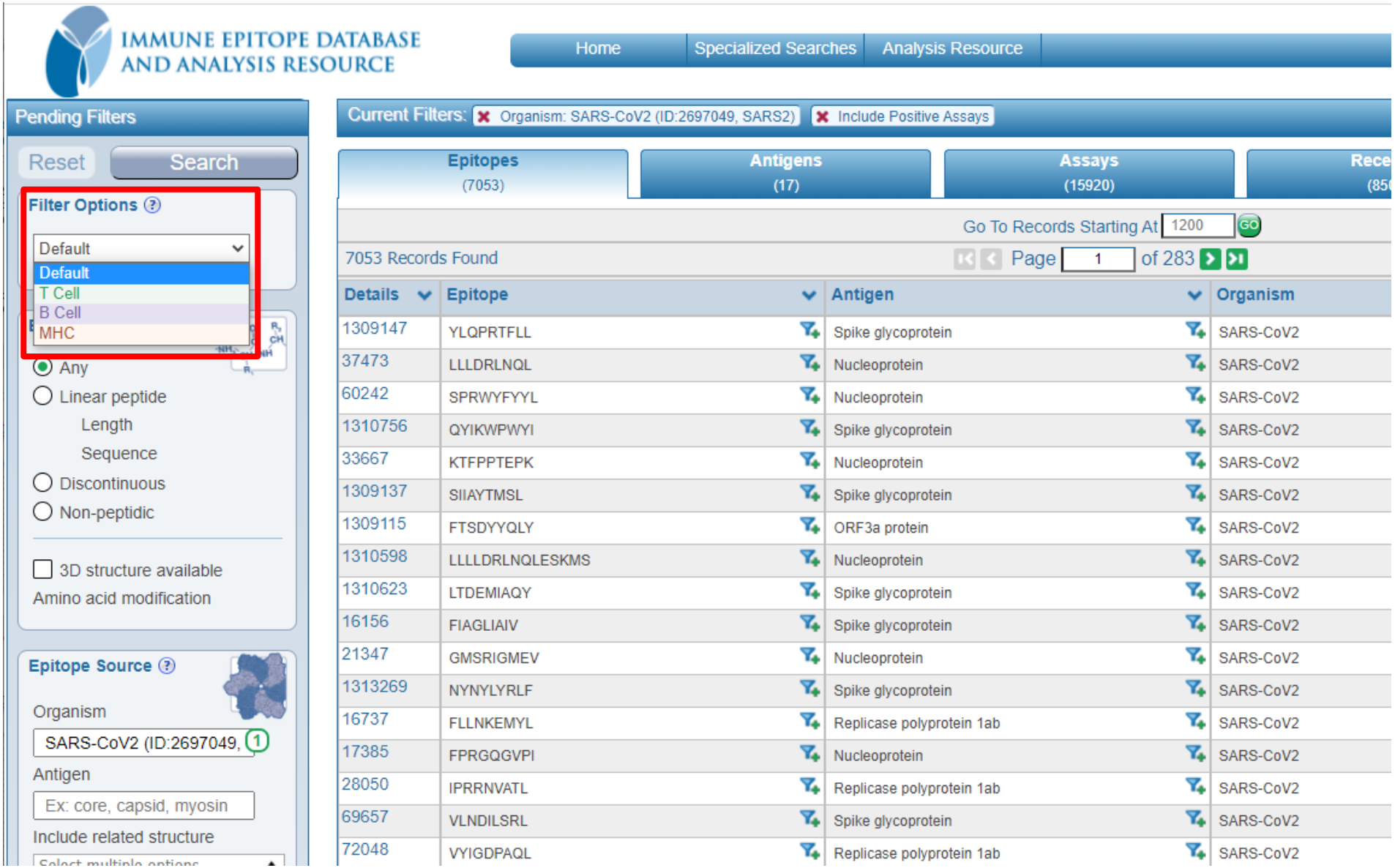
**You can select from all search panes or from none



Results Page: Pending Filters/Current Filters



Results Page: Pending Filters/Filter Options



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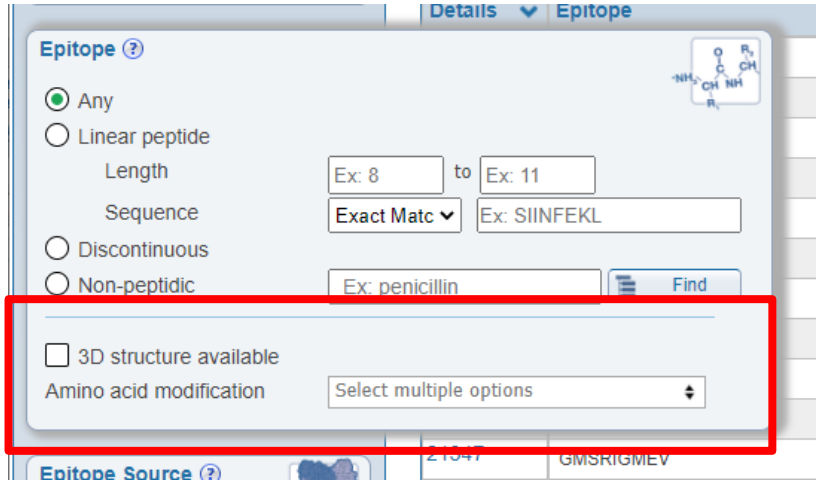
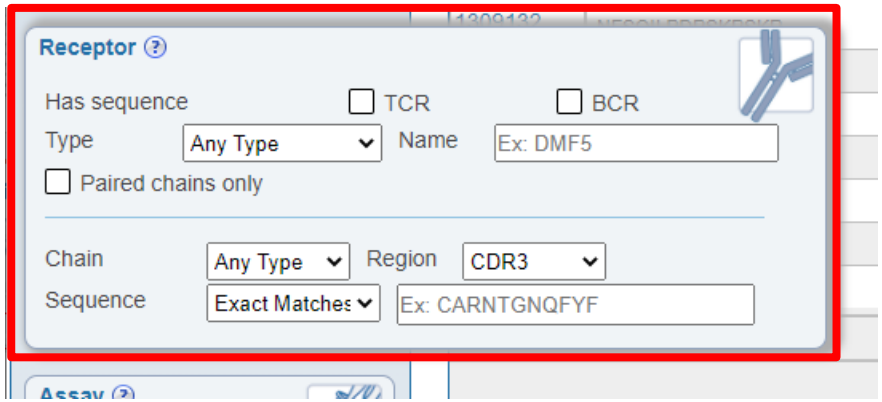
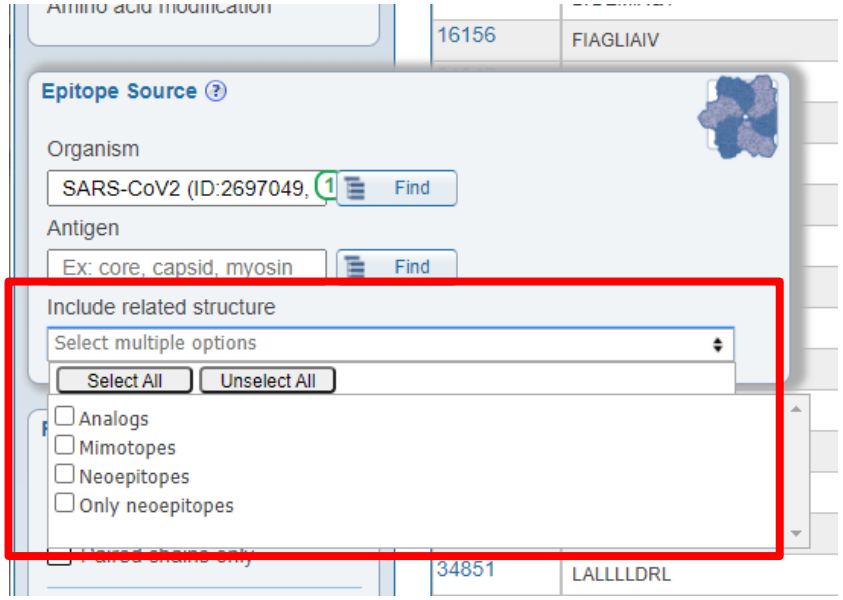
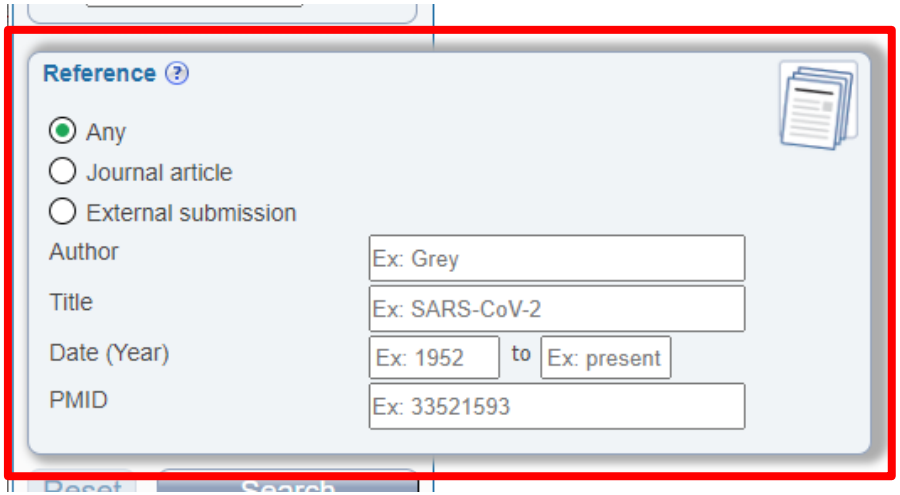
1310756	QYIKWPWYI	Spike glycoprotein	SARS-CoV2
33667	KTFPPTEPK	Nucleoprotein	SARS-CoV2
1309137	SIIAYTMSL	Spike glycoprotein	SARS-CoV2
1309115	FTSDYYQLY	ORF3a protein	SARS-CoV2
1310598	LLLLDRLNQLESKMS	Nucleoprotein	SARS-CoV2
1310623	LTDEMIAQY	Spike glycoprotein	SARS-CoV2
16156	FIAGLIAIV	Spike glycoprotein	SARS-CoV2
21347	GMSRIGMEV	Nucleoprotein	SARS-CoV2
1313269	NYNYLYRLF	Spike glycoprotein	SARS-CoV2
16737	FLLNKEMYL	Replicase polyprotein 1ab	SARS-CoV2
17385	FPRGQGVPI	Nucleoprotein	SARS-CoV2
28050	IPRRNVATL	Replicase polyprotein 1ab	SARS-CoV2
69657	VLNDILSRL	Spike glycoprotein	SARS-CoV2
72048	VYIGDPAQL	Replicase polyprotein 1ab	SARS-CoV2

