

2026 GVN Annual International Scientific Meeting

TAMPA, FLORIDA, U.S.A.
March 4–6, 2026

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La Jolla Institute for Immunology
March 4, 2026



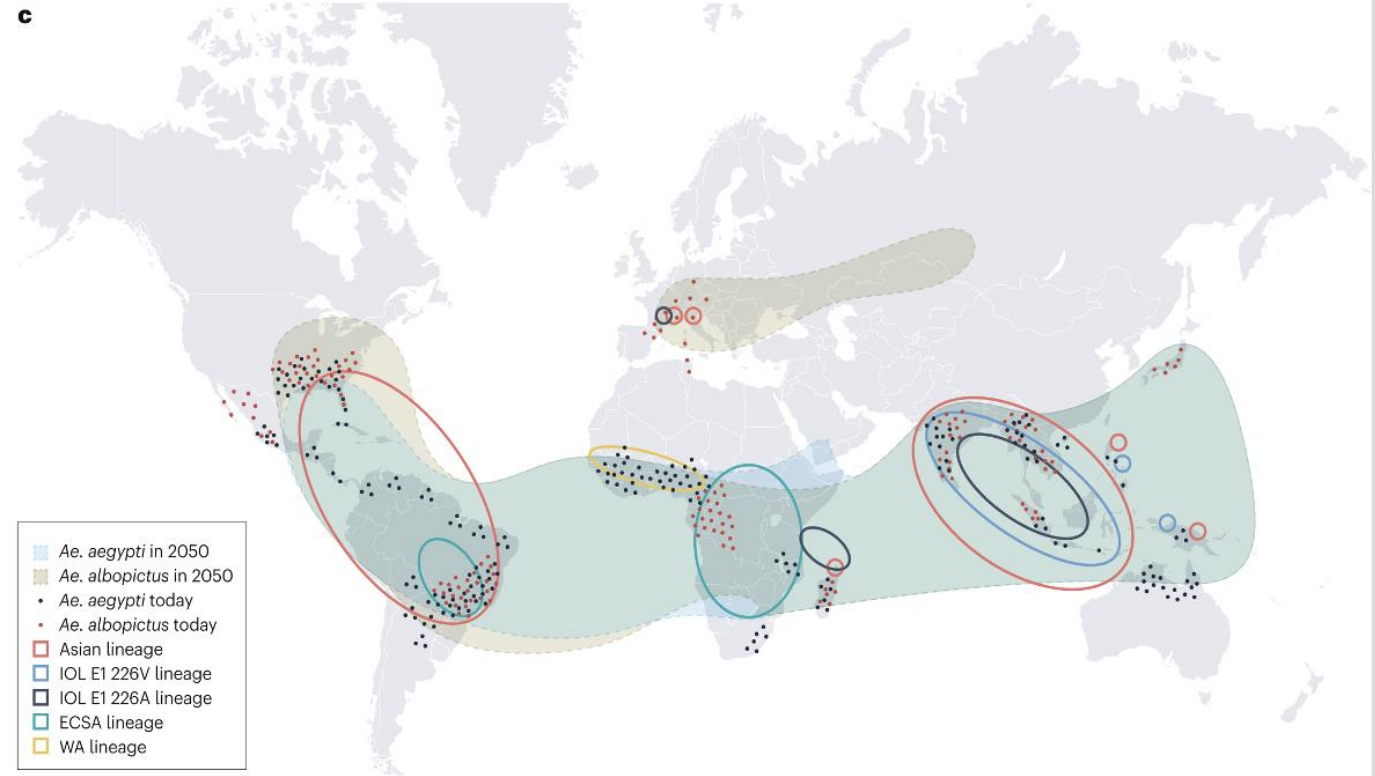
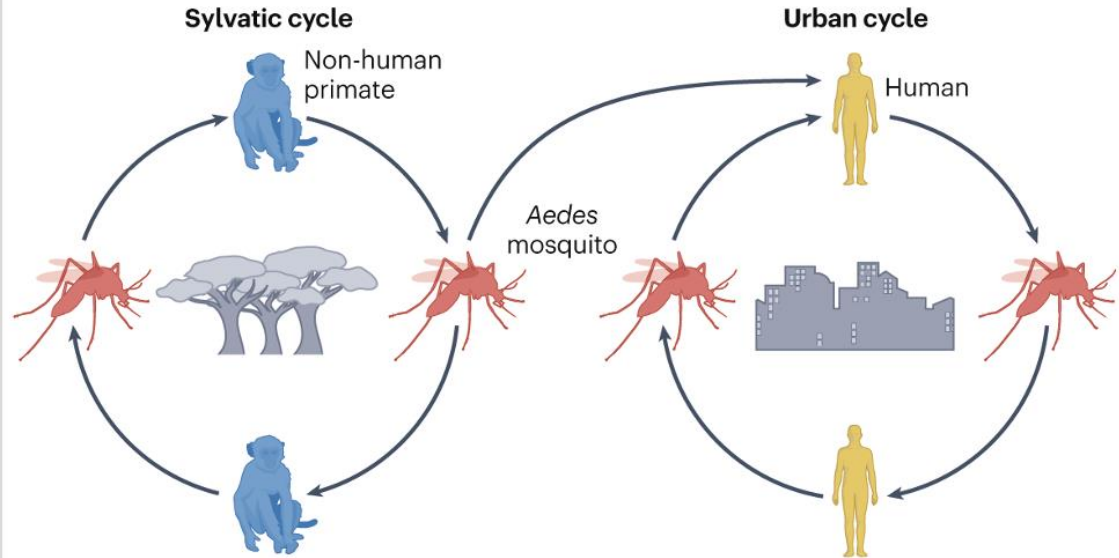
USF Health



CANCER
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CD4⁺ T cells are associated with
chronic chikungunya virus
disease