Results Page: Filter Options - Default

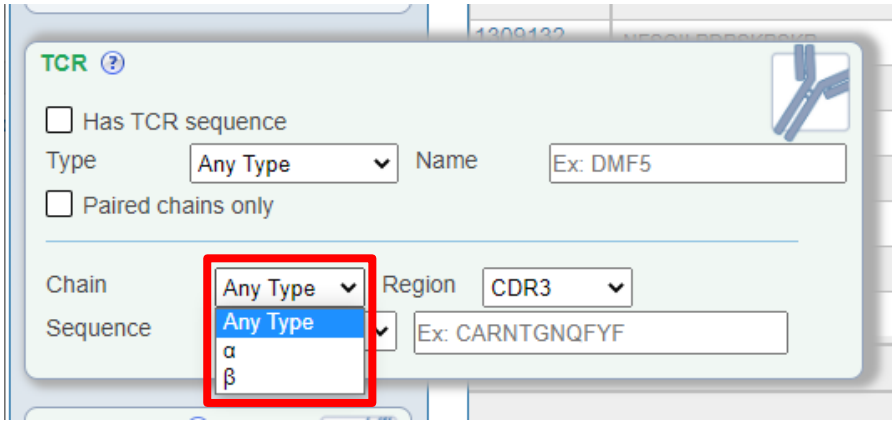


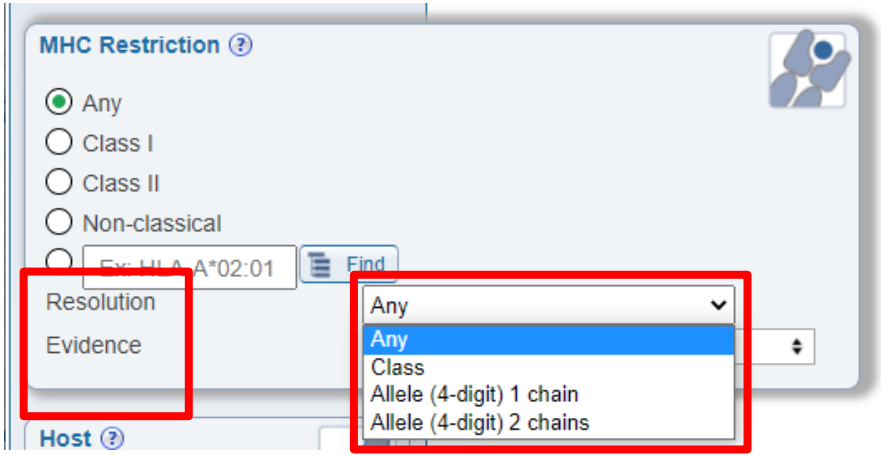


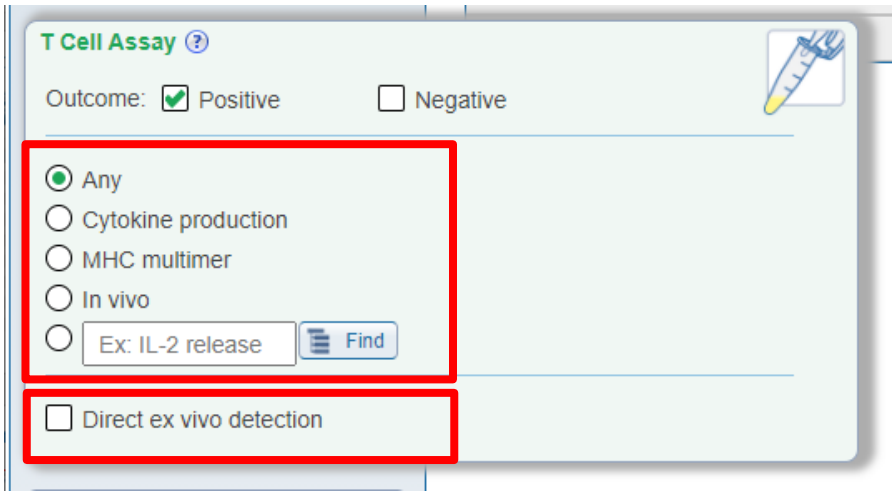


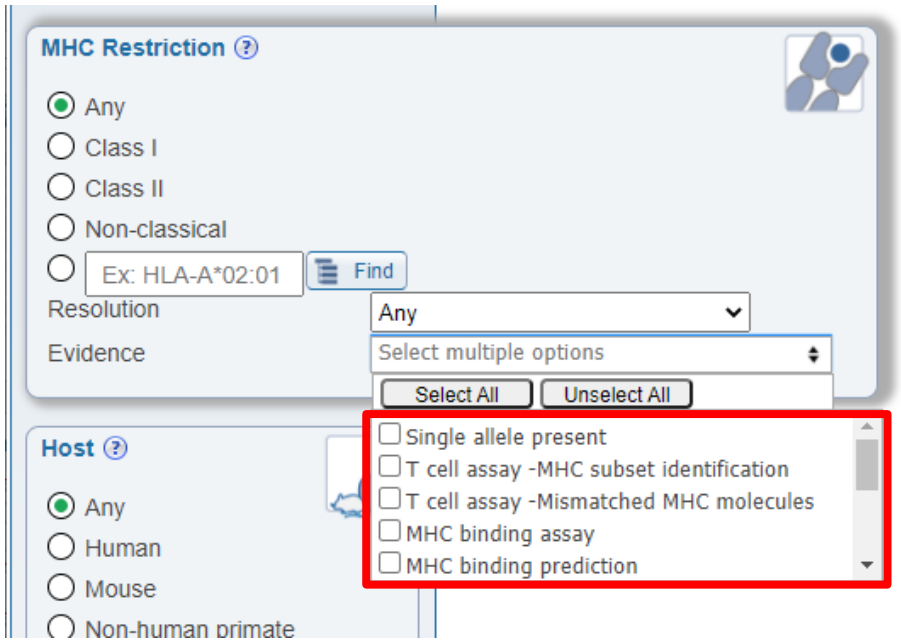


Results Page: Filter Options –T cell

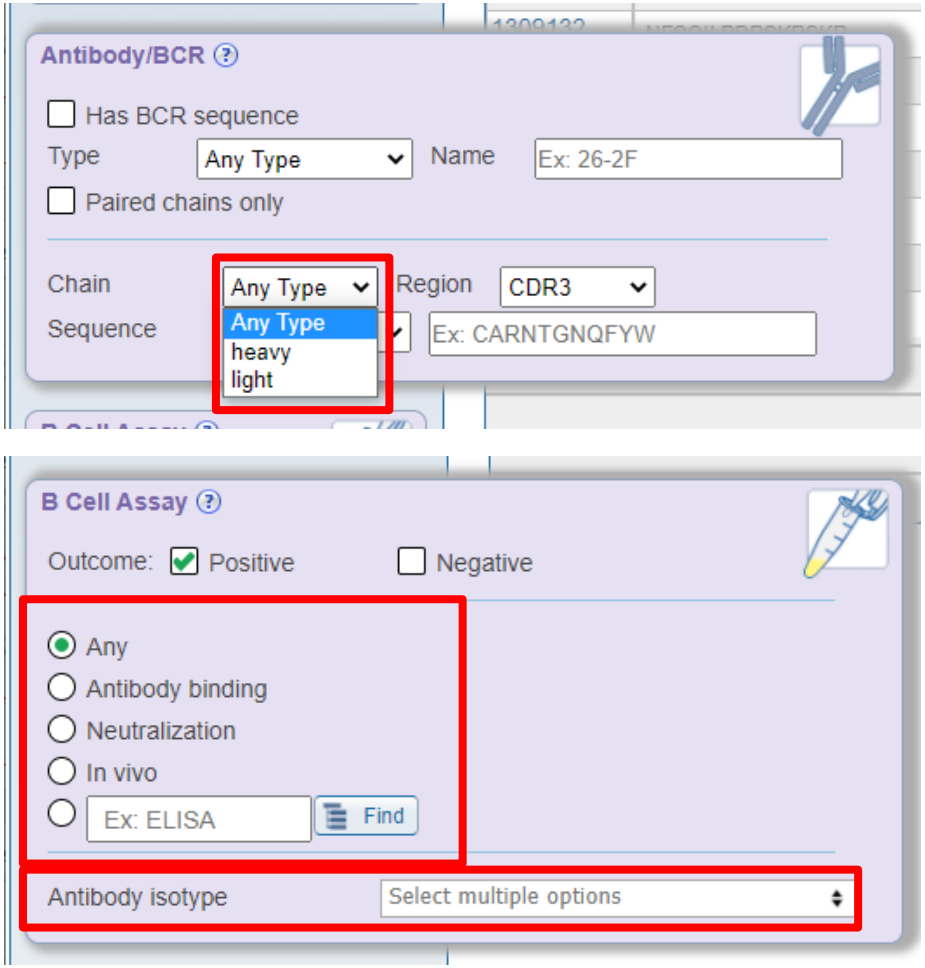




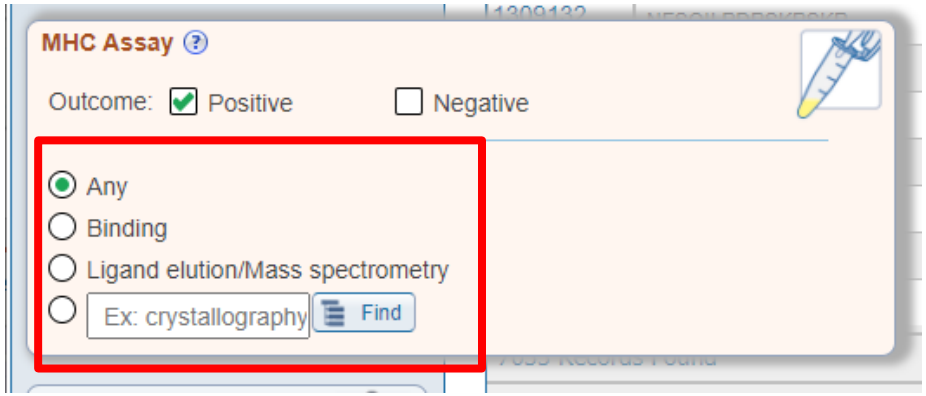


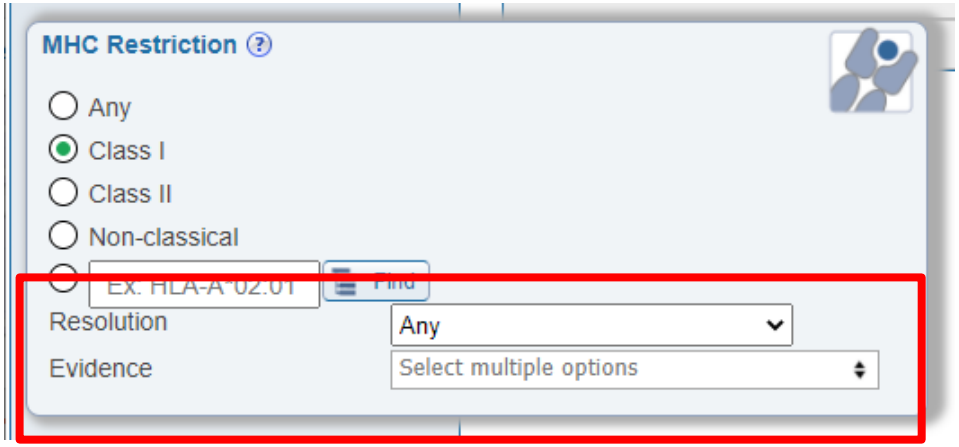


Results Page: Filter Options – B cell

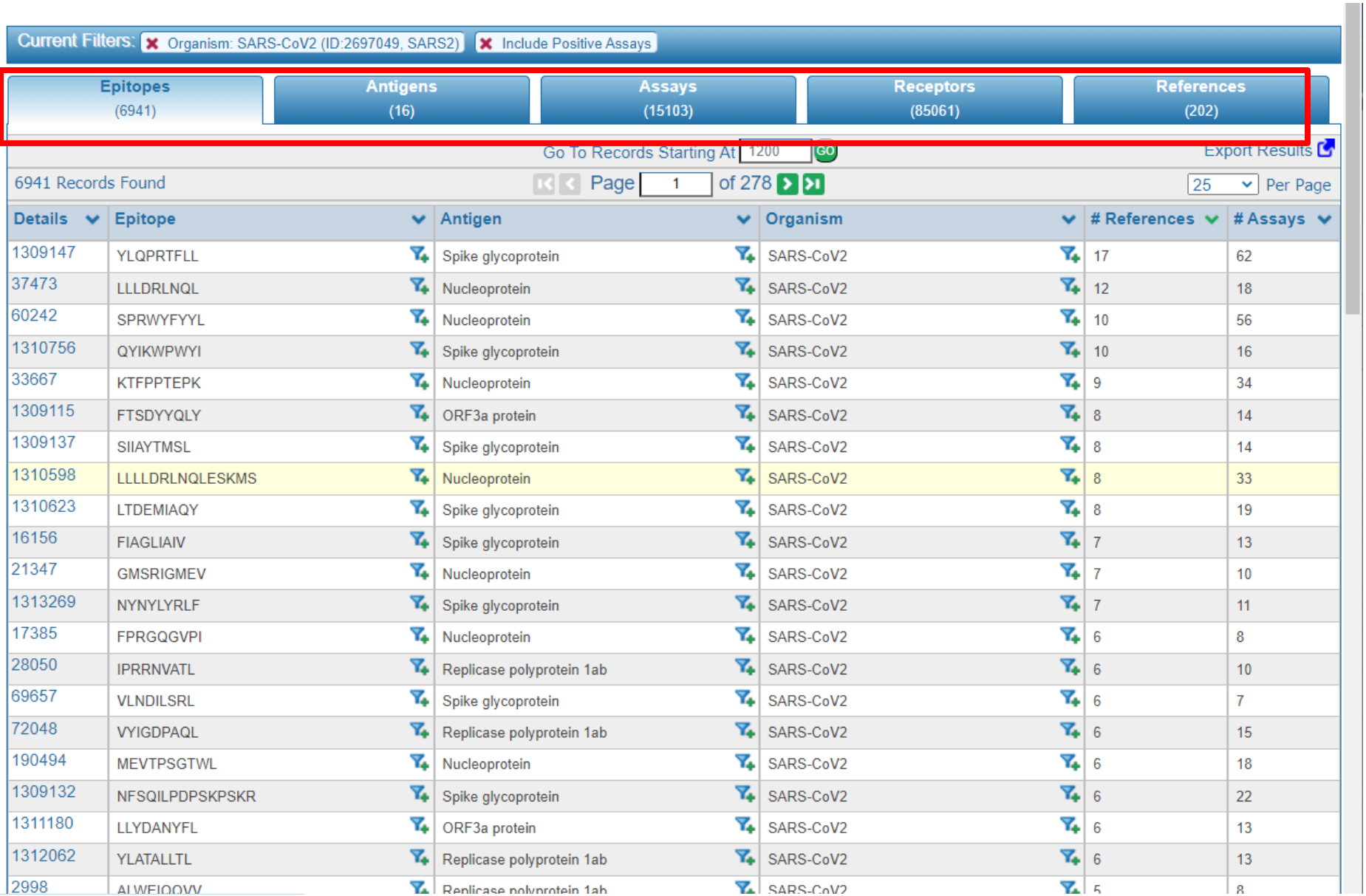


Results Page: Filter Options – MHC





Results Page: Epitope Tab



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

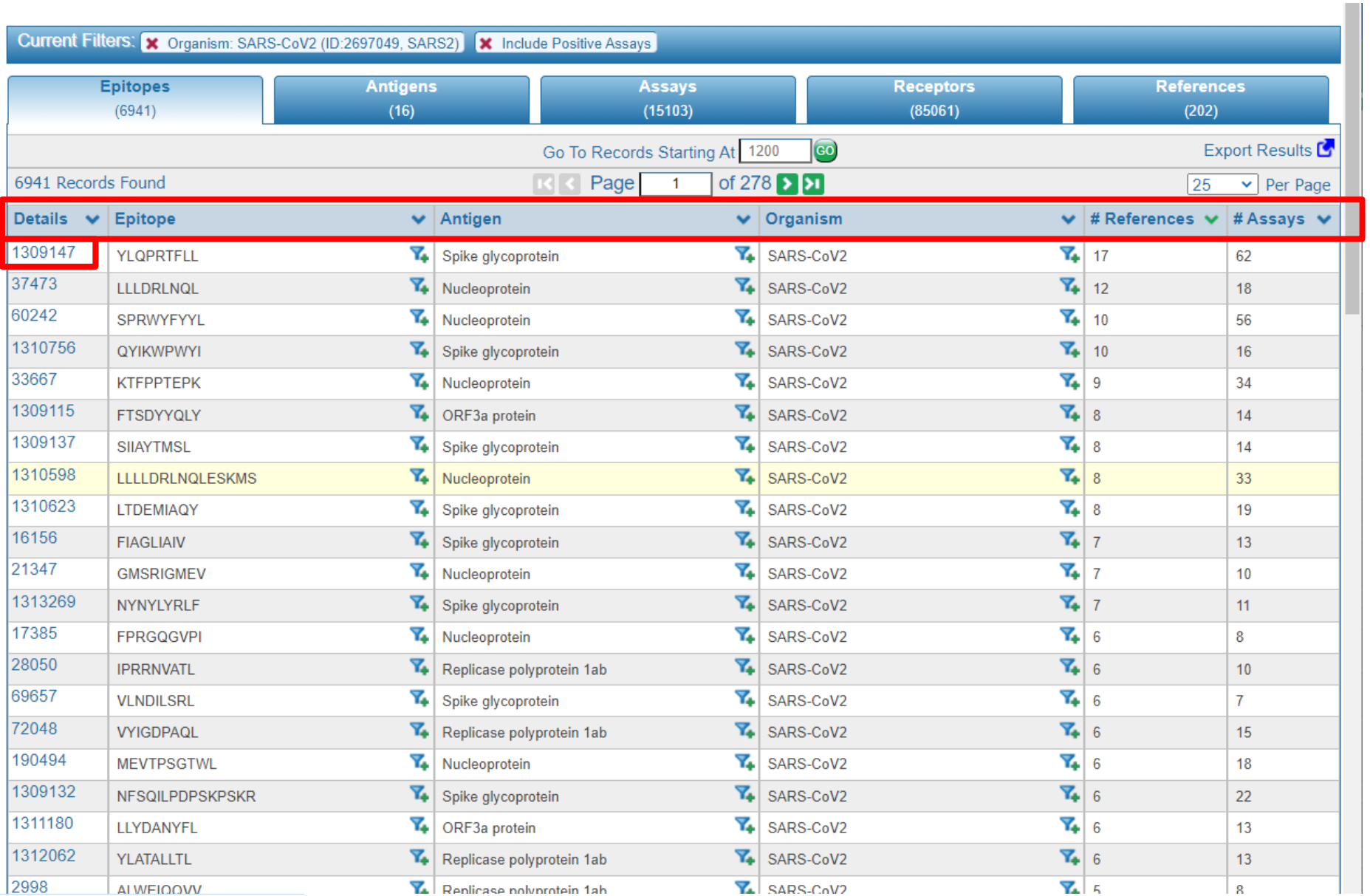
Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

Go To Records Starting At 1200 GO | Export Results

6941 Records Found | Page 1 of 278 | 25 Per Page

Details	Epitope	Antigen	Organism	# References	# Assays
1309147	YLQPRTFLL	Spike glycoprotein	SARS-CoV2	17	62
37473	LLLDRLNQL	Nucleoprotein	SARS-CoV2	12	18
60242	SPRWYFYYL	Nucleoprotein	SARS-CoV2	10	56
1310756	QYIKWPWYI	Spike glycoprotein	SARS-CoV2	10	16
33667	KTFPPTEPK	Nucleoprotein	SARS-CoV2	9	34
1309115	FTSDYYQLY	ORF3a protein	SARS-CoV2	8	14
1309137	SIIAYTMSL	Spike glycoprotein	SARS-CoV2	8	14
1310598	LLLLDRLNQLESKMS	Nucleoprotein	SARS-CoV2	8	33
1310623	LTDEMIAQY	Spike glycoprotein	SARS-CoV2	8	19
16156	FIAGLIAIV	Spike glycoprotein	SARS-CoV2	7	13
21347	GMSRIGMEV	Nucleoprotein	SARS-CoV2	7	10
1313269	NYNYLYRLF	Spike glycoprotein	SARS-CoV2	7	11
17385	FPRGQGVPI	Nucleoprotein	SARS-CoV2	6	8
28050	IPRRNVATL	Replicase polyprotein 1ab	SARS-CoV2	6	10
69657	VLNDILSRL	Spike glycoprotein	SARS-CoV2	6	7
72048	VYIGDPAQL	Replicase polyprotein 1ab	SARS-CoV2	6	15
190494	MEVTPSGTWL	Nucleoprotein	SARS-CoV2	6	18
1309132	NFSQILPDPSKPSKR	Spike glycoprotein	SARS-CoV2	6	22
1311180	LLYDANYFL	ORF3a protein	SARS-CoV2	6	13
1312062	YLATALLTL	Replicase polyprotein 1ab	SARS-CoV2	6	13
2998	ALWEIQQVV	Replicase polyprotein 1ab	SARS-CoV2	5	8

Results Page: Epitope Table Headers



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Results Page: Epitope Details

EPITOPE SUMMARY

YLQPRTFLL is a linear peptidic epitope (epitope ID 1309147) studied as part of Spike glycoprotein from SARS-CoV2. This epitope has been studied for immune reactivity in 19 publication(s), tested in 76 T cell assays, 3 MHC ligand assays and has 3D structure(s) 7N6E and 7N6D.

COMPILED DATA

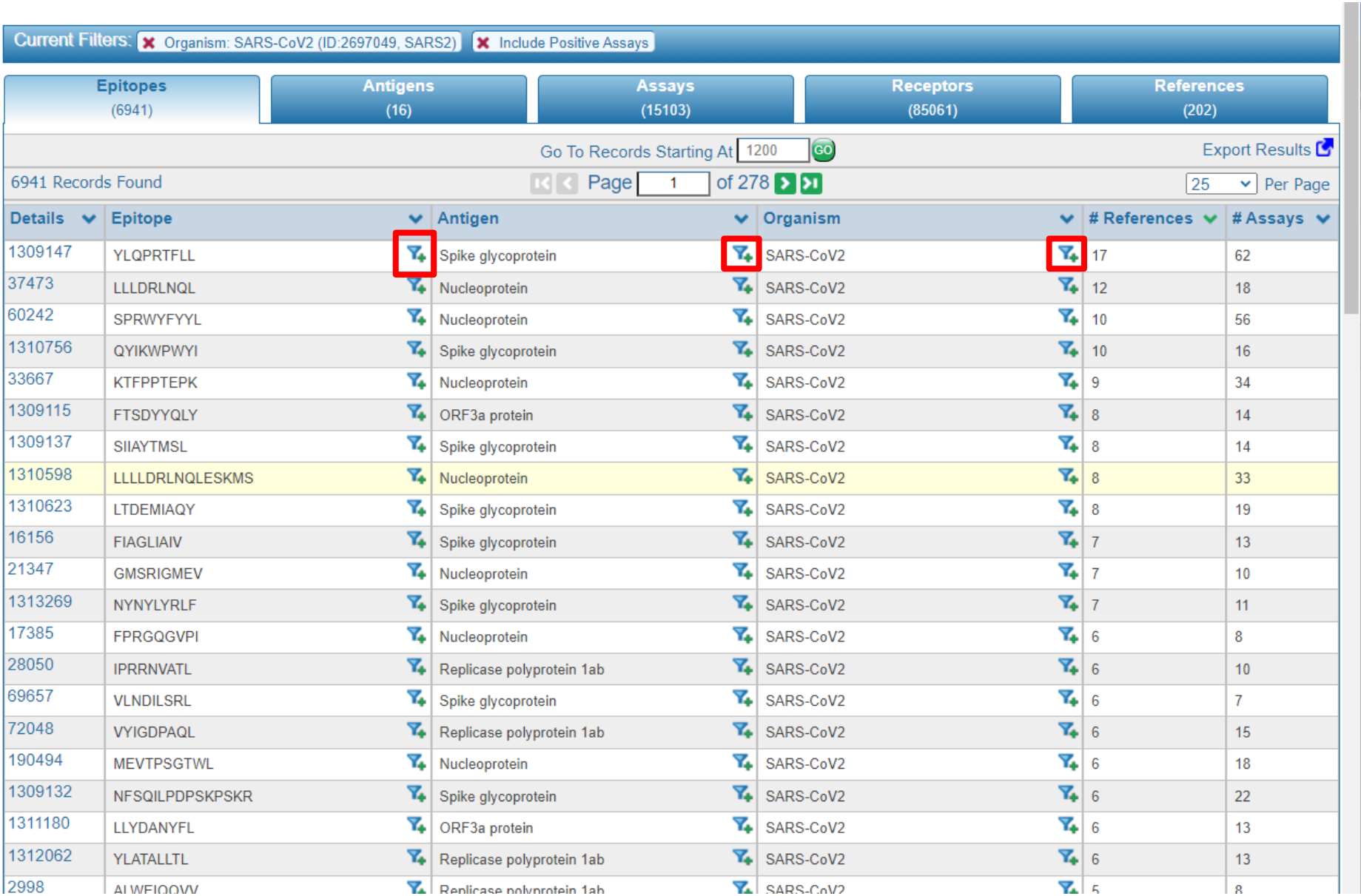
MHC Ligand Assay(s) 3

MHC molecule	Positive / All
HLA-A*02:01	3/3

T Cell Assay(s) 76

Assay Type	Positive / All
qualitative binding	33/37
IFNg release	9/10
dissociation constant KD	7/8
granzyme B release	4/4
activation	3/3
perforin release	3/3
TNFa release	3/3
cytotoxicity	2/3
granzyme A release	2/2
3D structure	1/1
degranulation	1/1
proliferation	1/1

Results Page: Inline Filters



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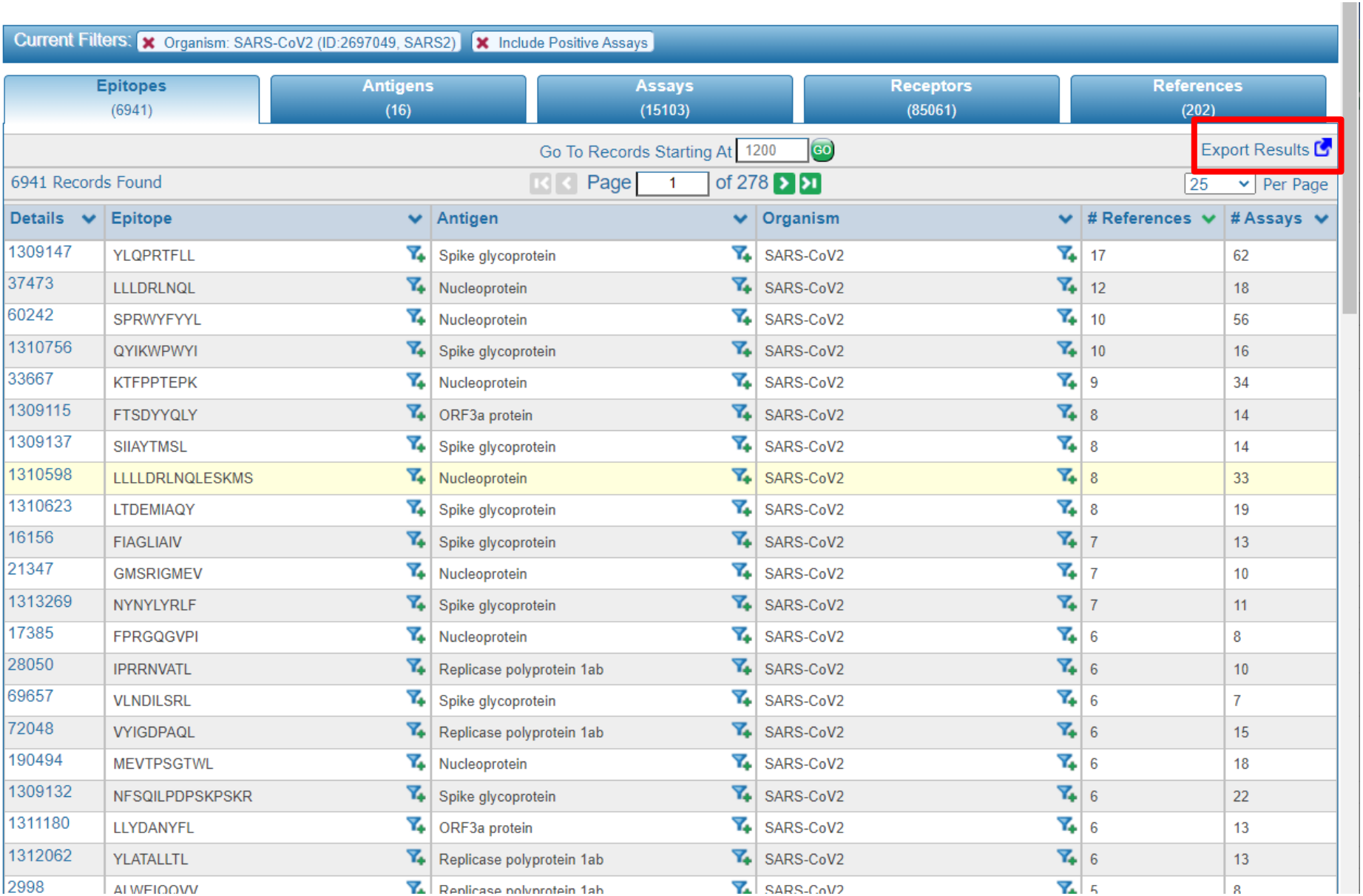
Results Page: Export