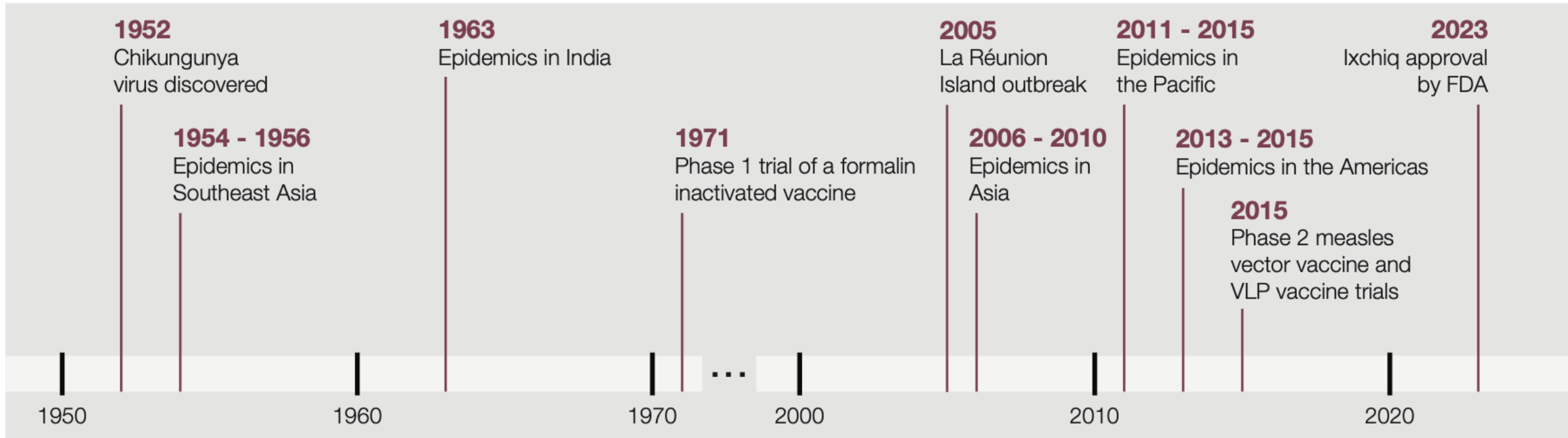
Transmission and Global Distribution



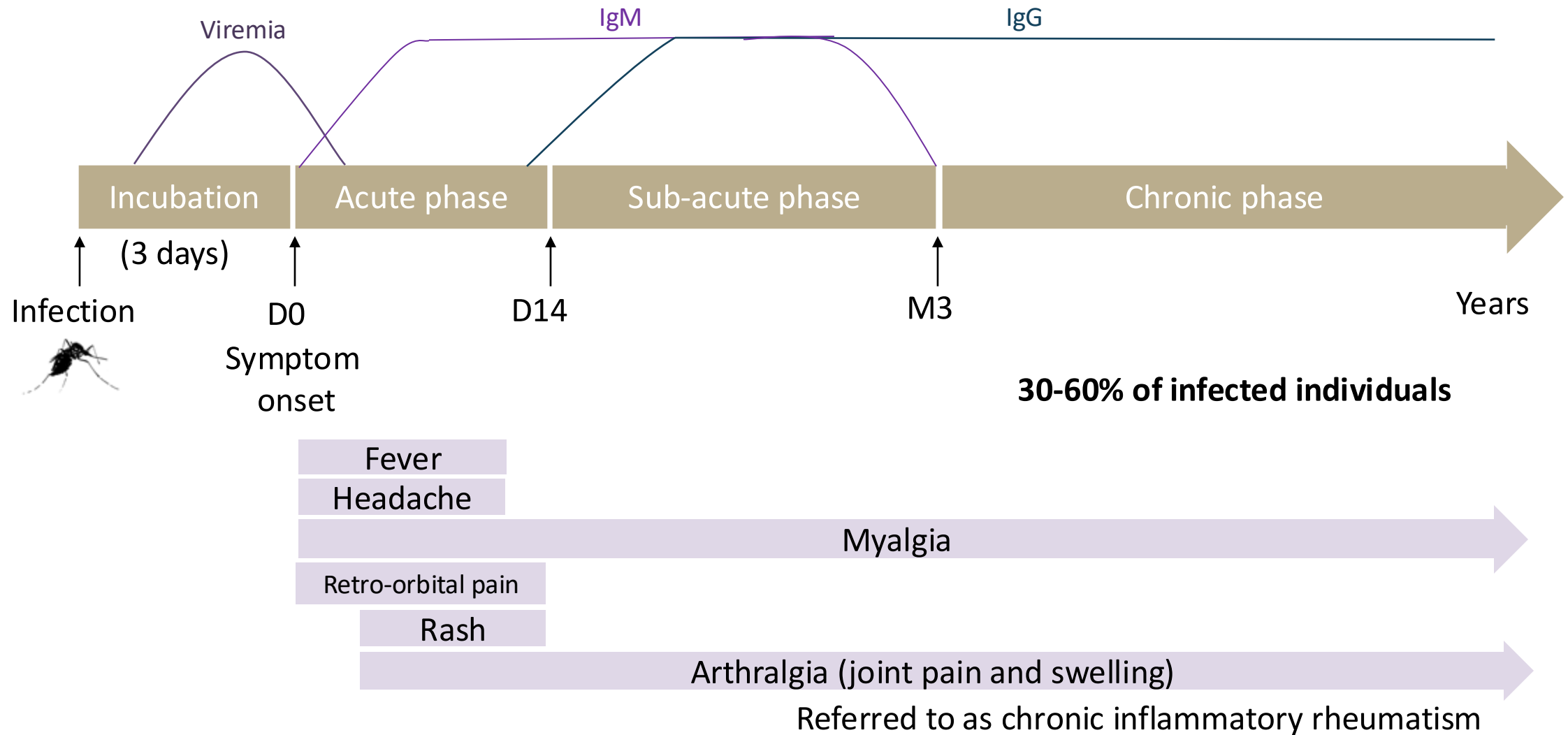
IOL – Indian Ocean lineage
ECSA – East, Central and South African lineage
WA – West African lineage

(Bartholomeeusen et al., 2023)

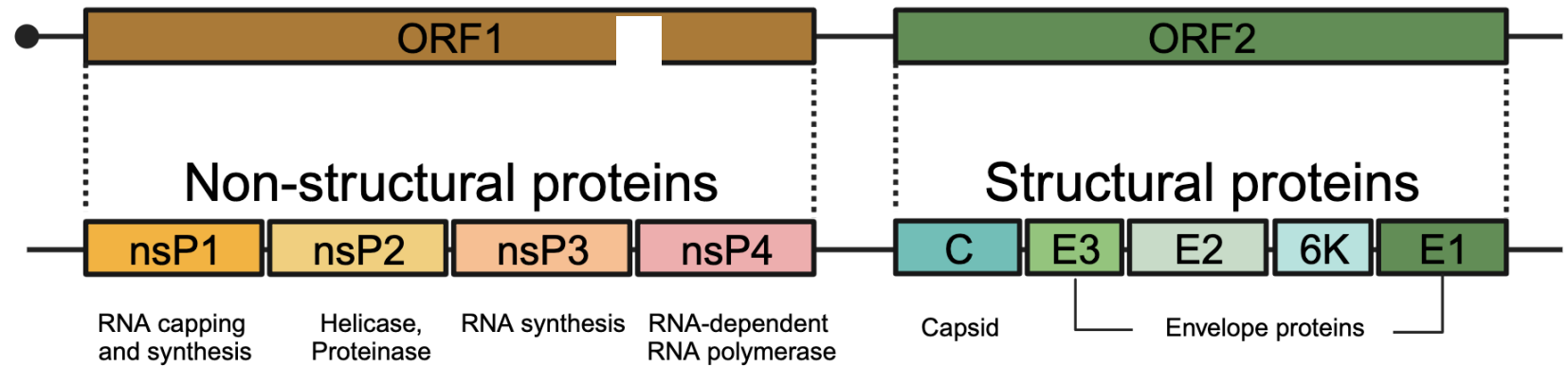
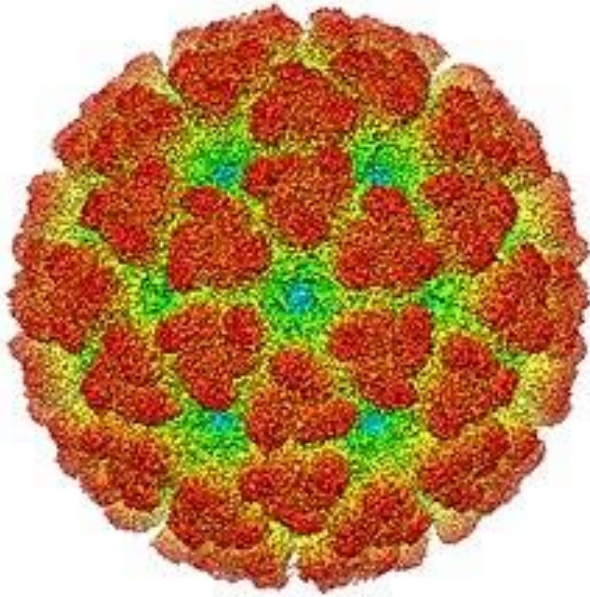
Outbreaks and vaccine



Pathology



Chikungunya virus



(Bartholomeeusen et al., 2023)

What parts of the virus do T cells recognize?

Study cohort

In 2014-2015, there was a huge outbreak of CHIKV in Colombia.

Samples were collected from Baranquilla, Colombia.

These samples are positive for CHIKV IgG

| Characteristic | Symptomatic | Recovered |
|---|-----------------|---------------|
| <i>Donors</i> , n | 113 | 76 |
| <i>Gender</i> , n (%) | | |
| Male | 33 (29%) | 22 (29%) |
| Female | 80 (71%) | 54 (71%) |
| <i>Age</i> *, years (mean \pm SD) | 46.2 \pm 12.1 | 37.5 \pm 12 |
| <i>Years post-infection</i> (mean \pm SD) | 6.7 \pm 0.8 | 7.5 \pm 0.6 |
| <i>Current symptoms</i> | | |
| Athralgia** (%) | 100 | 0 |
| <i>Symptoms at the time of infection</i> | | |
| Fever (%) | 100 | 100 |
| Headache (%) | 96 | 99 |
| Non-purulent conjunctivitis (%) | 1 | 0 |
| Retrorbital pain (%) | 4 | 4 |
| Diarrhea (%) | 5 | 11 |
| Asthenia (%) | 24 | 3 |
| Myalgia (%) | 93 | 89 |
| Arthralgia (%) | 98 | 95 |
| Exanthema (%) | 78 | 71 |
| Edema lower limb and/or other parts of the body (%) | 45 | 4 |