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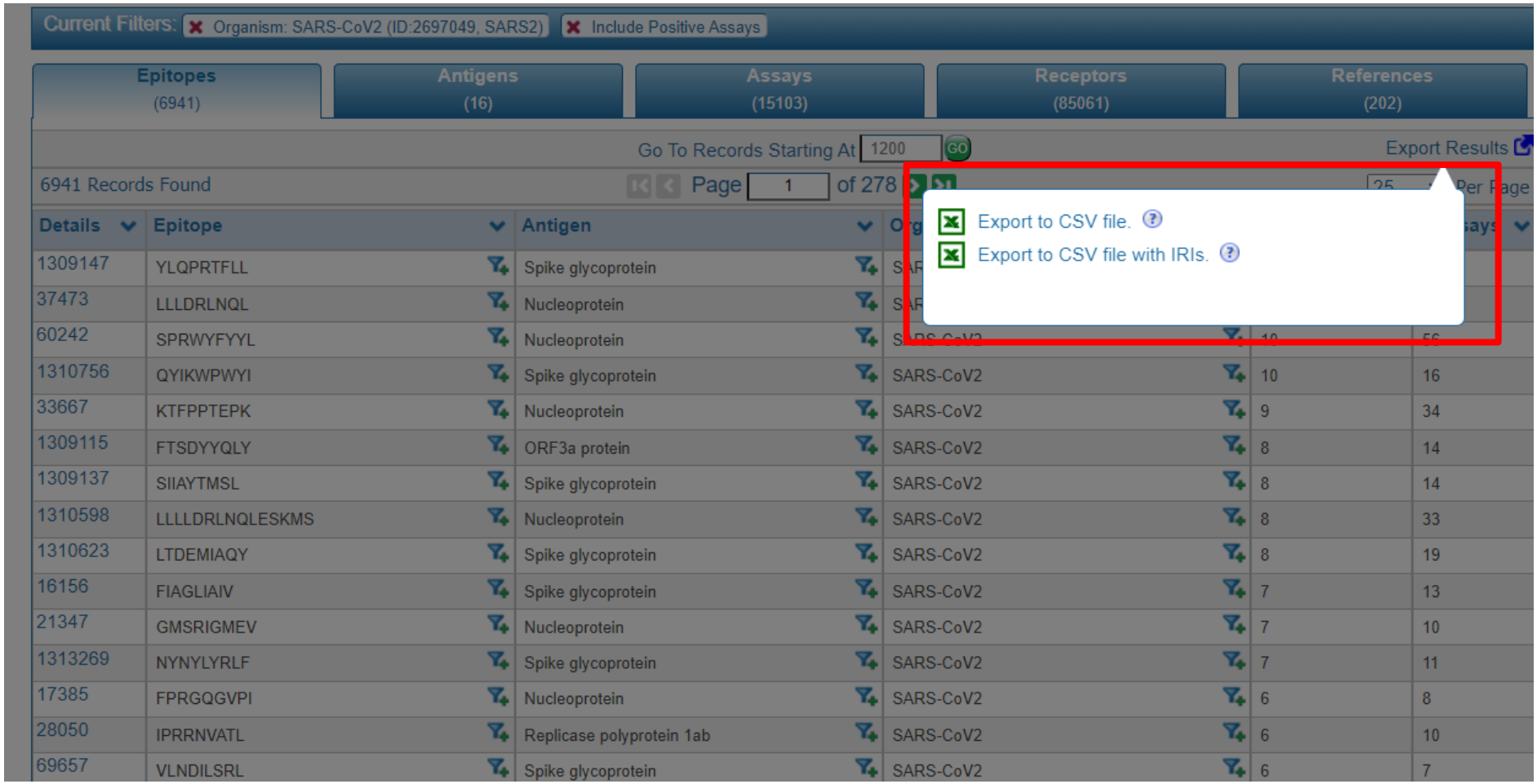
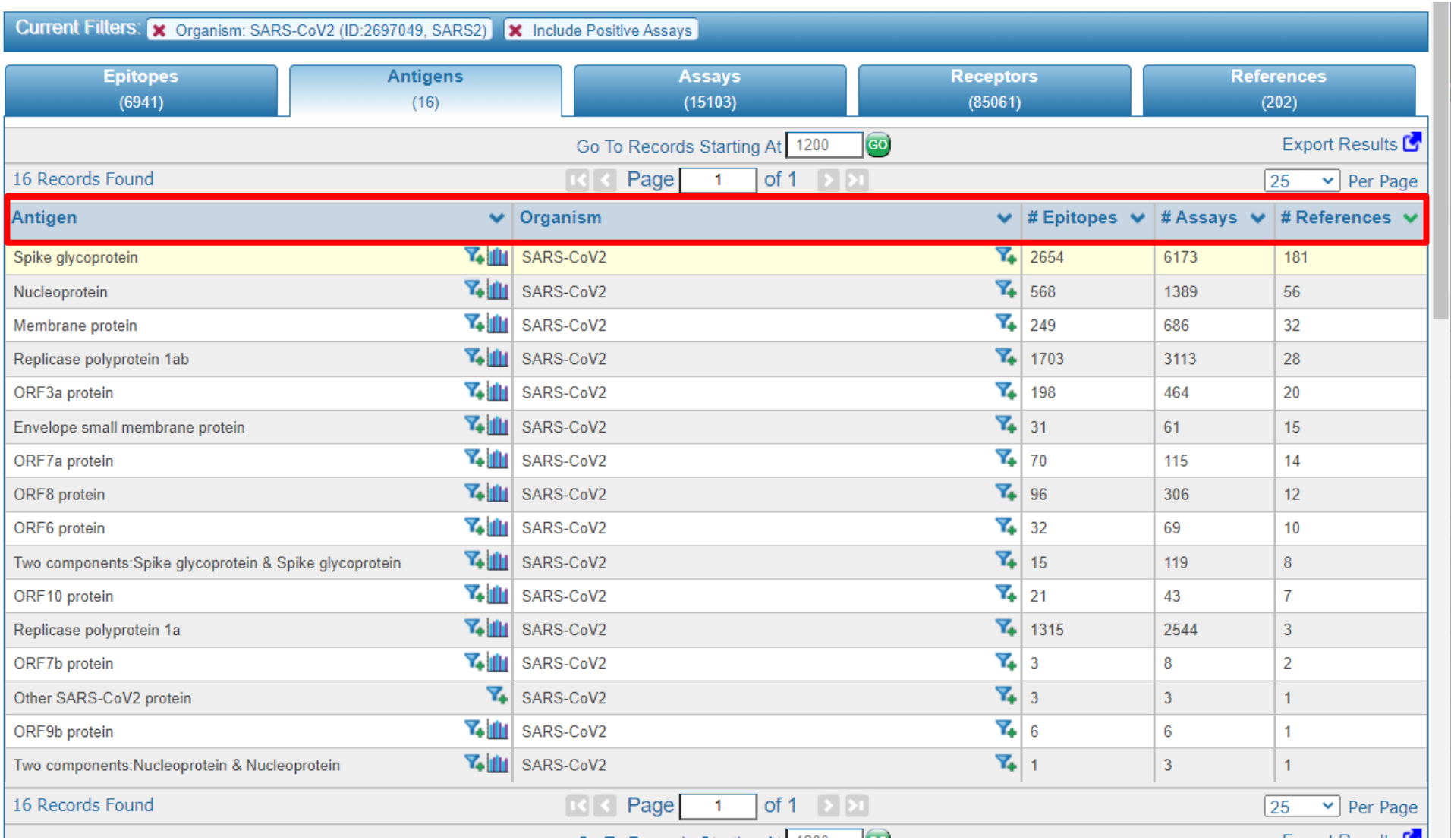
69657	VLNDILSRL	Spike glycoprotein	SARS-CoV2	6	7
72048	VYIGDPAQL	Replicase polyprotein 1ab	SARS-CoV2	6	15
190494	MEVTPSGTWL	Nucleoprotein	SARS-CoV2	6	18
1309132	NFSQILPDPSKPSKR	Spike glycoprotein	SARS-CoV2	6	22
1311180	LLYDANYFL	ORF3a protein	SARS-CoV2	6	13
1312062	YLATALLTL	Replicase polyprotein 1ab	SARS-CoV2	6	13
2998	ALWEIQQVV	Replicase polyprotein 1ab	SARS-CoV2	5	8

Results Page: Export Options



Results Page: Antigen Tab – Table Headers



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

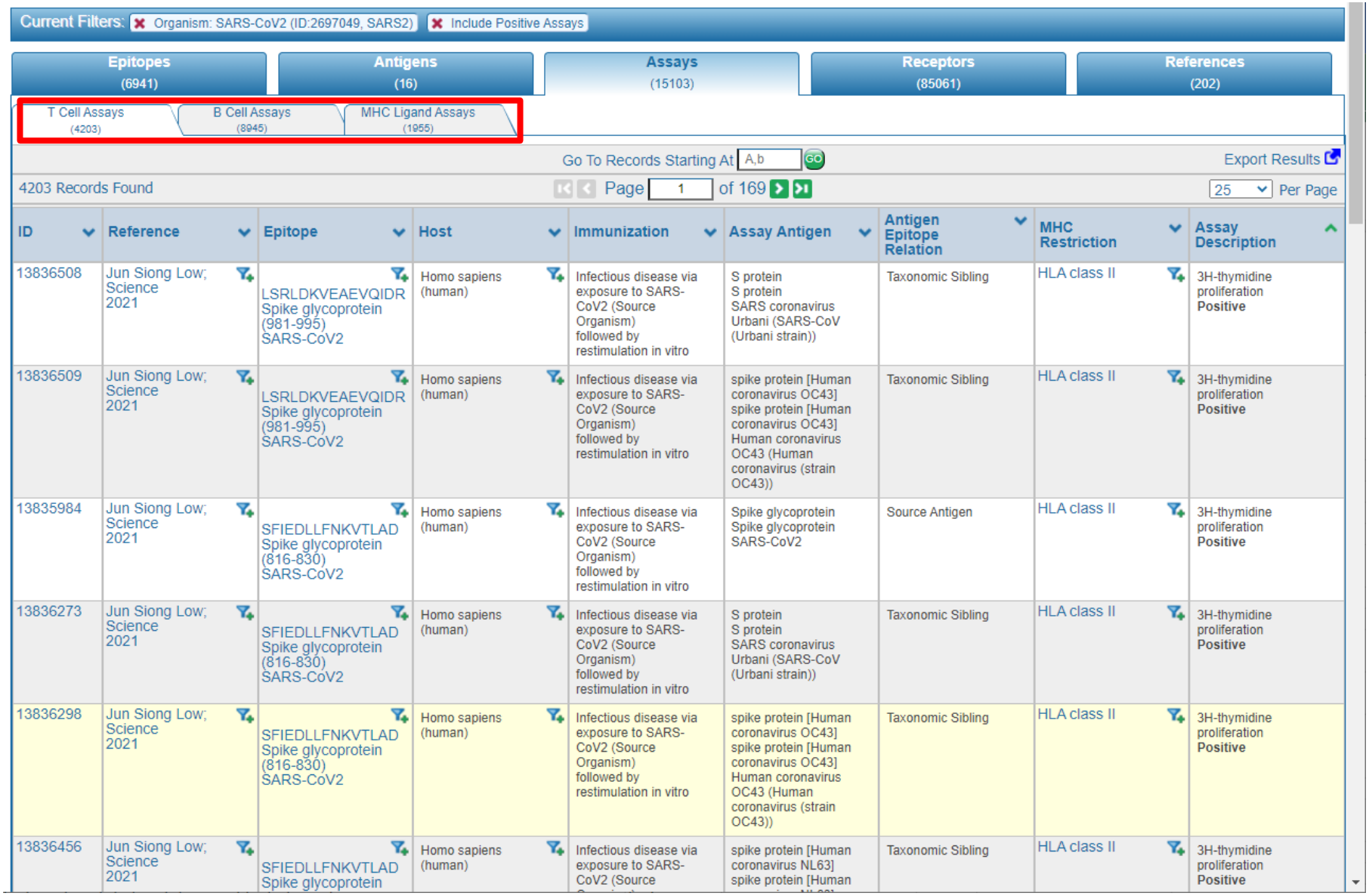
Go To Records Starting At 1200 GO — Export Results

16 Records Found — Page 1 of 1 — 25 Per Page

Antigen	Organism	# Epitopes	# Assays	# References
Spike glycoprotein	SARS-CoV2	2654	6173	181
Nucleoprotein	SARS-CoV2	568	1389	56
Membrane protein	SARS-CoV2	249	686	32
Replicase polyprotein 1ab	SARS-CoV2	1703	3113	28
ORF3a protein	SARS-CoV2	198	464	20
Envelope small membrane protein	SARS-CoV2	31	61	15
ORF7a protein	SARS-CoV2	70	115	14
ORF8 protein	SARS-CoV2	96	306	12
ORF6 protein	SARS-CoV2	32	69	10
Two components:Spike glycoprotein & Spike glycoprotein	SARS-CoV2	15	119	8
ORF10 protein	SARS-CoV2	21	43	7
Replicase polyprotein 1a	SARS-CoV2	1315	2544	3
ORF7b protein	SARS-CoV2	3	8	2
Other SARS-CoV2 protein	SARS-CoV2	3	3	1
ORF9b protein	SARS-CoV2	6	6	1
Two components:Nucleoprotein & Nucleoprotein	SARS-CoV2	1	3	1

16 Records Found — Page 1 of 1 — 25 Per Page

Results Page: Assays Tab – Subtabs



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

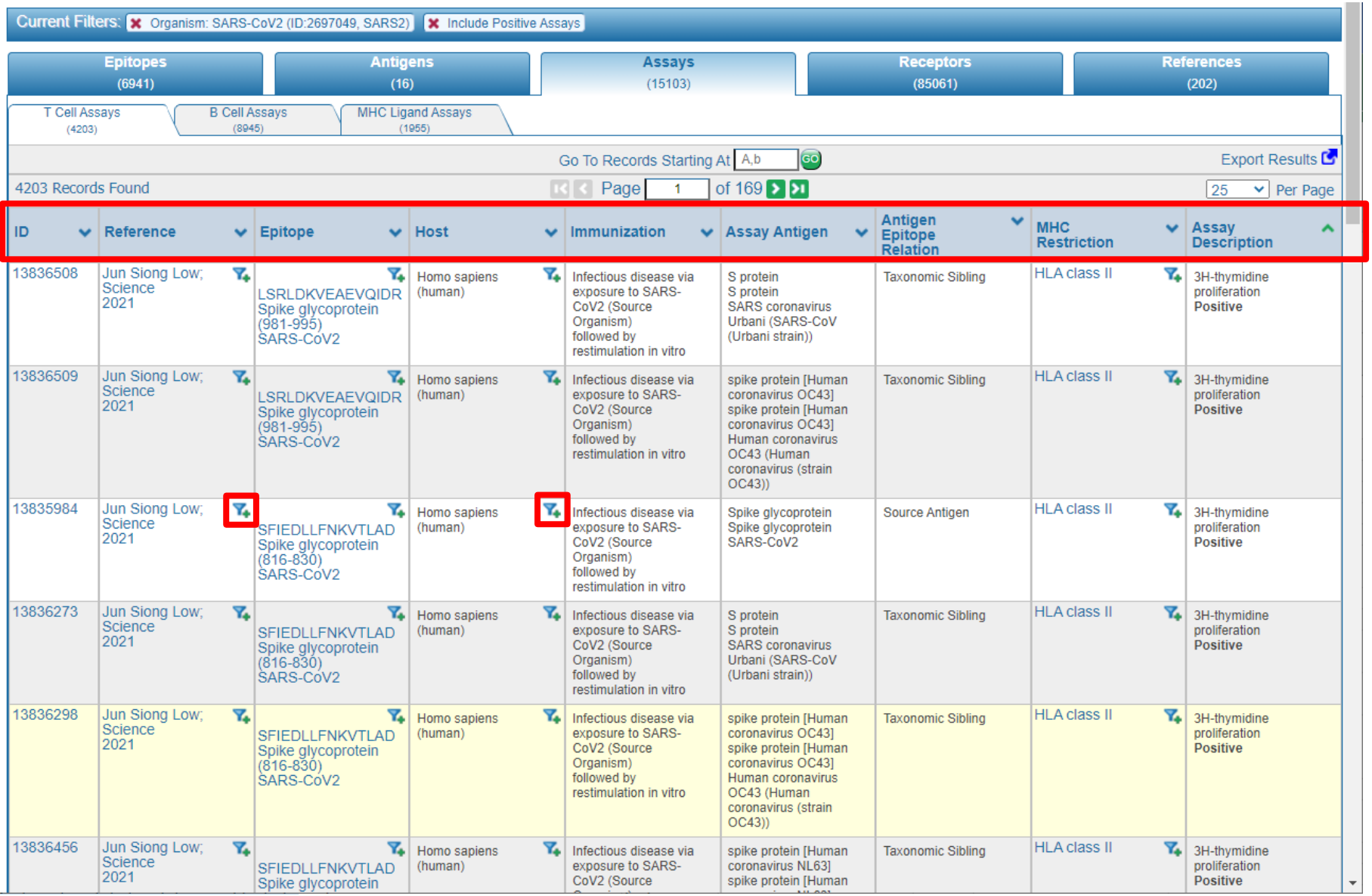
T Cell Assays (4203) | B Cell Assays (8945) | MHC Ligand Assays (1955)

Go To Records Starting At A,b GO | Export Results

4203 Records Found | Page 1 of 169 | 25 Per Page

ID	Reference	Epitope	Host	Immunization	Assay Antigen	Antigen Epitope Relation	MHC Restriction	Assay Description
13836508	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836509	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13835984	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	Spike glycoprotein Spike glycoprotein SARS-CoV2	Source Antigen	HLA class II	3H-thymidine proliferation **Positive**
13836273	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836298	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836456	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source	spike protein [Human coronavirus NL63] spike protein [Human	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**

Results Page: Assays Tab – Table Headers



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

T Cell Assays (4203) | B Cell Assays (8945) | MHC Ligand Assays (1955)

Go To Records Starting At A,b GO | Export Results

4203 Records Found | Page 1 of 169 | 25 Per Page

ID	Reference	Epitope	Host	Immunization	Assay Antigen	Antigen Epitope Relation	MHC Restriction	Assay Description
13836508	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836509	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13835984	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	Spike glycoprotein Spike glycoprotein SARS-CoV2	Source Antigen	HLA class II	3H-thymidine proliferation **Positive**
13836273	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836298	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836456	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source	spike protein [Human coronavirus NL63] spike protein [Human	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**

Results Page: Assays Tab – Assay Details

Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

T Cell Assays (4203) | B Cell Assays (8945) | MHC Ligand Assays (1955)

Go To Records Starting At A,b GO | Export Results

4203 Records Found | Page 1 of 169 | 25 Per Page

ID	Reference	Epitope	Host	Immunization	Assay Antigen	Antigen Epitope Relation	MHC Restriction	Assay Description
13836508	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836509	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13835984	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	Spike glycoprotein Spike glycoprotein SARS-CoV2	Source Antigen	HLA class II	3H-thymidine proliferation **Positive**
13836273	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836298	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836456	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source	spike protein [Human coronavirus NL63] spike protein [Human	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**

Results Page: Assays Tab – Assay Details Reference

Reference		
Reference Type	Literature	IEDB_Reference:1038797
Title	Clonal analysis of immunodominance and cross-reactivity of the CD4 T cell response to SARS-CoV-2.	
Authors	Jun Siong Low; Daniela Vaqueirinho; Federico Mele; Mathilde Foglierini; Josipa Jerak; Michela Perotti; David Jarrossay; Sandra Jovic; Laurent Perez; Rosalia Cacciatore; Tatiana Terrot; Alessandra Franzetti Pellanda; Maira Biggiogero; Christian Garzoni; Paolo Ferrari; Alessandro Ceschi; Antonio Lanzavecchia; Federica Sallusto; Antonino Cassotta	
Affiliations	Institute for Research in Biomedicine, Università della Svizzera Italiana, 6500 Bellinzona, Switzerland; Laboratory of Immunogenetics, Department of Transfusion Medicine and Immuno-Hematology, Fondazione I.R.C.C.S. Policlinico S. Matteo, 27100 Pavia, Italy; Clinical Trial Unit, Ente Ospedaliero Cantonale, 6500 Bellinzona, Switzerland; Clinic of Internal Medicine and Infectious Diseases, Clinica Luganese Moncucco, 6900 Lugano, Switzerland; Faculty of Biomedical Sciences, Università della Svizzera italiana, 6900 Lugano, Switzerland; Department of Internal Medicine, Ente Ospedaliero Cantonale, 6500 Bellinzona, Switzerland; Prince of Wales Hospital Clinical School, University of New South Wales, Sydney, New South Wales 2052, Australia; Division of Clinical Pharmacology and Toxicology, Institute of Pharmacological Sciences of Southern Switzerland, Ente Ospedaliero Cantonale, 6900 Lugano, Switzerland; Department of Clinical Pharmacology and Toxicology, University Hospital Zurich, 8091 Zurich, Switzerland; National Institute of Molecular Genetics, 20122 Milano, Italy; Institute for Research in Biomedicine, Università della Svizzera Italiana, 6500 Bellinzona, Switzerland. federica.sall...	
Journal	Science	PMID:34006597
Year	2021	
Abstract	The identification of CD4⁺ T cell epitopes is instrumental for the design of subunit vaccines for broad protection against coronaviruses. Here we demonstrate in COVID-19-recovered individuals a robust CD4⁺ T cell response to naturally processed SARS-CoV-2 spike (S) and nucleoprotein (N), including effector, helper, and memory T cells. By characterizing 2943 S-reactive T cell clones from 34 individuals, we found that 34% of clones and 93% of individuals recognized a conserved immunodominant S346-365 region within the RBD comprising nested HLA-DR- and HLA-DP-restricted epitopes. Using pre- and post-COVID-19 samples and S proteins from endemic coronaviruses, we identify cross-reactive T cells targeting multiple S protein sites. The immunodominant and cross-reactive epitopes identified can inform vaccination strategies to counteract emerging SARS-CoV-2 variants.	
Curation Last Updated	2021-08-17 20:01:02	

Results Page: Assays Tab – Assay Details Epitope

Epitope		
Epitope ID	1310620	IEDB_epitope:1310620
Chemical Type	Linear peptide	
Linear Sequence	LSRLDKVEAEVQIDR	
Source Molecule Name	Spike glycoprotein	GenPept:P0DTC2.1
Source Organism	SARS-CoV2	NCBITaxon:2697049
Starting Position	981	
Ending Position	995	

Epitope Reference Details		
Epitope Structure Defines	Exact Epitope	
Epitope Name	SARS CoV2 S 981-995	
Location of Data in Reference	Supplementary Table S5	

Results Page: Assays Tab – Assay Details Immunization

Immunization		
Host Organism	Homo sapiens (human)	NCBITaxon:9606

1st In Vivo Process		
In Vivo Process Type	Occurrence of infectious disease	
Disease State	COVID-19	DOID:0080600
Disease Stage	Post;	

1st Immunogen		
Epitope Relation	Source Organism	
Object Type	Organism	
Organism	SARS-CoV2	NCBITaxon:2697049

In Vitro Administration		
In Vitro Process Type	Restimulation in vitro	
Responder Cell Type	PBMC	CL:2000001
Stimulator Cell Type	PBMC	CL:2000001

In Vitro Immunogen		
In Vitro Process Type	Source Antigen	
Chemical Type	Protein	
Molecule Name	Spike glycoprotein	GenPept:P0DTC2.1
Organism	SARS-CoV2	NCBITaxon:2697049

Immunization Comments		
Immunization Comments	Cells from COVID-19 individuals were stimulated with S protein. CSFE cells were expanded an d restimulated with S protein from human beta (SARS-CoV, HKU1, and OC43) or alpha (NL63 and 229E) coronaviruses and proliferating T cells were cloned by limiting dilution.	

Results Page: Assays Tab – Assay Details

T Cell Assay		
Qualitative Measurement	Positive	
Method/Technique	3H-thymidine	OBI:1110180
Measurement of	proliferation	

Effector Cells		
Effector Cell Tissue Type	Blood	UBERON:0000178
Effector Cell Type	T cell CD4+	CL:0000624
Effector Cell Culture Conditions	Cell Line / Clone	

Assayed TCR Molecule		
Assayed TCR Molecule Name	P34-NL63-A2	

Antigen Presenting Cells		
Cell Tissue Type	Blood	UBERON:0000178
Cell Type	PBMC	CL:2000001
Cell Culture Conditions	Direct Ex Vivo	

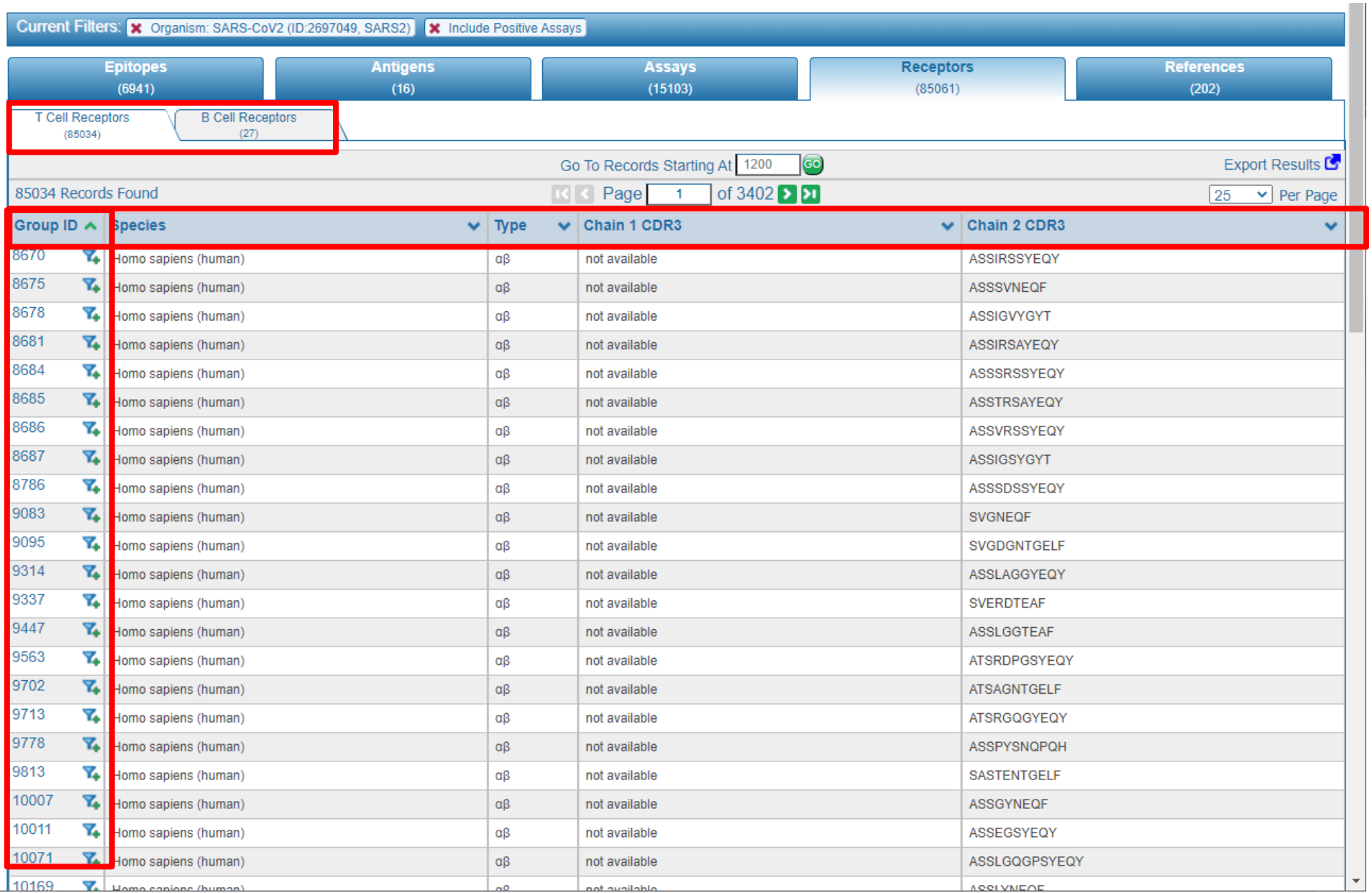
Results Page: Assays Tab – Assay Details

MHC Allele		
MHC Allele Name	HLA class II	MRO:0001455
MHC Evidence Code	T cell assay -T cell subset identification	

Antigen		
Epitope Relation	Taxonomic Sibling	
Chemical Type	Protein	
Molecule Name	S protein	GenPept:AAP13441.1
Organism	SARS coronavirus Urbani (SARS-CoV (Urbani strain))	NCBITaxon:228330

Assay Reference Details		
Assay Comments by IEDB Curator	Epitope-specific clones reacted with the antigen.	
Location of Assay Data in Reference	Table S5	

Results Page: Receptors Tab – Subtabs & Groups



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

T Cell Receptors (85034) | B Cell Receptors (27)

Go To Records Starting At 1200 GO | Export Results

85034 Records Found | Page 1 of 3402 | 25 Per Page

Group ID	Species	Type	Chain 1 CDR3	Chain 2 CDR3
8670	Homo sapiens (human)	αβ	not available	ASSIRSSYEQY
8675	Homo sapiens (human)	αβ	not available	ASSSVNEQF
8678	Homo sapiens (human)	αβ	not available	ASSIGVYGYT
8681	Homo sapiens (human)	αβ	not available	ASSIRSAYEQY
8684	Homo sapiens (human)	αβ	not available	ASSSRSSYEQY
8685	Homo sapiens (human)	αβ	not available	ASSTRSAYEQY
8686	Homo sapiens (human)	αβ	not available	ASSVRSSYEQY
8687	Homo sapiens (human)	αβ	not available	ASSIGSYGYT
8786	Homo sapiens (human)	αβ	not available	ASSSDSSYEQY
9083	Homo sapiens (human)	αβ	not available	SVGNEQF
9095	Homo sapiens (human)	αβ	not available	SVGDGNTGELF
9314	Homo sapiens (human)	αβ	not available	ASSLAGGYEQY
9337	Homo sapiens (human)	αβ	not available	SVERDTEAF
9447	Homo sapiens (human)	αβ	not available	ASSLGGTEAF
9563	Homo sapiens (human)	αβ	not available	ATSRDPGSYEQY
9702	Homo sapiens (human)	αβ	not available	ATSAGNTGELF
9713	Homo sapiens (human)	αβ	not available	ATSRGQGYEQY
9778	Homo sapiens (human)	αβ	not available	ASSPYSNQPQH
9813	Homo sapiens (human)	αβ	not available	SASTENTGELF
10007	Homo sapiens (human)	αβ	not available	ASSGYNEQF
10011	Homo sapiens (human)	αβ	not available	ASSEGSYEQY
10071	Homo sapiens (human)	αβ	not available	ASSLGQGPSYEQY
10169	Homo sapiens (human)	αβ	not available	ASSLYNEQF

Results Page: Receptors Tab – Receptor Group

T cell receptor (receptor group ID 8670)

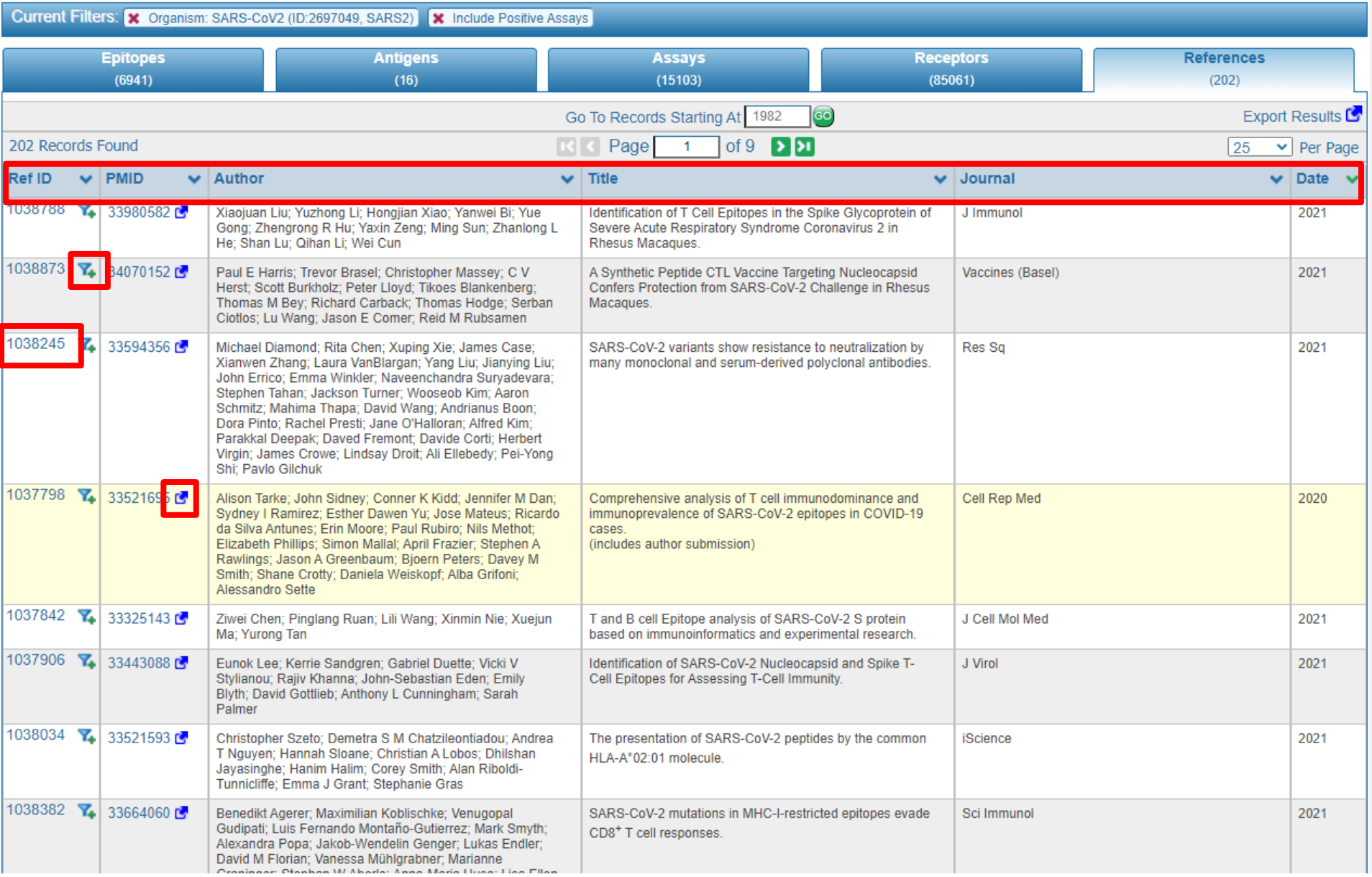
Alpha beta TCR with alpha chain CDR3 of AGAGSQGNLI and beta chain CDR3 of ASSIRSSYEQY was reported in Homo sapiens (human). This TCR has accessions for alpha chain 5HHO_D and beta chain 5HHO_E and was shown in 3D Structures 5HHO and 5EUO.

alpha		beta		Epitopes (# assays)
Gene usage	CDR sequences	Gene usage	CDR sequences	
V:TRAV27*01 D: J:TRAJ42*01	CDR1:SVFSS CDR2:VVTGGEV CDR3:AGAGSQGNLI	V:TRBV19*01 D: J:TRBJ2-7*01	CDR1:LNHDA CDR2:SQIVND CDR3:ASSIRSSYEQY	GILEFVFTL (1)
V Domain: LEQSPQFLSIQEGENLTVYCNSSSVFSSLQ...		V Domain: GITQSPKYLFRKEGQNVTLSCEQNLNHDAM...		
V:TRAV27 D: J:TRAJ37	CDR1: CDR2: CDR3:AGAIGSSNTGKLI	V:TRBV19 D: J:TRBJ2-7	CDR1: CDR2: CDR3:ASSIRSSYEQY	GILGFVFTL (3)
V Domain:		V Domain:		
V: D: J:	CDR1: CDR2: CDR3:	V:TRBV19 D: J:TRBJ2-7	CDR1: CDR2: CDR3:ASSIRSSYEQY	GILGFVFTL (1), LLWNGPMAV (1), FLPFFSNVTWFHAI (2), VQPTESIVRFPNITNLCPF (1), YYRARAGEAANF (1)
V Domain:		V Domain:		
V: D: J:	CDR1: CDR2: CDR3:	V:TRBV19 D: J:TRBJ2-7*01	CDR1: CDR2: CDR3:ASSIRSSYEQY	GILGFVFTL (2)
V Domain:		V Domain:		
V: D: J:	CDR1: CDR2: CDR3:	V:TRBV30*01 D: J:TRBJ2-7*01	CDR1: CDR2: CDR3:ASSIRSSYEQY	GILGFVFTL (2)
V Domain:		V Domain:		
V: D: J:	CDR1: CDR2: CDR3:	V:TRBV7-2*01 D: J:TRBJ2-7*01	CDR1: CDR2: CDR3:ASSIRSSYEQY	GILGFVFTL (2)
V Domain:		V Domain:		
V: D: J:	CDR1: CDR2: CDR3:	V:TRBV25-1*01 D: J:TRBJ2-7*01	CDR1: CDR2: CDR3:ASSIRSSYEQY	GILGFVFTL (2)
V Domain:		V Domain:		

Epitope summary

This TCR was studied for the following epitopes GILEFVFTL studied as part of Matrix protein 1 from Influenza A virus (epitope ID 538549, 1 publication, 1 assay), GILGFVFTL studied as part of Matrix protein 1 from Influenza A virus (epitope ID 20354, 2 publications, 8 assays), LLWNGPMAV studied as part of Genome polyprotein from Yellow fever virus (Flavivirus febricis) (epitope ID 121572, 1 publication, 1 assay), FLPFFSNVTWFHAI studied as part of Spike glycoprotein from SARS-CoV2 (epitope ID 1074888, 1 publication, 2 assays), VQPTESIVRFPNITNLCPF studied as part of Spike glycoprotein from SARS-CoV2 (epitope ID 1075108, 1 publication, 1 assay) and YYRARAGEAANF studied as part of Replicase polyprotein 1ab from SARS-CoV1 (epitope ID 1075129, 1 publication, 1 assay).

Results Page: References Tab – Table Headers



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays

Epitopes (6941) | Antigens (16) | Assays (15103) | Receptors (85061) | References (202)

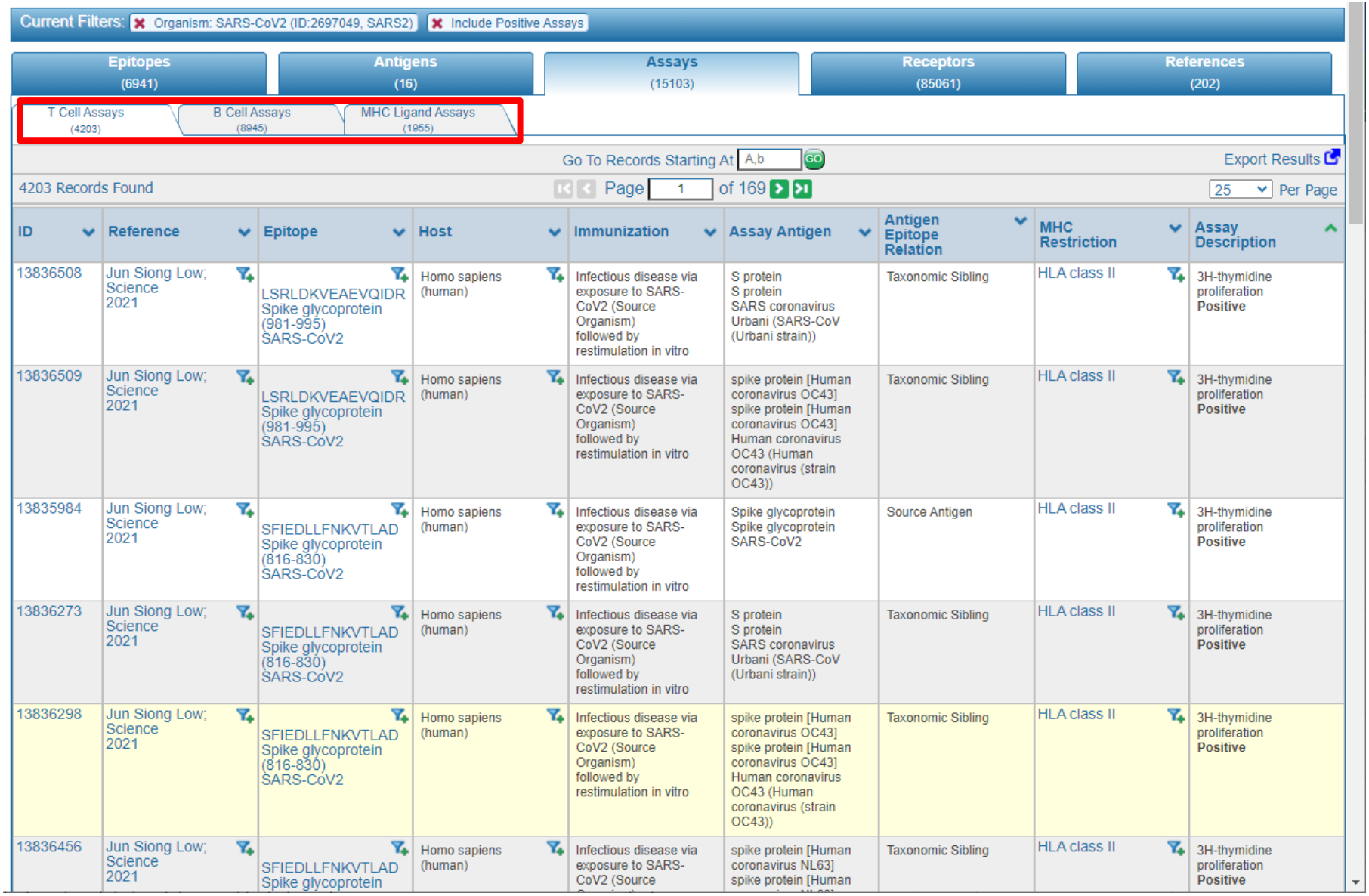
Go To Records Starting At 1982 GO | Export Results