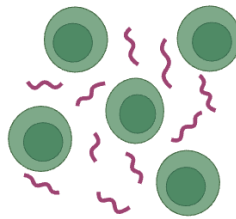
* At the time of sample collection

** Includes pain in joints and upper and lower limbs, swelling in limbs, and muscle pain

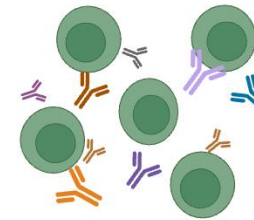
Approach



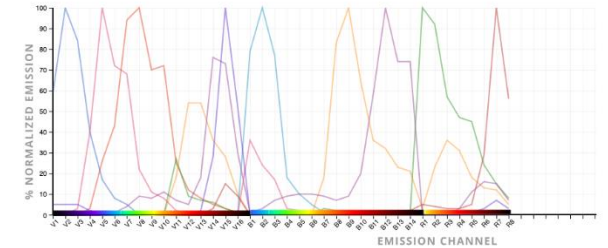
PBMCs were collected from
CHIKV-confirmed individuals
in Colombia
6 years post-infection



PBMCs were stimulated
for 24h with peptides
spanning the entire
CHIKV genome

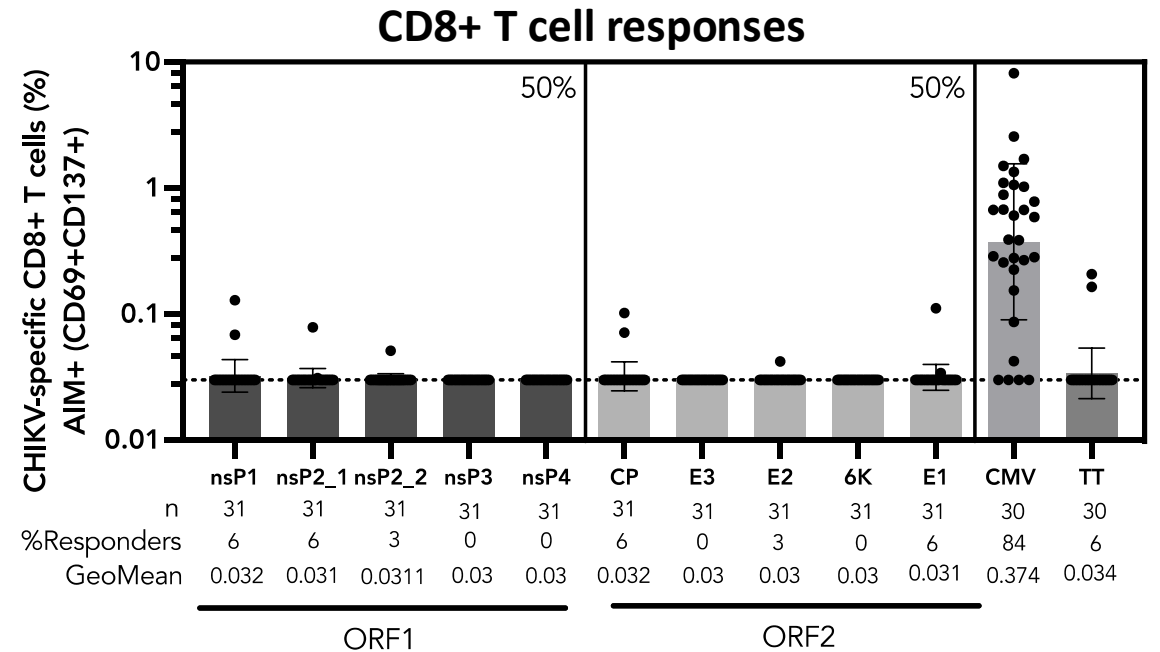
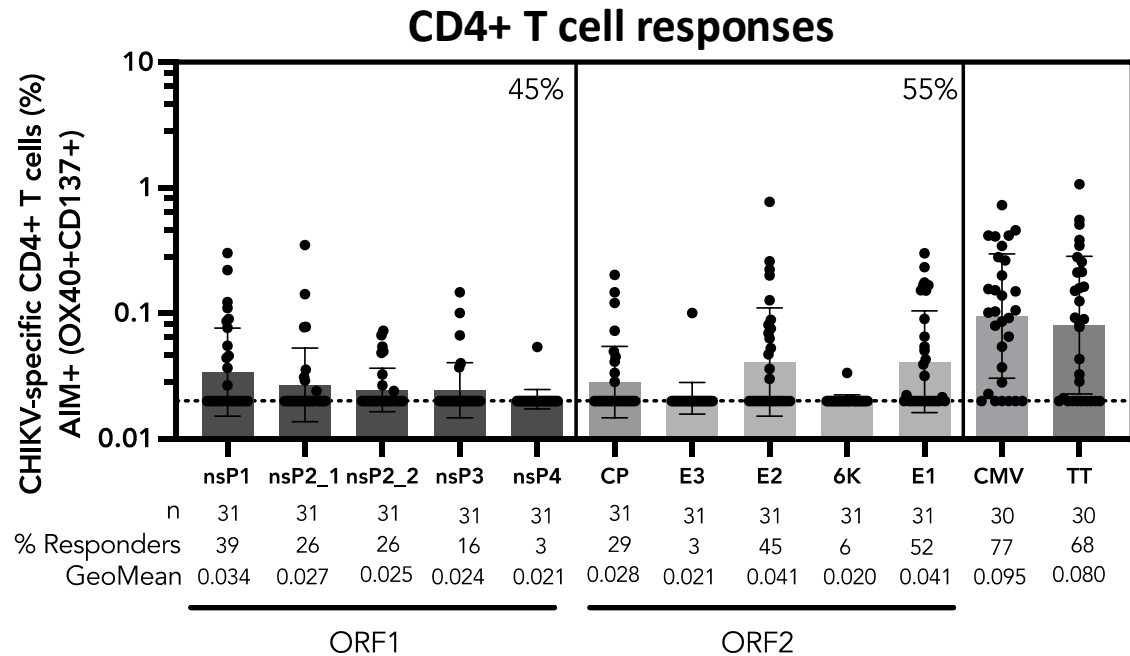


T cell activation and cytokine
production was measured via
spectral flow cytometry