202 Records Found | Page 1 of 9 | 25 Per Page

Ref ID	PMID	Author	Title	Journal	Date
1038788	33980582	Xiaojuan Liu; Yuzhong Li; Hongjian Xiao; Yanwei Bi; Yue Gong; Zhengrong R Hu; Yaxin Zeng; Ming Sun; Zhanlong L He; Shan Lu; Qihan Li; Wei Cun	Identification of T Cell Epitopes in the Spike Glycoprotein of Severe Acute Respiratory Syndrome Coronavirus 2 in Rhesus Macaques.	J Immunol	2021
1038873	34070152	Paul E Harris; Trevor Brasel; Christopher Massey; C V Herst; Scott Burkholz; Peter Lloyd; Tikoes Blankenberg; Thomas M Bey; Richard Carback; Thomas Hodge; Serban Ciotlos; Lu Wang; Jason E Comer; Reid M Rubsamen	A Synthetic Peptide CTL Vaccine Targeting Nucleocapsid Confers Protection from SARS-CoV-2 Challenge in Rhesus Macaques.	Vaccines (Basel)	2021
1038245	33594356	Michael Diamond; Rita Chen; Xuping Xie; James Case; Xianwen Zhang; Laura VanBlargan; Yang Liu; Jianying Liu; John Errico; Emma Winkler; Naveenchandra Suryadevara; Stephen Tahan; Jackson Turner; Wooseob Kim; Aaron Schmitz; Mahima Thapa; David Wang; Andrianus Boon; Dora Pinto; Rachel Presti; Jane O'Halloran; Alfred Kim; Parakkal Deepak; Daved Fremont; Davide Corti; Herbert Virgin; James Crowe; Lindsay Droit; Ali Ellebedy; Pei-Yong Shi; Pavlo Gilchuk	SARS-CoV-2 variants show resistance to neutralization by many monoclonal and serum-derived polyclonal antibodies.	Res Sq	2021
1037798	3352169[illegible]	Alison Tarke; John Sidney; Conner K Kidd; Jennifer M Dan; Sydney I Ramirez; Esther Dawen Yu; Jose Mateus; Ricardo da Silva Antunes; Erin Moore; Paul Rubiro; Nils Methot; Elizabeth Phillips; Simon Mallal; April Frazier; Stephen A Rawlings; Jason A Greenbaum; Bjoern Peters; Davey M Smith; Shane Crotty; Daniela Weiskopf; Alba Grifoni; Alessandro Sette	Comprehensive analysis of T cell immunodominance and immunoprevalence of SARS-CoV-2 epitopes in COVID-19 cases. (includes author submission)	Cell Rep Med	2020
1037842	33325143	Ziwei Chen; Pinglang Ruan; Lili Wang; Xinmin Nie; Xuejun Ma; Yurong Tan	T and B cell Epitope analysis of SARS-CoV-2 S protein based on immunoinformatics and experimental research.	J Cell Mol Med	2021
1037906	33443088	Eunok Lee; Kerrie Sandgren; Gabriel Duette; Vicki V Stylianou; Rajiv Khanna; John-Sebastian Eden; Emily Blyth; David Gottlieb; Anthony L Cunningham; Sarah Palmer	Identification of SARS-CoV-2 Nucleocapsid and Spike T-Cell Epitopes for Assessing T-Cell Immunity.	J Virol	2021
1038034	33521593	Christopher Szeto; Demetra S M Chatzileontiadou; Andrea T Nguyen; Hannah Sloane; Christian A Lobos; Dhilshan Jayasinghe; Hanim Halim; Corey Smith; Alan Riboldi-Tunnicliffe; Emma J Grant; Stephanie Gras	The presentation of SARS-CoV-2 peptides by the common HLA-A*02:01 molecule.	iScience	2021
1038382	33664060	Benedikt Agerer; Maximilian Koblischke; Venugopal Gudipati; Luis Fernando Montaño-Gutierrez; Mark Smyth; Alexandra Popa; Jakob-Wendelin Genger; Lukas Endler; David M Florian; Vanessa Mühlgrabner; Marianne [illegible]	SARS-CoV-2 mutations in MHC-I-restricted epitopes evade CD8+ T cell responses.	Sci Immunol	2021

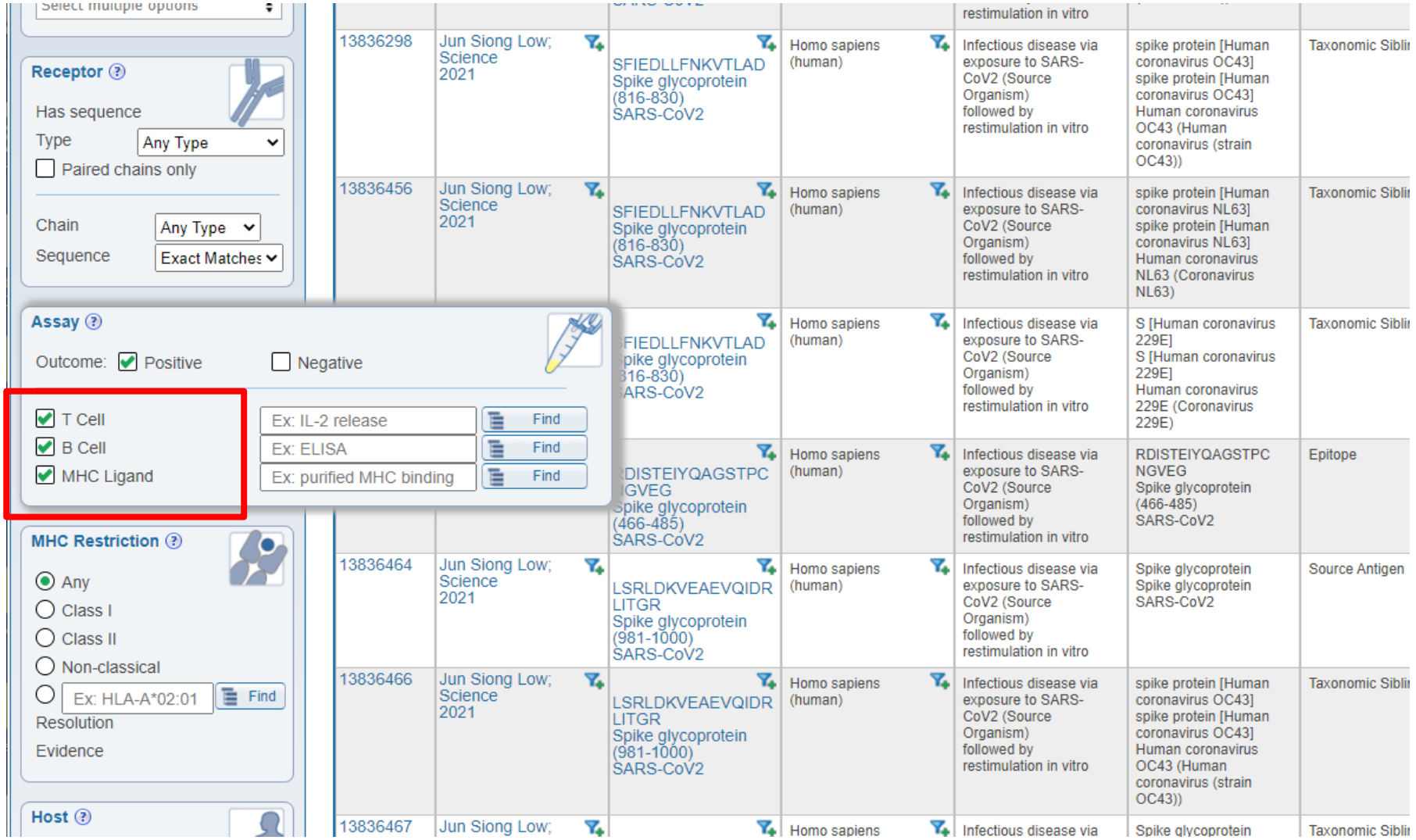
User Queries: How to see the differences between B and T cell responses AND identify SARS-CoV2 CD4 and CD8 T cell epitopes

Results Page: Assays Tab – Subtabs



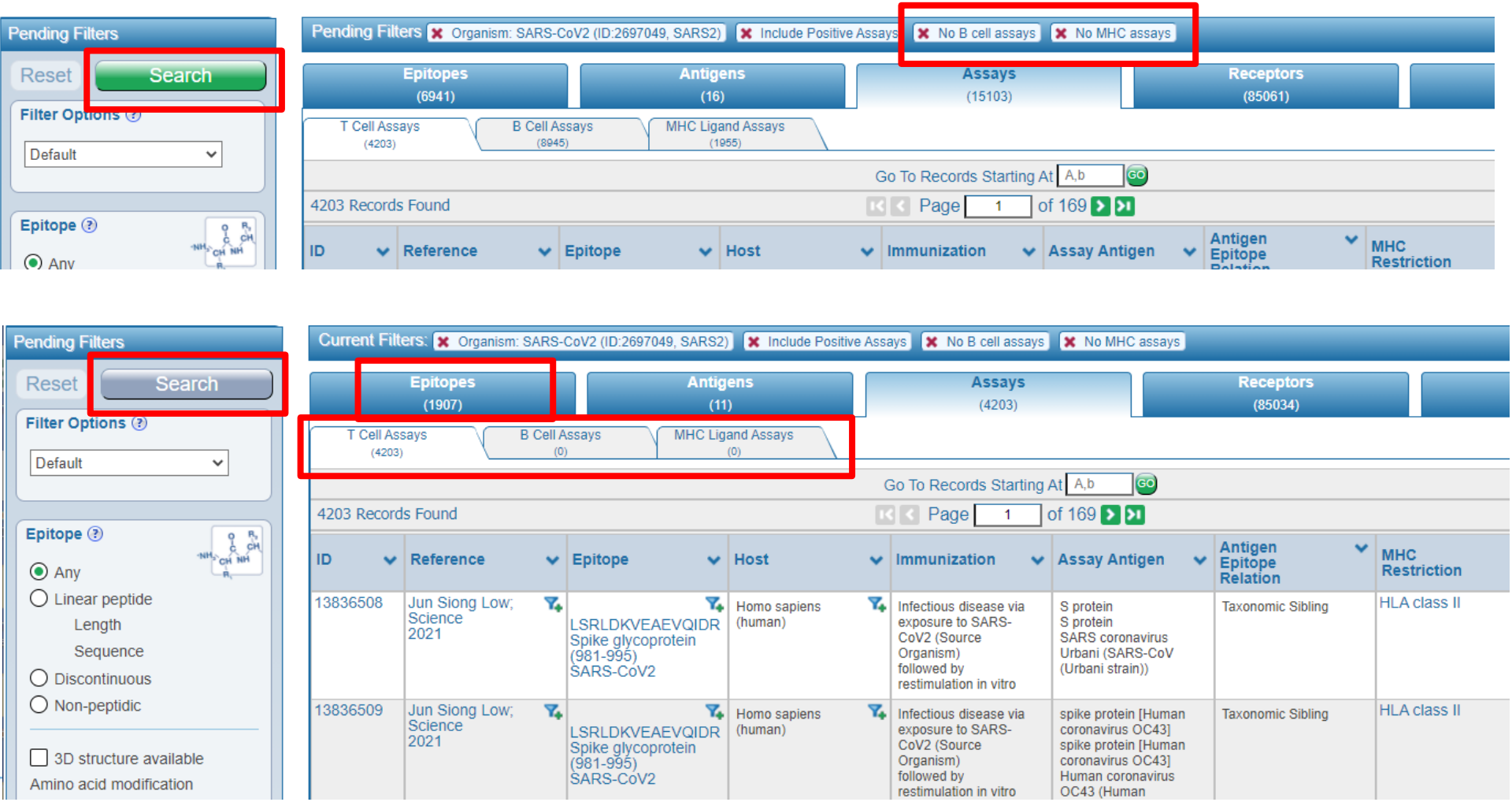
ID	Reference	Epitope	Host	Immunization	Assay Antigen	Antigen Epitope Relation	MHC Restriction	Assay Description
13836508	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836509	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR Spike glycoprotein (981-995) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13835984	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	Spike glycoprotein Spike glycoprotein SARS-CoV2	Source Antigen	HLA class II	3H-thymidine proliferation **Positive**
13836273	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S protein S protein SARS coronavirus Urbani (SARS-CoV (Urbani strain))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836298	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**
13836456	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source	spike protein [Human coronavirus NL63] spike protein [Human	Taxonomic Sibling	HLA class II	3H-thymidine proliferation **Positive**

Results Page: Additional Filters - Differences Between B and T Cell Responses



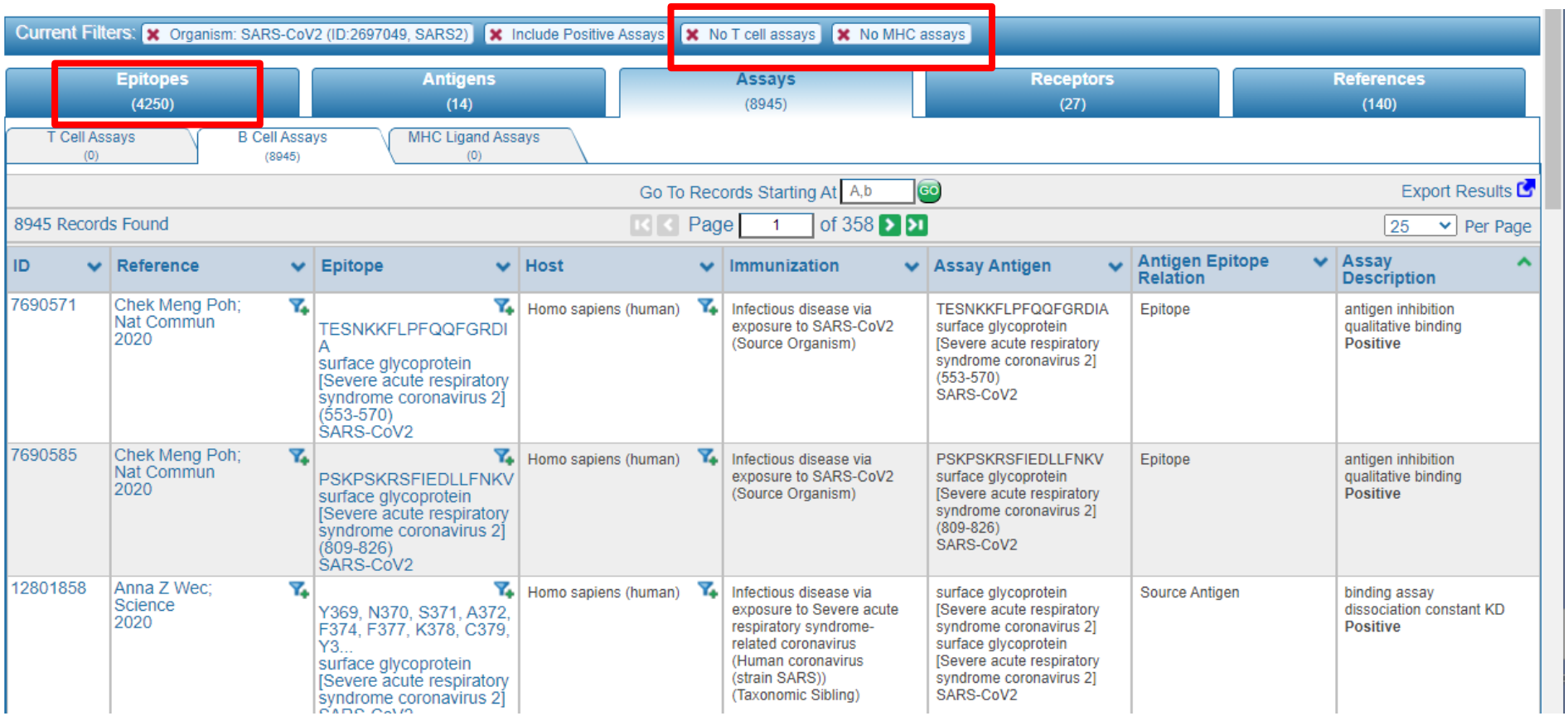
Results Page: Additional Filters - Differences Between B and T Cell Responses

T cell assays only = T cell epitopes (1,907 epitopes)



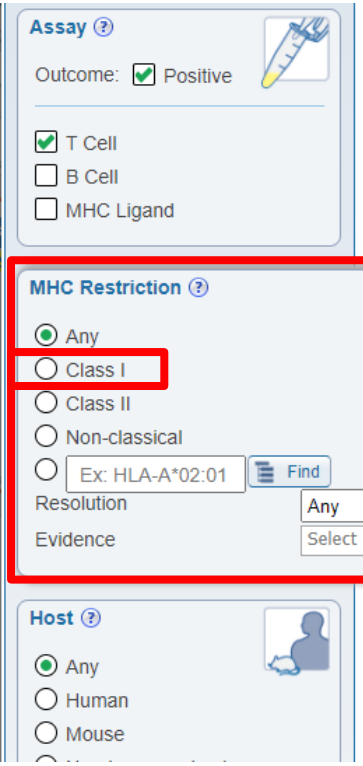
Results Page: Additional Filters - Differences Between B and T Cell Responses

B cell assays only = B cell epitopes (4,250 epitopes)



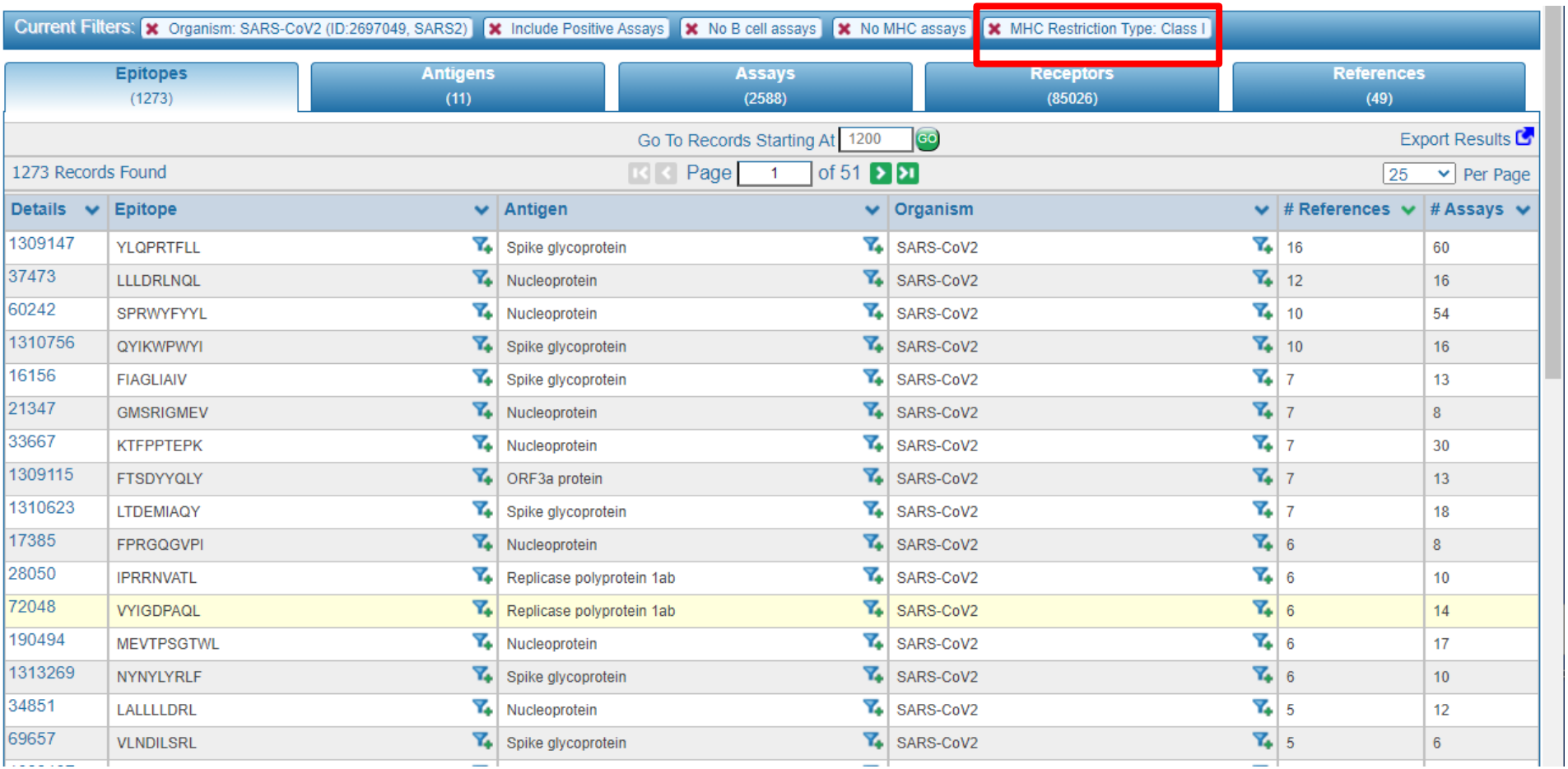
ID	Reference	Epitope	Host	Immunization	Assay Antigen	Antigen Epitope Relation	Assay Description
7690571	Chek Meng Poh; Nat Commun 2020	TESNKKFLPFQQFGRDIA surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] (553-570) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism)	TESNKKFLPFQQFGRDIA surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] (553-570) SARS-CoV2	Epitope	antigen inhibition qualitative binding **Positive**
7690585	Chek Meng Poh; Nat Commun 2020	PSKPSKRSFIEDLLFNKV surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] (809-826) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism)	PSKPSKRSFIEDLLFNKV surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] (809-826) SARS-CoV2	Epitope	antigen inhibition qualitative binding **Positive**
12801858	Anna Z Wec; Science 2020	Y369, N370, S371, A372, F374, F377, K378, C379, Y3... surface glycoprotein [Severe acute respiratory syndrome coronavirus 2]	Homo sapiens (human)	Infectious disease via exposure to Severe acute respiratory syndrome-related coronavirus (Human coronavirus (strain SARS)) (Taxonomic Sibling)	surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] SARS-CoV2	Source Antigen	binding assay dissociation constant KD **Positive**