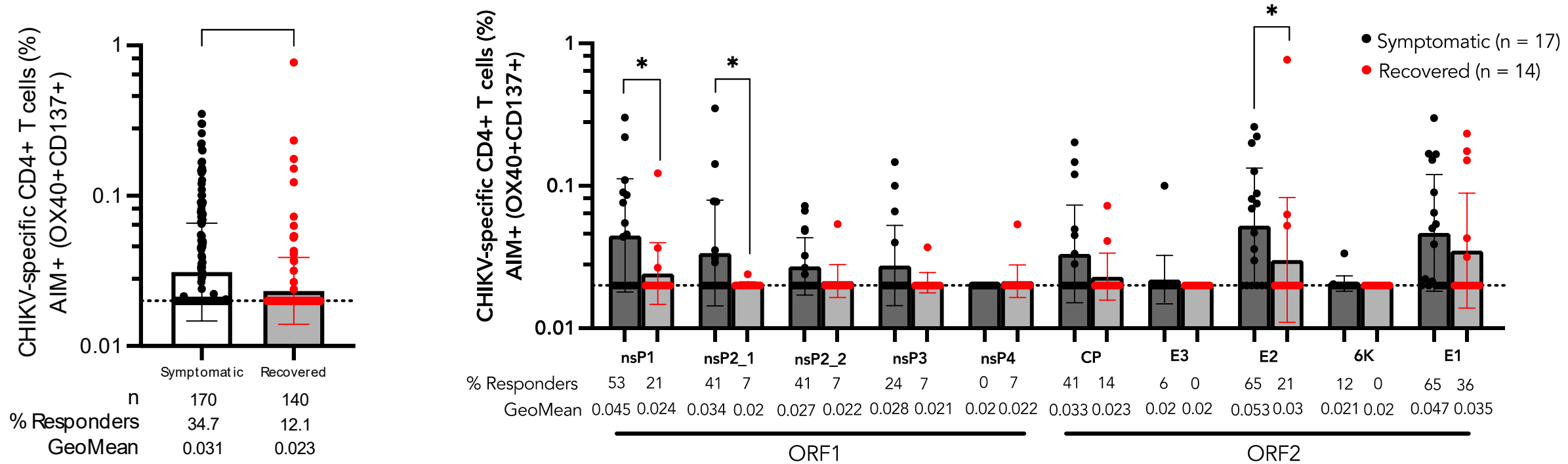


CHIKV-specific CD4+ T cells – OX40+ CD137+
CHIKV-specific CD8+ T cells – CD69+CD137+
T helper subsets – CXCR3, CCR6
Memory phenotype – CCR7, CD45RA
Cytokines - IFN γ , TNF α , IL-2, IL-4, IL-17A, GzB

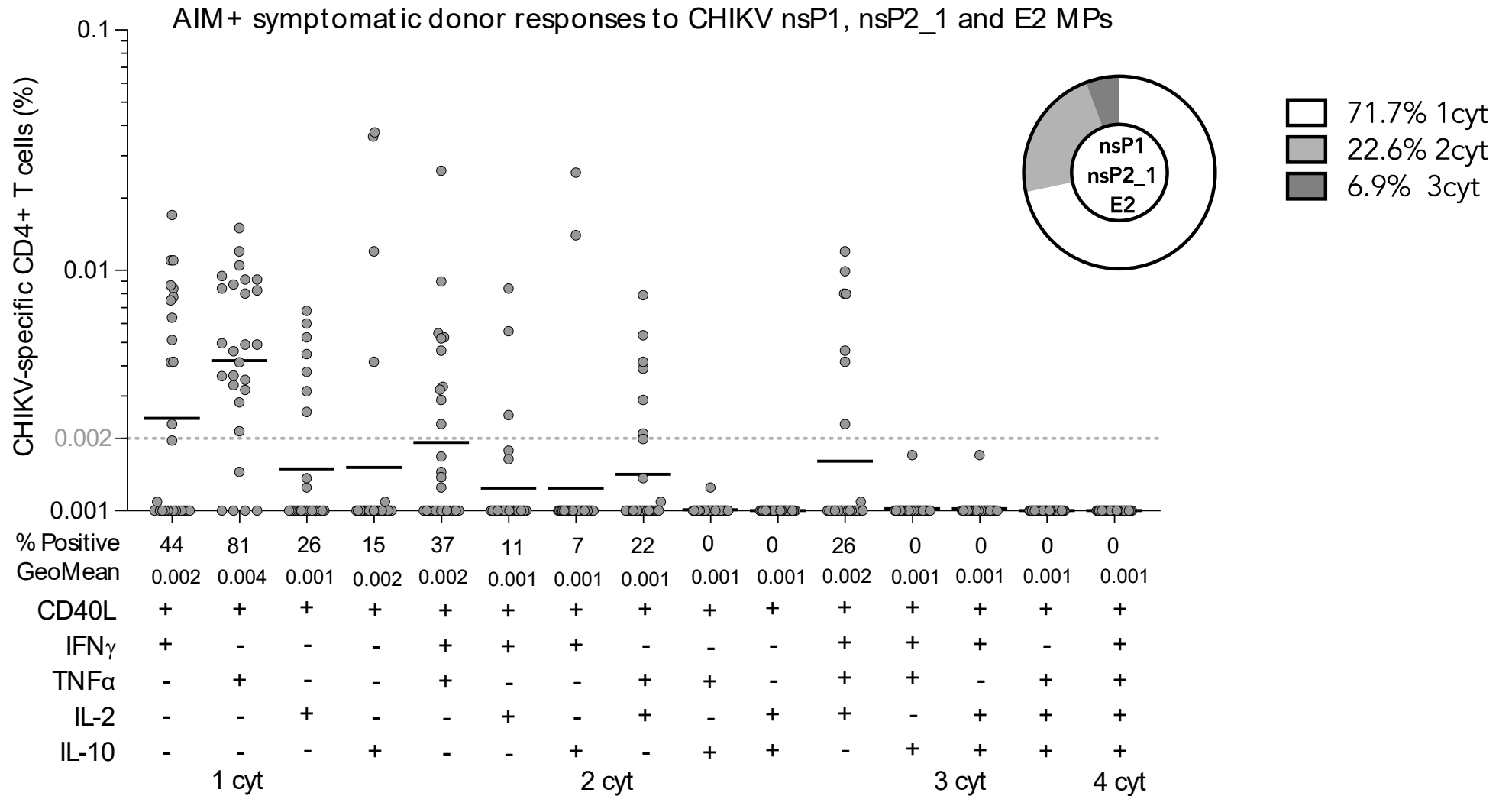
Only CD4+ T cell responses could be detected



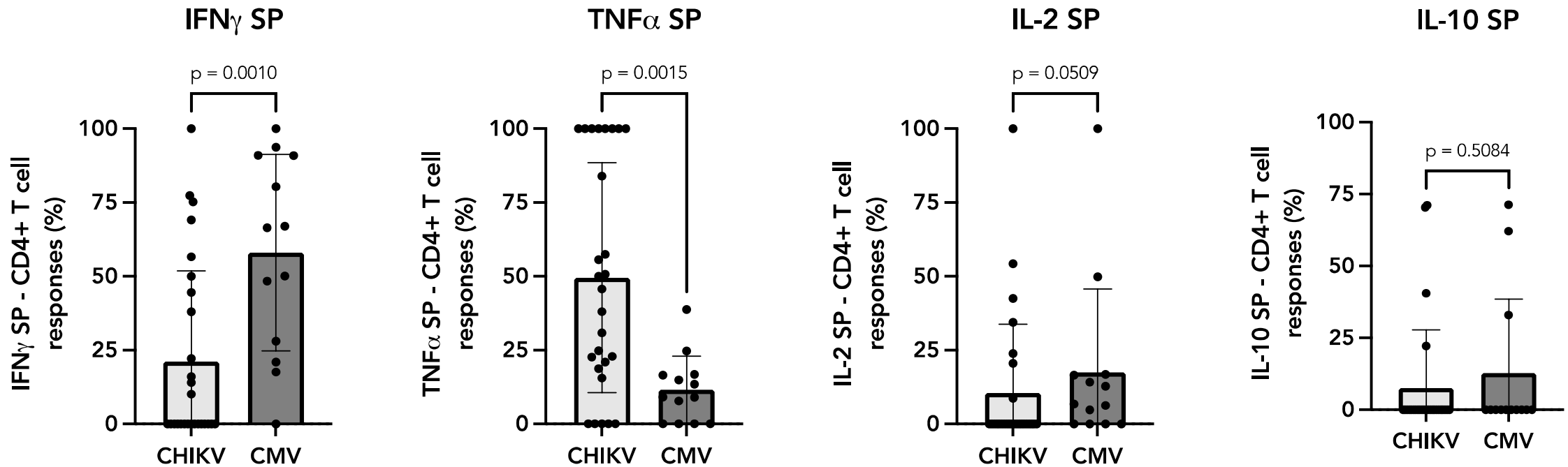
Higher frequency of CHIKV-specific CD4+ T cells in individuals with chronic symptoms



Multifunctional profile of CD4+ T cells



TNF α is the most produced cytokine



SP – single producers

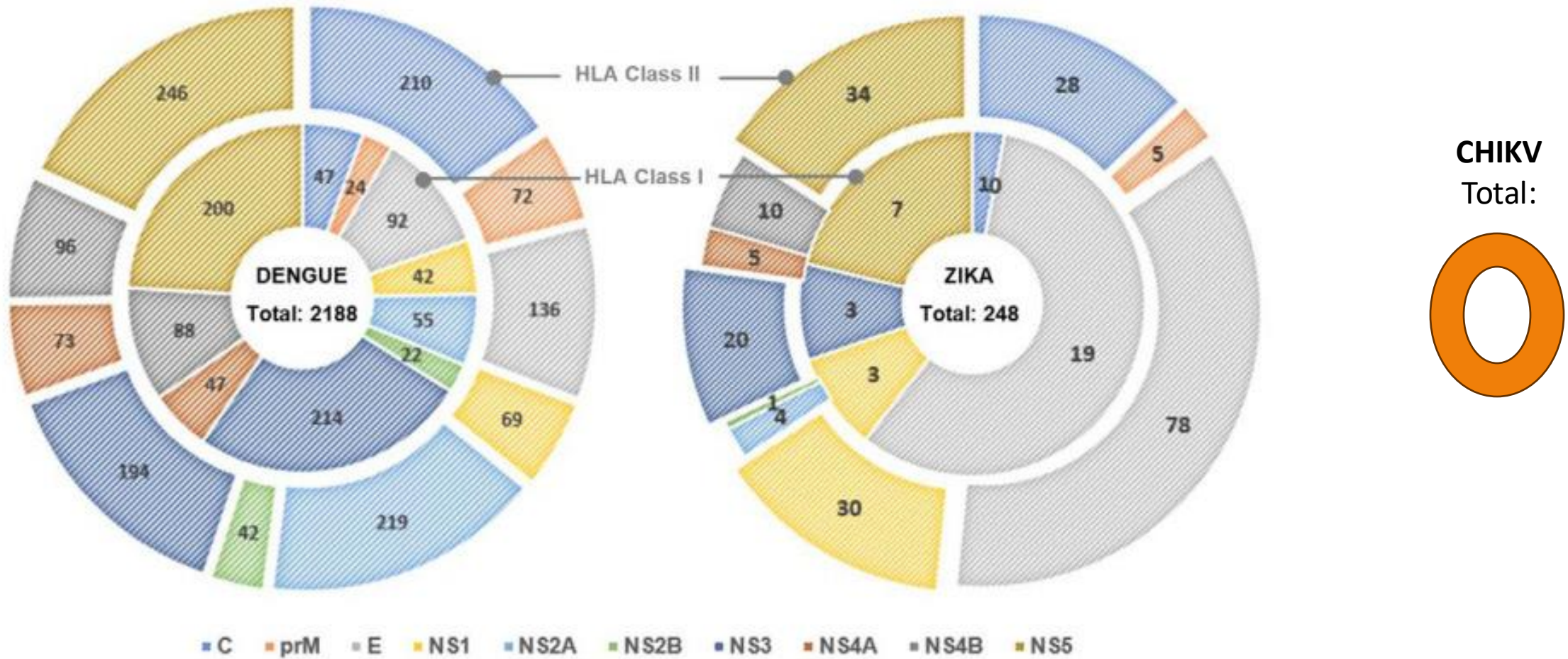
Conclusions (I)