User Queries: How to see the differences between B and T cell responses AND identify SARS-CoV2 CD4 and CD8 T cell epitopes



13836457	Jun Siong Low; Science 2021	SFIEDLLFNKVTLAD Spike glycoprotein (816-830) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	S [Human coronavirus 229E] S [Human coronavirus 229E] Human coronavirus 229E (Coronavirus 229E)	Taxonomic Sibling	HLA class II
13849429	Jun Siong Low; Science 2021	RDISTEIYQAGSTPC NGVEG Spike glycoprotein 466-485) ARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	RDISTEIYQAGSTPC NGVEG Spike glycoprotein (466-485) SARS-CoV2	Epitope	HLA class II
		SRLDKVEAEVQIDR ITGR pike glycoprotein 981-1000) ARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	Spike glycoprotein Spike glycoprotein SARS-CoV2	Source Antigen	HLA class II
		SRLDKVEAEVQIDR ITGR pike glycoprotein 981-1000) ARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	spike protein [Human coronavirus OC43] spike protein [Human coronavirus OC43] Human coronavirus OC43 (Human coronavirus (strain OC43))	Taxonomic Sibling	HLA class II
13836467	Jun Siong Low; Science 2021	LSRLDKVEAEVQIDR LITGR Spike glycoprotein (981-1000) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism) followed by restimulation in vitro	Spike glycoprotein Spike glycoprotein Human coronavirus HKU1 (isolate N5)	Taxonomic Sibling	HLA class II

User Queries: How to see the differences between B and T cell responses AND identify CD8 T cell epitopes (1,273)



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays | No B cell assays | No MHC assays | MHC Restriction Type: Class I

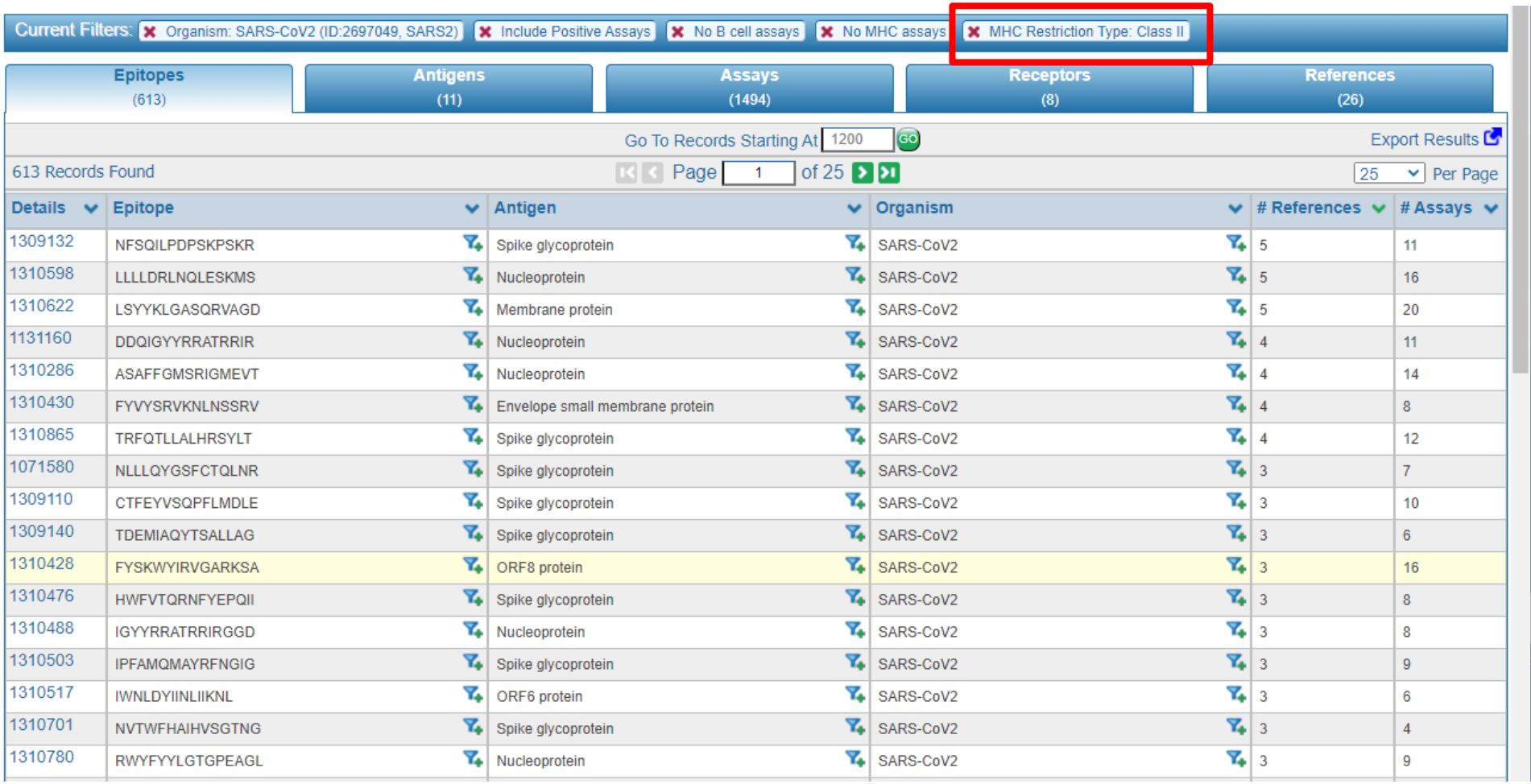
Epitopes (1273) | Antigens (11) | Assays (2588) | Receptors (85026) | References (49)

Go To Records Starting At 1200 GO — Export Results

1273 Records Found — Page 1 of 51 — 25 Per Page

Details	Epitope	Antigen	Organism	# References	# Assays
1309147	YLQPRTFLL	Spike glycoprotein	SARS-CoV2	16	60
37473	LLLDRLNQL	Nucleoprotein	SARS-CoV2	12	16
60242	SPRWYFYYL	Nucleoprotein	SARS-CoV2	10	54
1310756	QYIKWPWYI	Spike glycoprotein	SARS-CoV2	10	16
16156	FIAGLIAIV	Spike glycoprotein	SARS-CoV2	7	13
21347	GMSRIGMEV	Nucleoprotein	SARS-CoV2	7	8
33667	KTFPPTEPK	Nucleoprotein	SARS-CoV2	7	30
1309115	FTSDYYQLY	ORF3a protein	SARS-CoV2	7	13
1310623	LTDEMIAQY	Spike glycoprotein	SARS-CoV2	7	18
17385	FPRGQGVPI	Nucleoprotein	SARS-CoV2	6	8
28050	IPRRNVATL	Replicase polyprotein 1ab	SARS-CoV2	6	10
72048	VYIGDPAQL	Replicase polyprotein 1ab	SARS-CoV2	6	14
190494	MEVTPSGTWL	Nucleoprotein	SARS-CoV2	6	17
1313269	NYNYLYRLF	Spike glycoprotein	SARS-CoV2	6	10
34851	LALLLLDRL	Nucleoprotein	SARS-CoV2	5	12
69657	VLNDILSRL	Spike glycoprotein	SARS-CoV2	5	6

User Queries: How to see the differences between B and T cell responses AND identify CD4 T cell epitopes (613)



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays | No B cell assays | No MHC assays | MHC Restriction Type: Class II

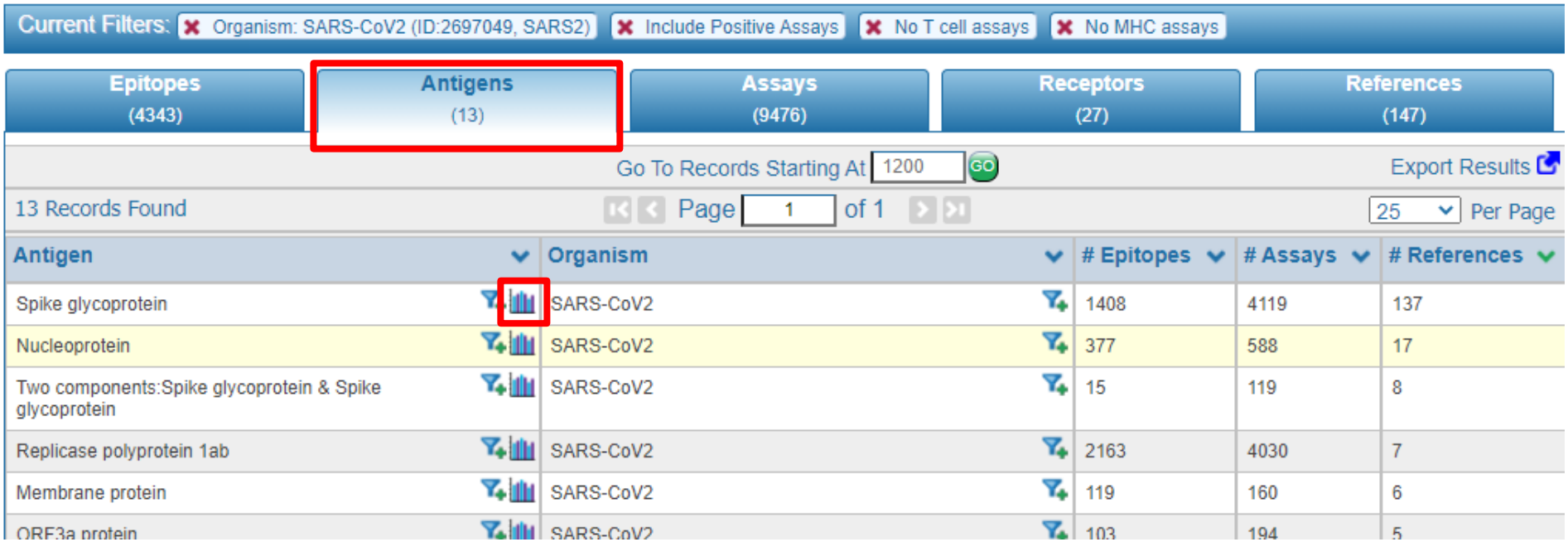
Epitopes (613) | Antigens (11) | Assays (1494) | Receptors (8) | References (26)

Go To Records Starting At 1200 GO — Export Results

613 Records Found — Page 1 of 25 — 25 Per Page

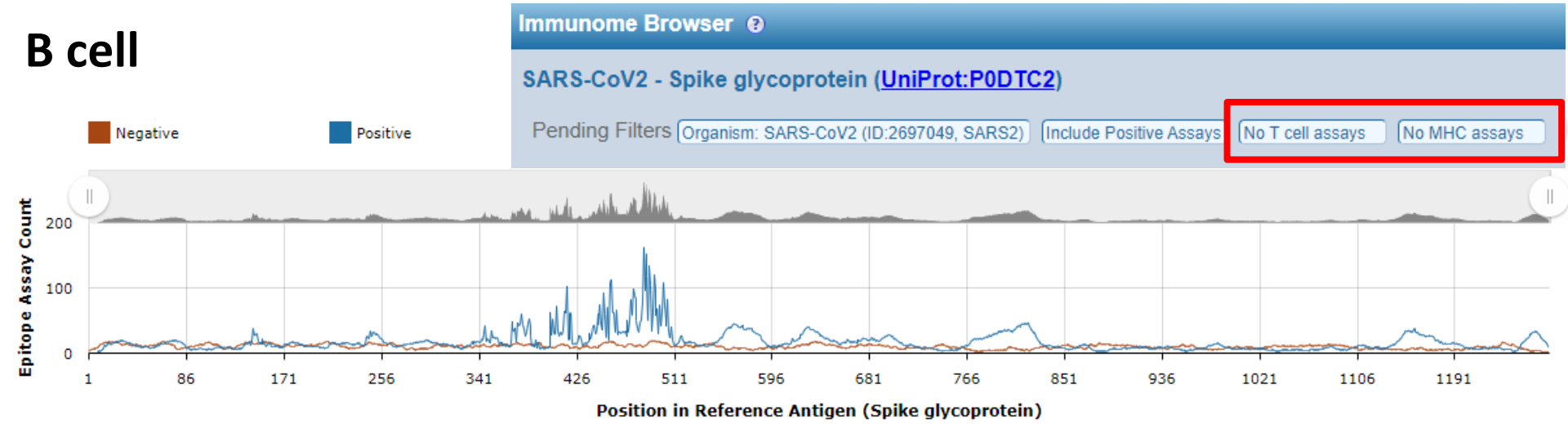
Details	Epitope	Antigen	Organism	# References	# Assays
1309132	NFSQILPDPSKPSKR	Spike glycoprotein	SARS-CoV2	5	11
1310598	LLLLDRLNQLESKMS	Nucleoprotein	SARS-CoV2	5	16
1310622	LSYYKLGASQRVAGD	Membrane protein	SARS-CoV2	5	20
1131160	DDQIGYYRRATRRIR	Nucleoprotein	SARS-CoV2	4	11
1310286	ASAFFGMSRIGMEVT	Nucleoprotein	SARS-CoV2	4	14
1310430	FYVYSRVKNLNSSRV	Envelope small membrane protein	SARS-CoV2	4	8
1310865	TRFQTLLALHRSYLT	Spike glycoprotein	SARS-CoV2	4	12
1071580	NLLLQYGSFCTQLNR	Spike glycoprotein	SARS-CoV2	3	7
1309110	CTFEYVSQPFLMDLE	Spike glycoprotein	SARS-CoV2	3	10
1309140	TDEMIAQYTSALLAG	Spike glycoprotein	SARS-CoV2	3	6
1310428	FYSKWYIRVGARKSA	ORF8 protein	SARS-CoV2	3	16
1310476	HWFVTQRNFYEPQII	Spike glycoprotein	SARS-CoV2	3	8
1310488	IGYYRRATRRIRGGD	Nucleoprotein	SARS-CoV2	3	8
1310503	IPFAMQMAYRFNGIG	Spike glycoprotein	SARS-CoV2	3	9
1310517	IWNLDYIINLIIKNL	ORF6 protein	SARS-CoV2	3	6
1310701	NVTWFHAIHVSGTNG	Spike glycoprotein	SARS-CoV2	3	4
1310780	RWYFYYLGTGPEAGL	Nucleoprotein	SARS-CoV2	3	9

User Queries: How to see the differences between B and T cell responses Immunome Browser

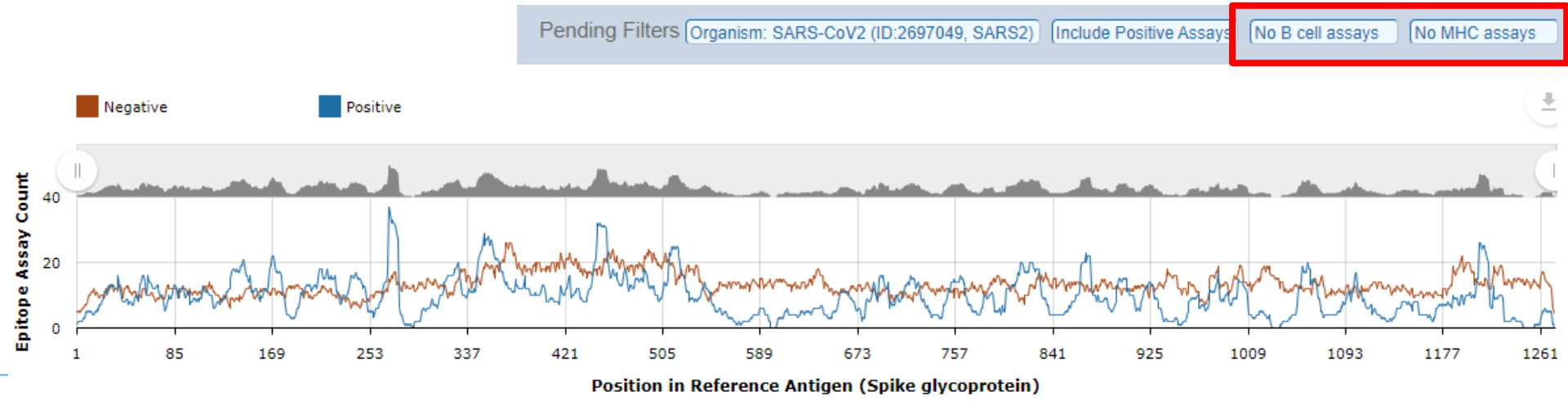


User Queries: How to see the differences between B and T cell responses

B cell

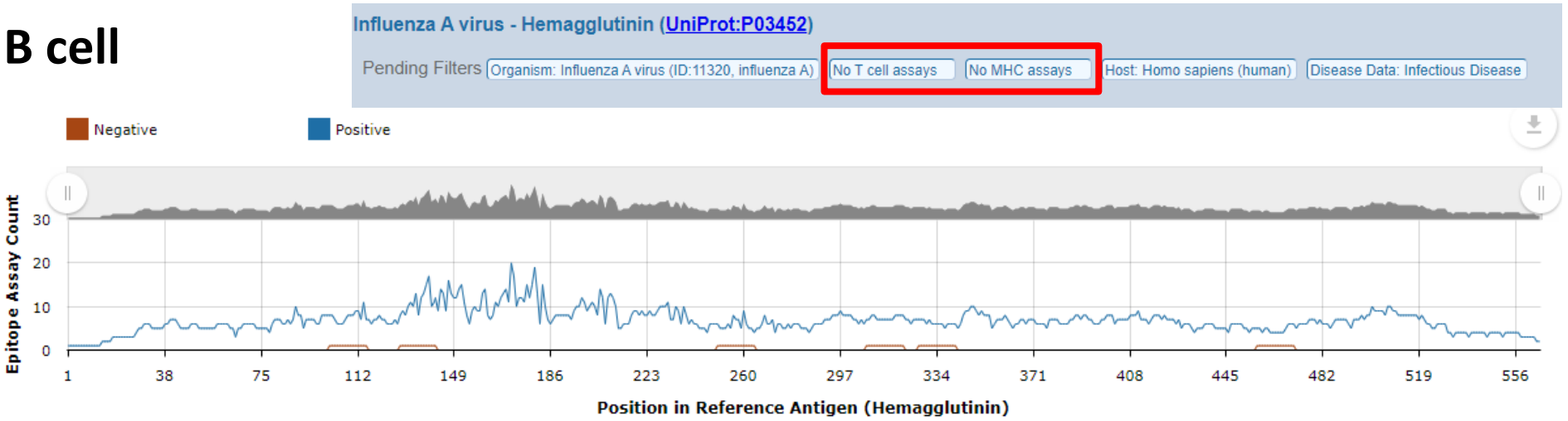


T cell

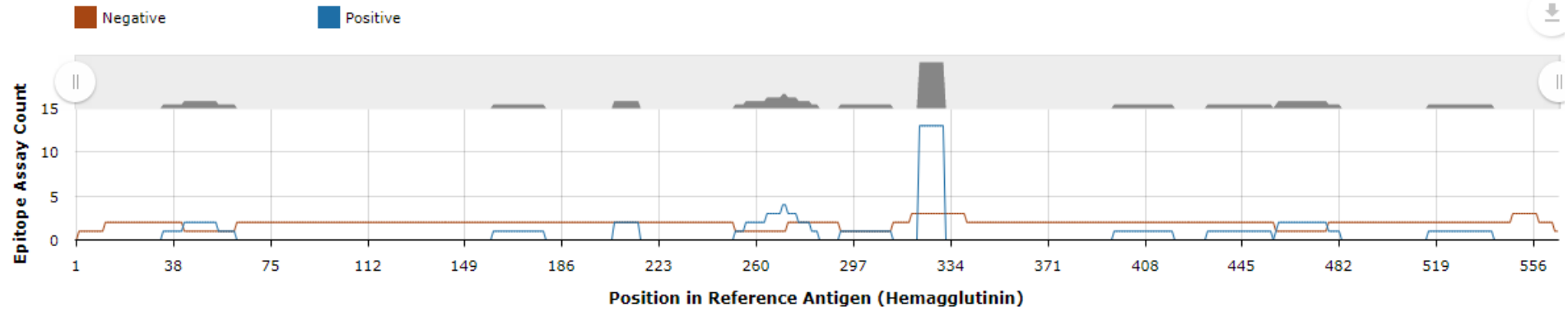


User Queries: How to see the differences between B and T cell responses

B cell

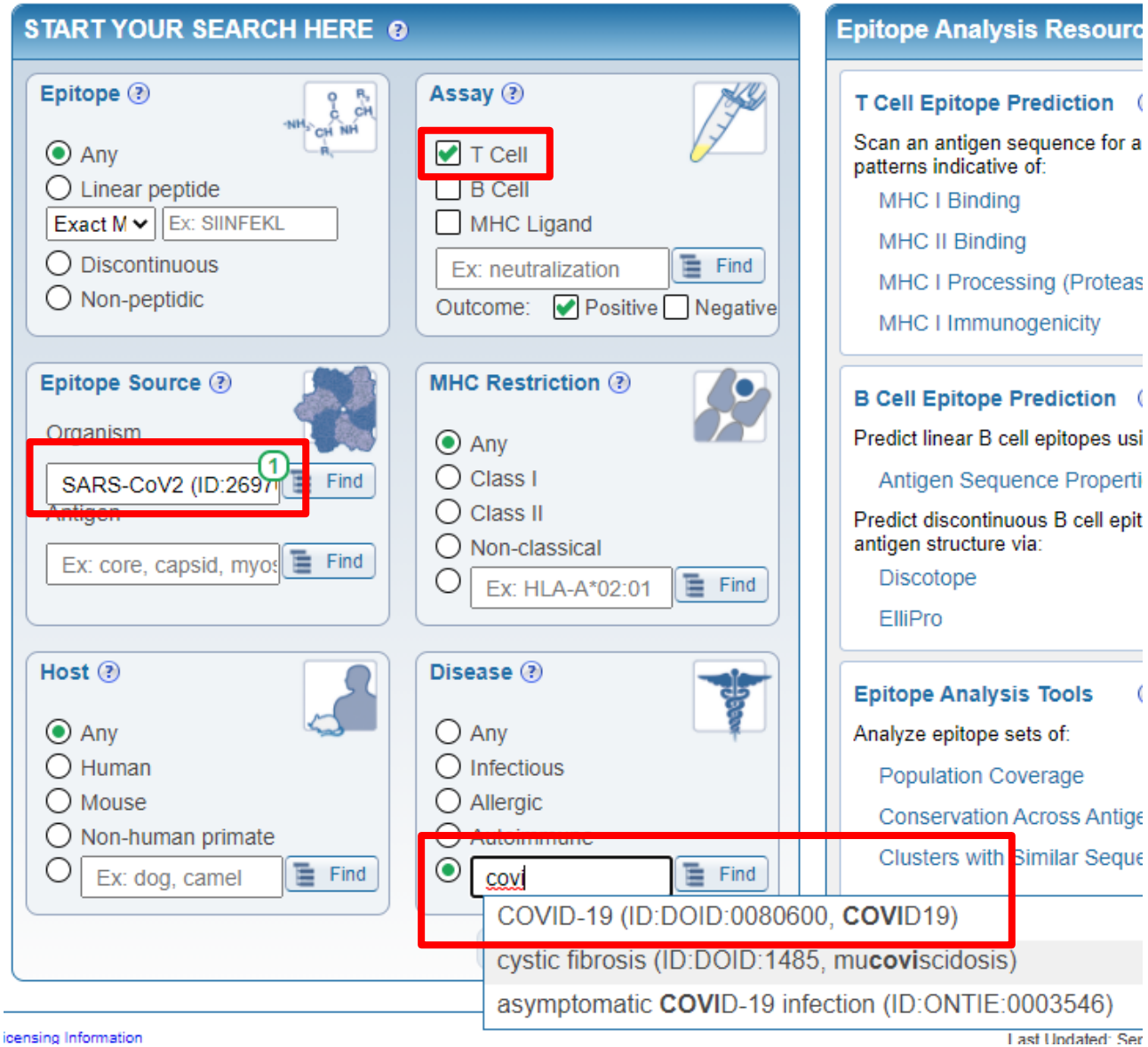


T cell



User Queries: How to see spike specific T cell epitopes induced by infection

Build query:
T cell epitopes from SARS-COV2 in donors with COVID19



User Queries: How to see spike specific T cell epitopes induced by infection

Limit query: SARS-COV2 spike protein filter

Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays | No B cell assays | No MHC assays | Disease Data: COVID-19 (ID:DOID:0080600, COVID19)

Epitopes (1364) | Antigens (11) | Assays (2593) | Receptors (13317) | References (35)

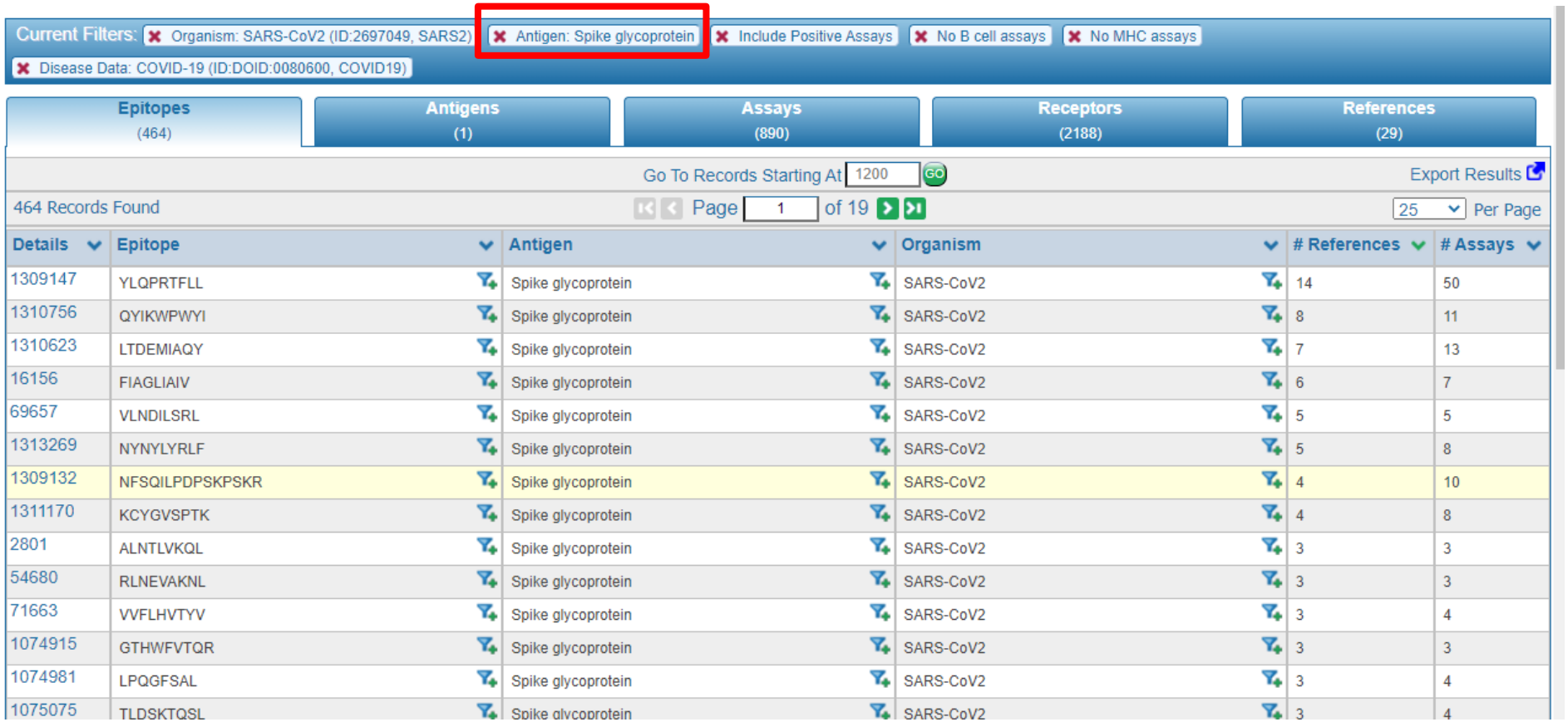
Go To Records Starting At 1200 GO — Export Results

1364 Records Found — Page 1 of 55 — 25 Per Page

Details	Epitope	Antigen	Organism	# References	# Assays
1309147	YLQPRTFLL	Spike glycoprotein	SARS-CoV2	14	50
60242	SPRWYFYYL	Nucleoprotein	SARS-CoV2	9	33
37473	LLLDRLNQL	Nucleoprotein	SARS-CoV2	8	11
1310756	QYIKWPWYI	Spike glycoprotein	SARS-CoV2	8	11
33667	KTFPPTEPK	Nucleoprotein	SARS-CoV2	7	30
1309115	FTSDYYQLY	ORF3a protein	SARS-CoV2	7	13
1310623	LTDEMIAQY	Spike glycoprotein	SARS-CoV2	7	13
16156	FIAGLIAIV	Spike glycoprotein	SARS-CoV2	6	7
190494	MEVTPSGTWL	Nucleoprotein	SARS-CoV2	6	17
17385	FPRGQGVPI	Nucleoprotein	SARS-CoV2	5	7
21347	GMSRIGMEV	Nucleoprotein	SARS-CoV2	5	5
28050	IPRRNVATL	Replicase polyprotein 1ab	SARS-CoV2	5	6
69657	VLNDILSRL	Spike glycoprotein	SARS-CoV2	5	5
72048	VYIGDPAQL	Replicase polyprotein 1ab	SARS-CoV2	5	6

User Queries: How to see spike specific T cell epitopes induced by infection

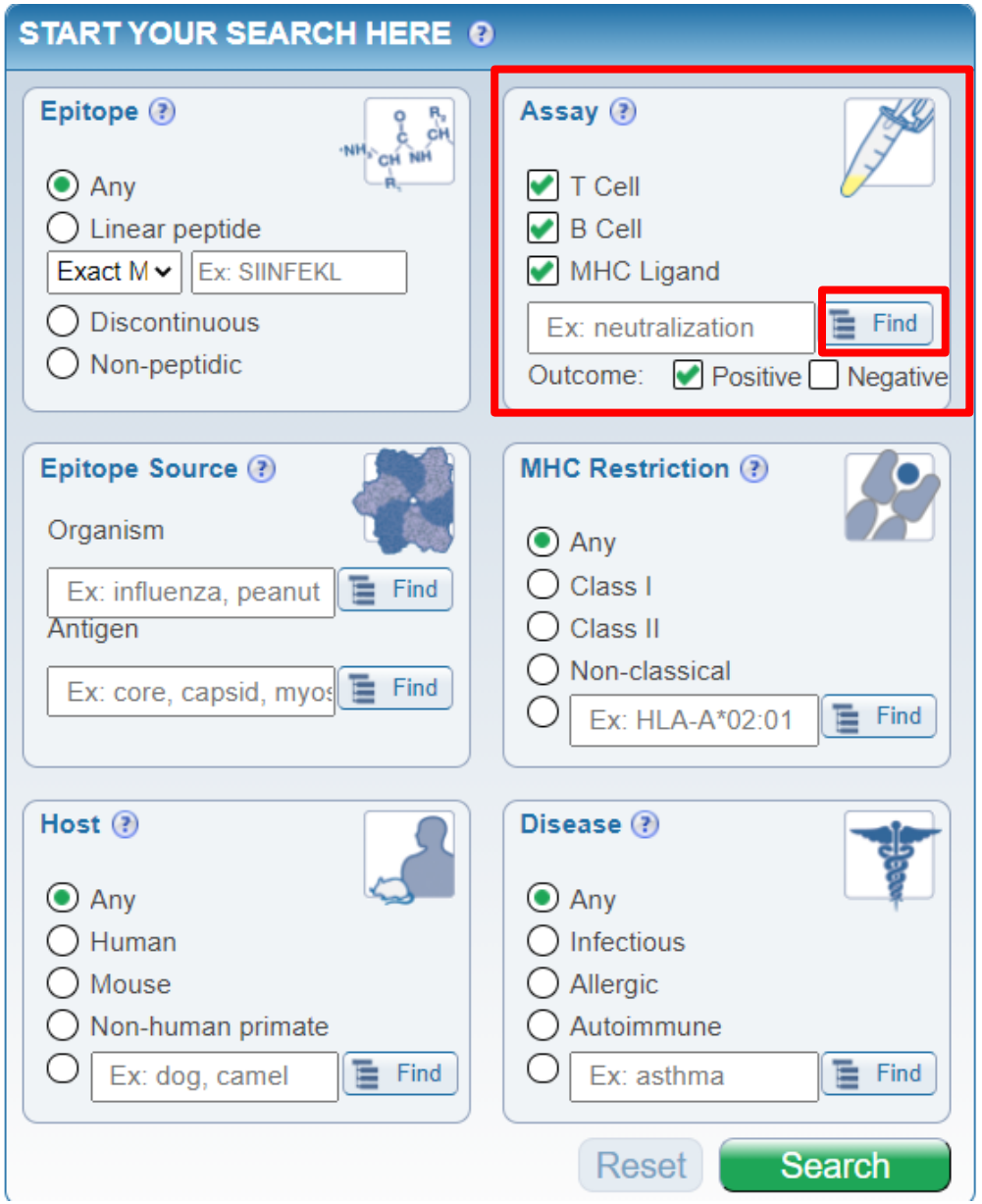
Limit query: SARS-COV2 spike protein filter



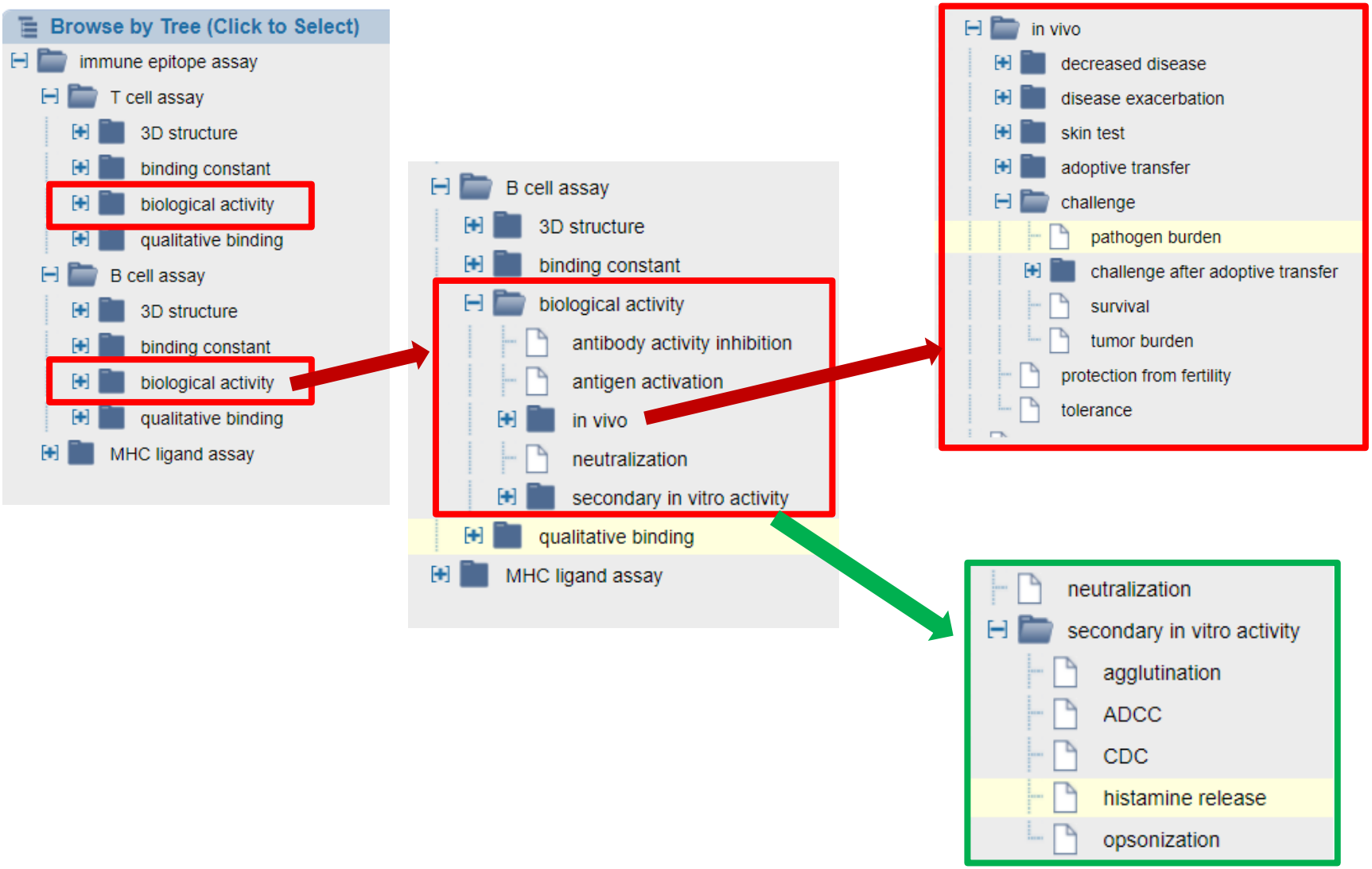
Details	Epitope	Antigen	Organism	# References	# Assays
1309147	YLQPRTFLL	Spike glycoprotein	SARS-CoV2	14	50
1310756	QYIKWPWYI	Spike glycoprotein	SARS-CoV2	8	11
1310623	LTDEMIAQY	Spike glycoprotein	SARS-CoV2	7	13
16156	FIAGLIAIV	Spike glycoprotein	SARS-CoV2	6	7
69657	VLNDILSRL	Spike glycoprotein	SARS-CoV2	5	5
1313269	NYNYLYRLF	Spike glycoprotein	SARS-CoV2	5	8
1309132	NFSQILPDPSKPSKR	Spike glycoprotein	SARS-CoV2	4	10
1311170	KCYGVSPTK	Spike glycoprotein	SARS-CoV2	4	8
2801	ALNTLVKQL	Spike glycoprotein	SARS-CoV2	3	3
54680	RLNEVAKNL	Spike glycoprotein	SARS-CoV2	3	3
71663	VVFLHVTYV	Spike glycoprotein	SARS-CoV2	3	4
1074915	GTHWFVTQR	Spike glycoprotein	SARS-CoV2	3	3
1074981	LPQGFSAL	Spike glycoprotein	SARS-CoV2	3	4
1075075	TLDSKTQSL	Spike glycoprotein	SARS-CoV2	3	4

User Queries: How can we assess the protective capability of the epitopes of the database?

Look for epitopes that were tested for in vivo protection assays



User Queries: How can we assess the protective capability of the epitopes of the database?



User Queries: How can we assess the protective capability of the epitopes of the database?

Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays | B Cell Assays: decreased disease, challenge

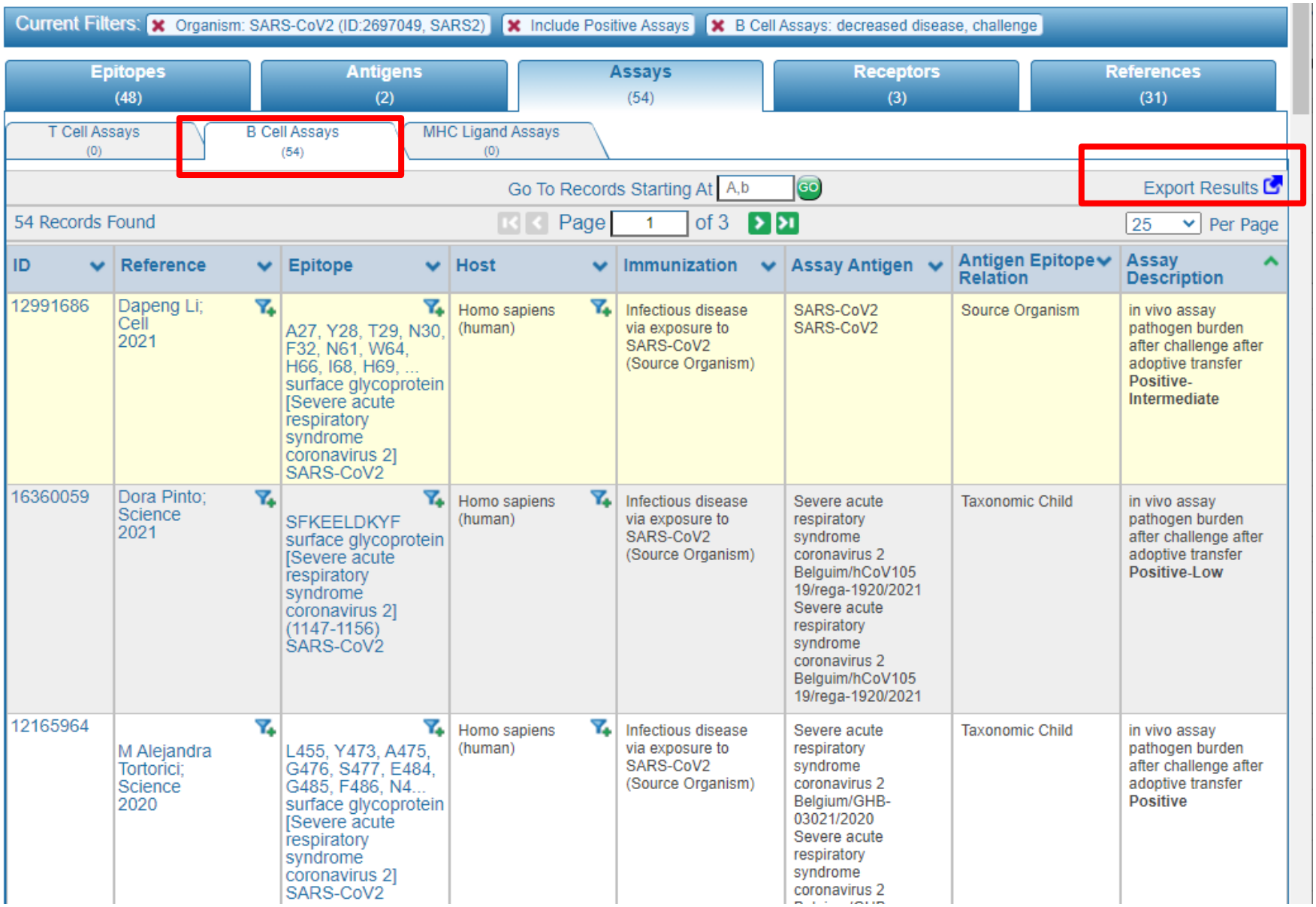
Epitopes (48) | Antigens (2) | Assays (54) | Receptors (3) | References (31)

Go To Records Starting At 1200 GO | Export Results

48 Records Found | Page 1 of 2 | 25 Per Page

Details	Epitope	Antigen	Organism	# References	# Assays
1075136	R403, Q409, T415, G416, K417, D420, Y421, L455, F4...	Spike glycoprotein	SARS-CoV2	1	1
1083498	R403, D405, E406, R408, Q409, T415, G416, K417, D4...	Spike glycoprotein	SARS-CoV2	1	1
1181324	L455, A475, G502	Spike glycoprotein	SARS-CoV2	1	1
1310239	R346, N440, L441, K444, V445, G446, N448, Y449, Q4...	Spike glycoprotein	SARS-CoV2	1	1
1311114	L455, Y473, A475, G476, S477, E484, G485, F486, N4...	Spike glycoprotein	SARS-CoV2	1	1
1311119	A: G446, Y449, L452, L455, F456, E484, G485, F486,...	Two components:Spike glycoprotein & Spike glycoprotein	SARS-CoV2	1	1
1311244	K444, G446, Y449, N450, L452, N481, G482, V483, E4...	Spike glycoprotein	SARS-CoV2	1	1
1311251	Y369, A372, S373, F374, S375, T376, F377, K378, C3...	Spike glycoprotein	SARS-CoV2	1	1
1314086	F486, N487	Spike glycoprotein	SARS-CoV2	1	1
1334436	L455, T470, E471, N481, G482, V483, E484, G485, F4...	Spike glycoprotein	SARS-CoV2	1	1
1334437	Y369, N370, S371, A372, S373, F374, S375, T376, F3...	Spike glycoprotein	SARS-CoV2	1	1
1334440	R403, T415, G416, K417, D420, Y421, Y453, L455, F4...	Spike glycoprotein	SARS-CoV2	1	1

User Queries: How can we assess the protective capability of the epitopes of the database?