- Individuals with chronic symptoms have a higher proportion of CHIKV-specific CD4+ T cells that are specific to nsP1, nsP2 and E2.
- CHIKV-specific CD4+ T cells are enriched in the Th17 phenotype in symptomatic individuals and in Th1 phenotype in recovered individuals.
- CHIKV-specific CD4+ T cells are primarily monofunctional and predominantly produce $\text{TNF}\alpha$.
- **Overall, our work suggests that CD4+ T cell potentially play a pathogenic role in chronic chikungunya disease in humans.**

Unanswered questions

1. What are the CD4+ T cell epitopes of CHIKV that are recognized in chronic CHIKVD?

Identified Human Epitopes



Cohort

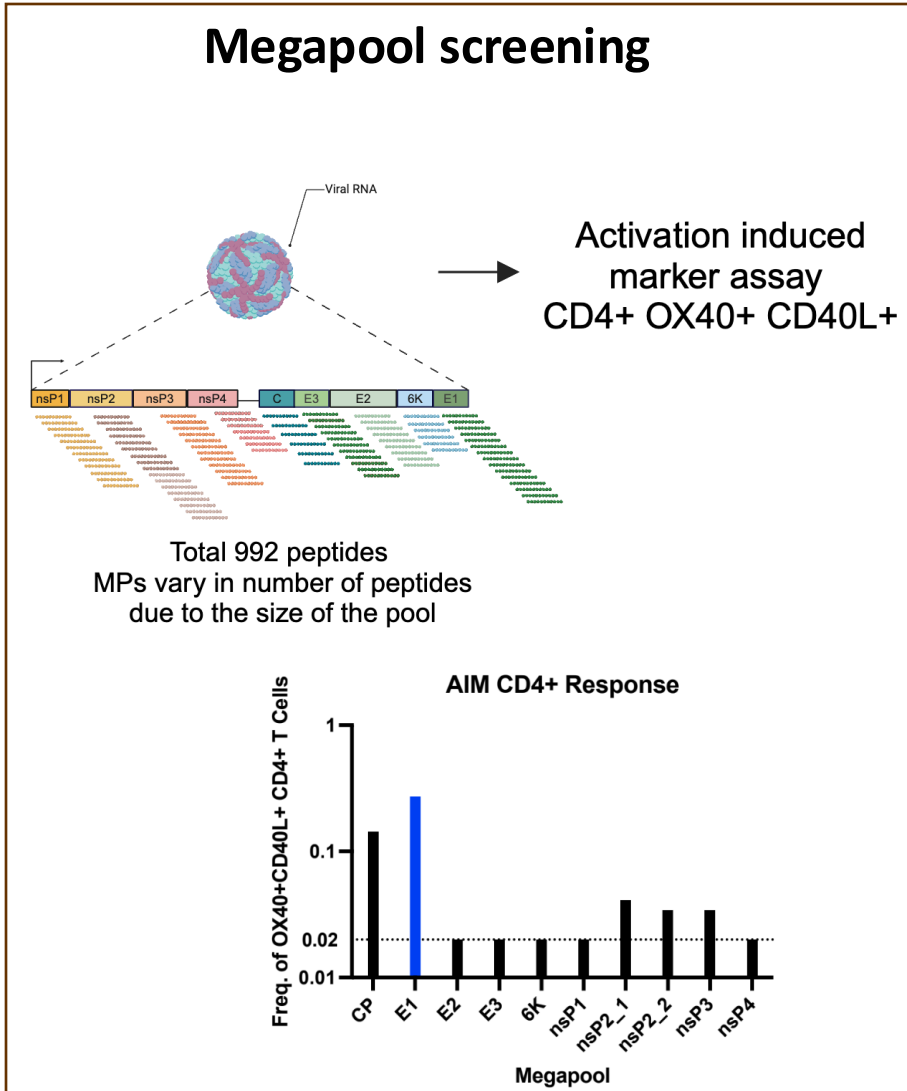
| Characteristic | Chronic |
|--------------------------------------|-----------------|
| Donors, n | 17 |
| Gender, n (%) | |
| Male | 6 (35%) |
| Female | 11 (65%) |
| Age *, years (mean \pm SD) | 46.8 \pm 14.1 |
| Years post-infection (mean \pm SD) | 6.3 \pm 0.5 |
| Current symptoms | |
| Arthralgia** (%) | 100 |