Current Filters: Organism: SARS-CoV2 (ID:2697049, SARS2) | Include Positive Assays | B Cell Assays: decreased disease, challenge

Epitopes (48) | Antigens (2) | Assays (54) | Receptors (3) | References (31)

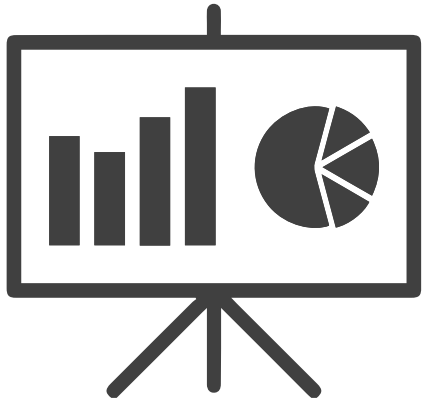
T Cell Assays (0) | B Cell Assays (54) | MHC Ligand Assays (0)

Go To Records Starting At A,b GO | Export Results

54 Records Found | Page 1 of 3 | 25 Per Page

ID	Reference	Epitope	Host	Immunization	Assay Antigen	Antigen Epitope Relation	Assay Description
12991686	Dapeng Li; Cell 2021	A27, Y28, T29, N30, F32, N61, W64, H66, I68, H69, ... surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism)	SARS-CoV2 SARS-CoV2	Source Organism	in vivo assay pathogen burden after challenge after adoptive transfer **Positive-Intermediate**
16360059	Dora Pinto; Science 2021	SFKEELDKYF surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] (1147-1156) SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism)	Severe acute respiratory syndrome coronavirus 2 Belguim/hCoV105 19/rega-1920/2021 Severe acute respiratory syndrome coronavirus 2 Belguim/hCoV105 19/rega-1920/2021	Taxonomic Child	in vivo assay pathogen burden after challenge after adoptive transfer **Positive-Low**
12165964	M Alejandra Tortorici; Science 2020	L455, Y473, A475, G476, S477, E484, G485, F486, N4... surface glycoprotein [Severe acute respiratory syndrome coronavirus 2] SARS-CoV2	Homo sapiens (human)	Infectious disease via exposure to SARS-CoV2 (Source Organism)	Severe acute respiratory syndrome coronavirus 2 Belgium/GHB-03021/2020 Severe acute respiratory syndrome coronavirus 2	Taxonomic Child	in vivo assay pathogen burden after challenge after adoptive transfer **Positive**

Additional Slides



Exports - Headers

Top Header Row = Field Group
2nd Header Row = Field

Stable URL for every epitope

Amino acid modifications

Position in protein

Non-peptidic epitopes

Epitope	Epitope	Epitope	Epitope	Epitope	Epitope	Epitope	Epitope	Epitope
Epitope IRI	Object Type	Description	Epitope Modified Residue(s)	Epitope Modification (s)	Epitope Starting Position	Epitope Ending Position	Epitope Non-peptidic epitope IRI	Epitope Synonyms
http://www.iedb.org/epitope/4156	Linear peptide	ARHTPVNSW			2820	2828		
http://www.iedb.org/epitope/4197	Linear peptide	ARMILMTHF			2841	2849		
http://www.iedb.org/epitope/13263	Linear peptide	ELRSRYWAI			380	388		
http://www.iedb.org/epitope/17661	Linear peptide	FRYNGLIHR			38	46		
http://www.iedb.org/epitope/21982	Linear peptide	GRAAICGKY			2936	2944		
http://www.iedb.org/epitope/22072	Linear peptide	GRIDKPILK			173	181		
http://www.iedb.org/epitope/24701	Linear peptide	HRQSIWITW			82	90		
http://www.iedb.org/epitope/24702	Linear peptide	HRQSIWITWH			82	91		
http://www.iedb.org/epitope/33140	Linear peptide	KRGILTLKY			63	71		
http://www.iedb.org/epitope/33170	Linear peptide	KRKKAYADF						
http://www.iedb.org/epitope/33250	Linear peptide	KRWIILGLNK			262	271		
http://www.iedb.org/epitope/33260	Linear peptide	KRYKSIVKY			86	94		
http://www.iedb.org/epitope/55529	Linear peptide	RRARSLSAERY			243	253		
http://www.iedb.org/epitope/55556	Linear peptide	RRFFPYYVY			127	135		
http://www.iedb.org/epitope/55565	Linear peptide	RRFVNVVPTF			114	123		
http://www.iedb.org/epitope/55620	Linear peptide	RRIYDLIEL			258	266		
http://www.iedb.org/epitope/55763	Linear peptide	RRVKEVVKK			175	183		
http://www.iedb.org/epitope/55779	Linear peptide	RRYPDAVYL			438	446		
http://www.iedb.org/epitope/55785	Linear peptide	RRYQKSTEL			53	61		
http://www.iedb.org/epitope/60777	Linear peptide	SRQRQAIPY			2145	2153		

Exports – Epitope Source Antigen

Source protein isoform of epitope, author specified, 100% identical

Reference proteome source protein of epitope, groups all same proteins, not 100% identical

Epitope Antigen Name	Epitope Antigen IRI	Epitope Parent Protein	Epitope Parent Protein IRI
polyprotein	http://www.ncbi.nlm.nih.gov/protein/ABR25251.1	sp|P27958|POLG_HCVH Genome polyprotein OS=Hepatitis C virus genotype 1a (isolate H)	http://www.uniprot.org/uniprot/P27958
polyprotein	http://www.ncbi.nlm.nih.gov/protein/ABR25251.1	sp|P27958|POLG_HCVH Genome polyprotein OS=Hepatitis C virus genotype 1a (isolate H)	http://www.uniprot.org/uniprot/P27958
NP	http://www.ncbi.nlm.nih.gov/protein/Q91UL1	sp|P03466|NCAP_I34A1 Nucleoprotein OS=Influenza A virus (strain A/Puerto Rico/8/1934 H1N1)	http://www.uniprot.org/uniprot/P03466
60S ribosomal protein L28 isoform 2	http://www.ncbi.nlm.nih.gov/protein/NP_000982.2	sp|P46779|RL28_HUMAN 60S ribosomal protein L28 OS=Homo sapiens OX=9606 GN=RPL28 PE=1 SV=3	http://www.uniprot.org/uniprot/P46779
polyprotein	http://www.ncbi.nlm.nih.gov/protein/ABY67667.1	sp|P27958|POLG_HCVH Genome polyprotein OS=Hepatitis C virus genotype 1a (isolate H)	http://www.uniprot.org/uniprot/P27958
60S ribosomal protein L8	http://www.ncbi.nlm.nih.gov/protein/NP_000964.1	sp|P62917|RL8_HUMAN 60S ribosomal protein L8 OS=Homo sapiens OX=9606 GN=RPL8 PE=1 SV=2	http://www.uniprot.org/uniprot/P62917
K1 glycoprotein	http://www.ncbi.nlm.nih.gov/protein/AAT44989.1	sp|Q2HRD5|K1_HHV8P Protein K1 OS=Human herpesvirus 8 type P (isolate GK18) OX=868565	http://www.uniprot.org/uniprot/Q2HRD5
K1 glycoprotein [Human herpesvirus 8]	http://www.ncbi.nlm.nih.gov/protein/AAT44977.1	sp|Q2HRD5|K1_HHV8P Protein K1 OS=Human herpesvirus 8 type P (isolate GK18) OX=868565	http://www.uniprot.org/uniprot/Q2HRD5
alpha-actin	http://www.ncbi.nlm.nih.gov/protein/AAA51577.1	sp|P62736|ACTA_HUMAN Actin, aortic smooth muscle OS=Homo sapiens OX=9606 GN=ACTA2 PE=1	http://www.uniprot.org/uniprot/P62736
cytochrome c oxidase I	https://ontology.iedb.org/ontology/ONTIE_0002983	sp|P00395|COX1_HUMAN Cytochrome c oxidase subunit 1 OS=Homo sapiens OX=9606 GN=MT-CO1	http://www.uniprot.org/uniprot/P00395
gag protein	http://www.ncbi.nlm.nih.gov/protein/AAX81417.1	sp|P03349|GAG_HV1A2 Gag polyprotein OS=Human immunodeficiency virus type 1 group M subtype B (isolate ARV2/SF2) OX=11685 GN=gag PE=1 SV=3	http://www.uniprot.org/uniprot/P03349

Exports – Epitope Source Organism

Source organism of epitope, author specified

Reference proteome species of epitope, groups all same

Epitope Organism Name	Epitope Organism IRI	Epitope Parent Organism	Epitope Parent Organism IRI
Hepacivirus C	http://purl.obolibrary.org/obo/NCBITaxon_11103	Hepacivirus C	http://purl.obolibrary.org/obo/NCBITaxon_11103
Hepacivirus C	http://purl.obolibrary.org/obo/NCBITaxon_11103	Hepacivirus C	http://purl.obolibrary.org/obo/NCBITaxon_11103
Influenza A virus (A/X-31(H3N2))	http://purl.obolibrary.org/obo/NCBITaxon_132504	Influenza A virus	http://purl.obolibrary.org/obo/NCBITaxon_11320
Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606	Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606
Hepacivirus C	http://purl.obolibrary.org/obo/NCBITaxon_11103	Hepacivirus C	http://purl.obolibrary.org/obo/NCBITaxon_11103
Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606	Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606
Human gammaherpesvirus 8	http://purl.obolibrary.org/obo/NCBITaxon_37296	Human gammaherpesvirus 8	http://purl.obolibrary.org/obo/NCBITaxon_37296
Human gammaherpesvirus 8	http://purl.obolibrary.org/obo/NCBITaxon_37296	Human gammaherpesvirus 8	http://purl.obolibrary.org/obo/NCBITaxon_37296
Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606	Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606
Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606	Homo sapiens	http://purl.obolibrary.org/obo/NCBITaxon_9606
Human immunodeficiency virus 1	http://purl.obolibrary.org/obo/NCBITaxon_11676	Human immunodeficiency virus 1	http://purl.obolibrary.org/obo/NCBITaxon_11676

Exports – Source of Data

Top Header row = Field Group (Reference, Epitope, etc.)
2nd Header Row = Field (terms may repeat)

Stable URL for every assay and reference

Reference	Reference	Reference	Reference	Reference	Reference	Referen	Reference	Reference	Epitope	Epitope	Epitope	Epitope
Assay IRI	Reference IR	Type	PubMed	Authors	Journal	Date	Title	Submission I	Epitope IRI	Object Type	Description	Starting
http://www.iec	http://www.iec	Literature	7542549	L G Tussey; S Ro	Immunity	1995	Different MHC class I alleles con		http://www.iec	Linear peptide	ELRSRYWAI	380
http://www.iec	http://www.iec	Literature	12634388	Justin Stebbing;	J Virol	2003	Kaposi's sarcoma-associated he		http://www.iec	Linear peptide	HRQSIWITWH	82
http://www.iec	http://www.iec	Literature	12634388	Justin Stebbing;	J Virol	2003	Kaposi's sarcoma-associated he		http://www.iec	Linear peptide	HRQSIWITW	82
http://www.iec	http://www.iec	Literature	9820497	J M Brooks; R A	J Immunol	1998	HLA-B27 subtype polymorphism		http://www.iec	Linear peptide	RRARSLSAERY	243
http://www.iec	http://www.iec	Literature	9820497	J M Brooks; R A	J Immunol	1998	HLA-B27 subtype polymorphism		http://www.iec	Linear peptide	RRIYDLIEL	258
http://www.iec	http://www.iec	Submission		Mikkel Harndahl; Kasper Lambe		2009	Large scale anal	1000422	http://www.iec	Linear peptide	SRQRQAIPY	2145
http://www.iec	http://www.iec	Literature	12122005	Manuel Ramos;	J Biol Chem	2002	Molecular mimicry of an HLA-B2		http://www.iec	Linear peptide	RRKSSGGKGGSY	333
http://www.iec	http://www.iec	Literature	12122005	Manuel Ramos;	J Biol Chem	2002	Molecular mimicry of an HLA-B2		http://www.iec	Linear peptide	RRFKEGGRGGKY	211
http://www.iec	http://www.iec	Literature	9820524	A Paradela; M G	J Immunol	1998	The same natural ligand is invol		http://www.iec	Linear peptide	RRFFPYYV	127
http://www.iec	http://www.iec	Literature	9820524	A Paradela; M G	J Immunol	1998	The same natural ligand is invol		http://www.iec	Linear peptide	RRFFPYYVY	127
http://www.iec	http://www.iec	Literature	23978718	Katja Nitschke;	J Hepatol	2014	HLA-B*27 subtype specificity de		http://www.iec	Linear peptide	ARHTPVNSW	2820
http://www.iec	http://www.iec	Literature	23978718	Katja Nitschke;	J Hepatol	2014	HLA-B*27 subtype specificity de		http://www.iec	Linear peptide	ARMILMTHF	2841
http://www.iec	http://www.iec	Literature	23978718	Katja Nitschke;	J Hepatol	2014	HLA-B*27 subtype specificity de		http://www.iec	Linear peptide	GRAAICGKY	2936
http://www.iec	http://www.iec	Literature	23978718	Katja Nitschke;	J Hepatol	2014	HLA-B*27 subtype specificity de		http://www.iec	Linear peptide	SRYWAIRTR	383
http://www.iec	http://www.iec	Literature	23978718	Katja Nitschke;	J Hepatol	2014	HLA-B*27 subtype specificity de		http://www.iec	Linear peptide	KRWIILGLNK	262
http://www.iec	http://www.iec	Literature	25268942	Alejandro Barrig	PLoS One	2014	A common minimal motif for th		http://www.iec	Linear peptide	VRNKDLNTL	169
http://www.iec	http://www.iec	Literature	25268942	Alejandro Barrig	PLoS One	2014	A common minimal motif for th		http://www.iec	Linear peptide	KRLPADVLKK	150
http://www.iec	http://www.iec	Literature	25268942	Alejandro Barrig	PLoS One	2014	A common minimal motif for th		http://www.iec	Linear peptide	HRQDINGKEM	100

Exports – Assay Types

Top Header row = Field Group (Reference, Epitope, etc.)
2nd Header Row = Field (terms may repeat)

Separate method and assay group columns allow sorting

IRI is linked to ontology term for assay (OBI ontology)

Assay	Assay	Assay	Assay	Assay	Assay	Assay	Assay
Location of assay data in the manuscript	Method/Technique	Assay Group	Units	Assay Type IRI	Qualitative Measure	Measurement Inequality	Quantitative measurement
Fig. 4A	lysate MHC/direct/radioactivity	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001556	Positive		
Figure 4	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive		
Figure 4	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive		
Figures 2 and 5, table III	cellular MHC/direct/fluorescence	half life	min	http://purl.obolibrary.org/obo/OBI_0001559	Positive		2520
Figures 2 and 5, table III	cellular MHC/direct/fluorescence	half life	min	http://purl.obolibrary.org/obo/OBI_0001559	Positive		2220
	purified MHC/direct/fluorescence	dissociation constant KD (~EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001543	Positive-Low	>	5000
Figure 4 and table II	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive		5000
Figure 4 and table II	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive		7000
Figure 4	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-High	=	4000
Figure 4	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-High	=	3000
Figures 2 and 4	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive-High		
Figure 2	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive-High		
Figure 2	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive-High		
Figure 2	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive-Low		
Figure 2	cellular MHC/direct/fluorescence	qualitative binding		http://purl.obolibrary.org/obo/OBI_0001606	Positive-High		
Figure 7 and Tables 1, 2, ar	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-Low	=	94000
Figure 7 and Tables 1, 2, ar	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-Low	=	136000
Figure 7 and Tables 1, 2, ar	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-Low	=	132000
Figure 7 and Tables 1, 2, 3,	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-Interm	=	43000
Figure 7 and Tables 1, 2, 3,	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-High	=	9000
Figure 7 and Tables 1, 2, ar	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-Low	=	77000
Table 2	cellular MHC/direct/fluorescence	half maximal effective concentration (EC50)	nM	http://purl.obolibrary.org/obo/OBI_0001561	Positive-High	=	16000

Results Page: Discontinuous Epitopes

B cell assays only = B cell epitopes

Epitopes (4347) | Antigens (13) | Assays (9492) | Receptors (27) | References (149)

Go To Records Starting At 1200 GO Export Results

4347 Records Found Page 1 of 174 25 Per Page

Details	Epitope	Antigen	Organism	# References	# Assays
1336251	E484	Spike glycoprotein	SARS-CoV2	4	12
1338787	N501	Spike glycoprotein	SARS-CoV2	4	11
1069378	ECDIPIGAGICASYQ	Spike glycoprotein	SARS-CoV2	3	4
1070803	KPSKRSFIEDLLFNK	Spike glycoprotein	SARS-CoV2	3	5
1073281	TESNKKFLPFQQFGRDIA	Spike glycoprotein	SARS-CoV2	3	4
1310239	R346, N440, L441, K444, V445, G446, N448, Y449, Q4...	Spike glycoprotein	SARS-CoV2	3	19
1310265	AIVLQLPQGTTLPKG	Nucleoprotein	SARS-CoV2	3	6
1310304	CASYQTQTNSPRRAR	Spike glycoprotein	SARS-CoV2	3	6
1313381	QRVAGDSGFAAYSRY	Membrane protein	SARS-CoV2	3	4
1314086	F486, N487	Spike glycoprotein	SARS-CoV2	3	13
1316945	FSQILPDPSKPSKRSFIE	Spike glycoprotein	SARS-CoV2	3	5
1335914	E484	Spike glycoprotein	SARS-CoV2	3	9
1338780	K417	Spike glycoprotein	SARS-CoV2	3	6
1340666	EPIYDEPTTTTSVPL	ORF3a protein	SARS-CoV2	3	6
5406	AVKLQNNELSPVALR	Replicase polyprotein 1ab	SARS-CoV2	2	4

User Query: What protein are B cell epitope residues in reference to?

Epitope		
Epitope ID	1314086	IEDB_epitope:1314086
Chemical Type	Discontinuous peptide	
Source Name	surface glycoprotein [Severe acute respiratory syndrome coronavirus 2]	GenPept:QHD43416.1
Source Organism	SARS-CoV2	NCBITaxon:2697049
Discontinuous Residues	F486, N487	

Epitope Reference Details		
Epitope Structure Defines	Partial Epitope	
Epitope Name	Epitope of COV2-2196 on SARS-CoV-2	
Reference Region	F486, N487	
Location of Data in Reference	Figure 3	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