* *At the time of sample collection*

** *Includes pain in joints and upper and lower limbs, swelling in limbs, and muscle pain*

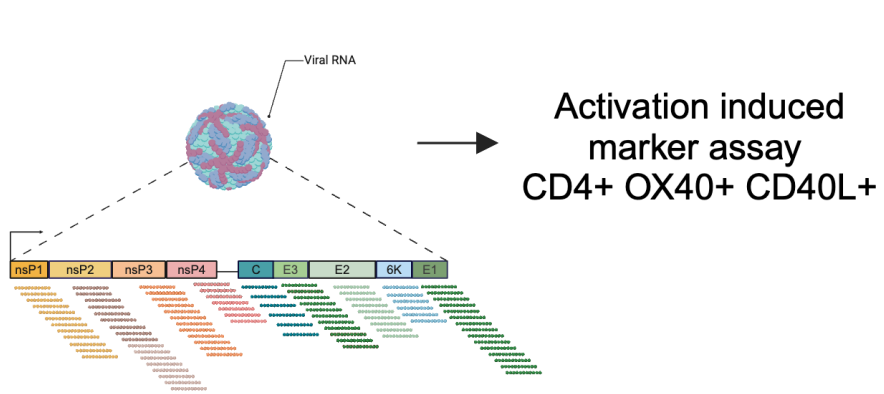
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PBMCs were collected from Baranquilla, Colombia.
These samples are positive for CHIKV IgG.

Approach

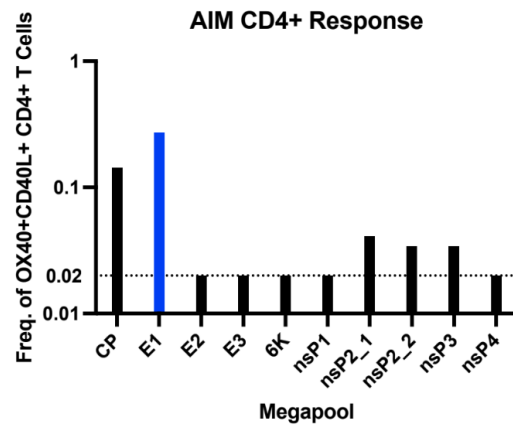


Approach

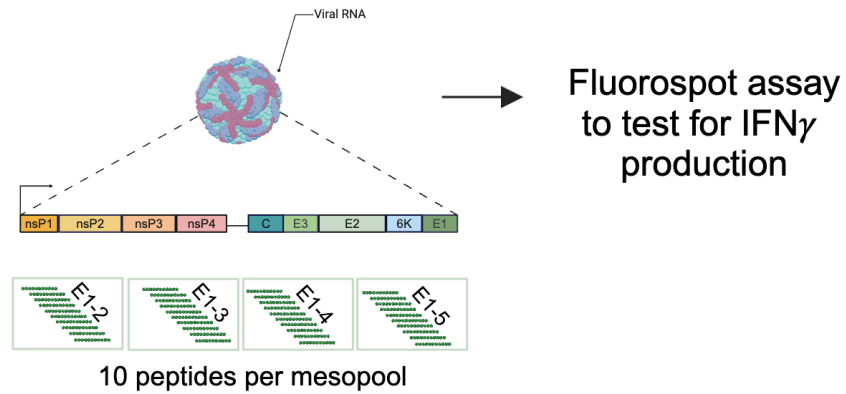
Megapool screening



Total 992 peptides
MPs vary in number of peptides
due to the size of the pool

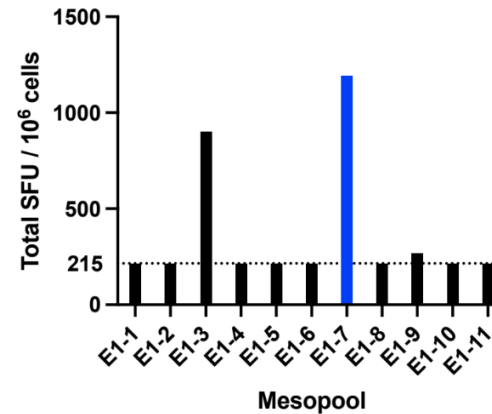


Mesopool screening



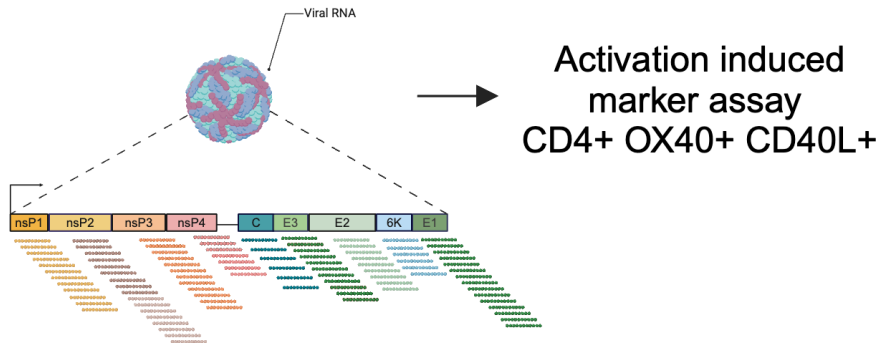
10 peptides per mesopool

Mesopool Response

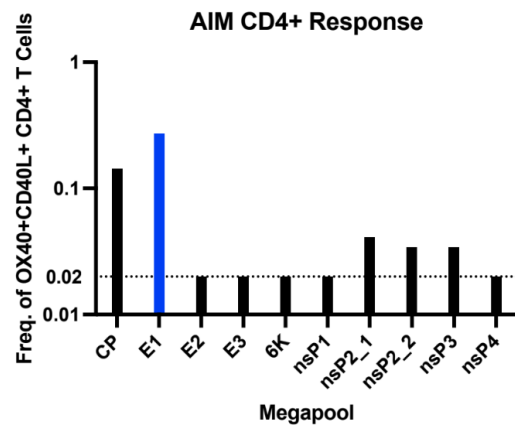


Approach

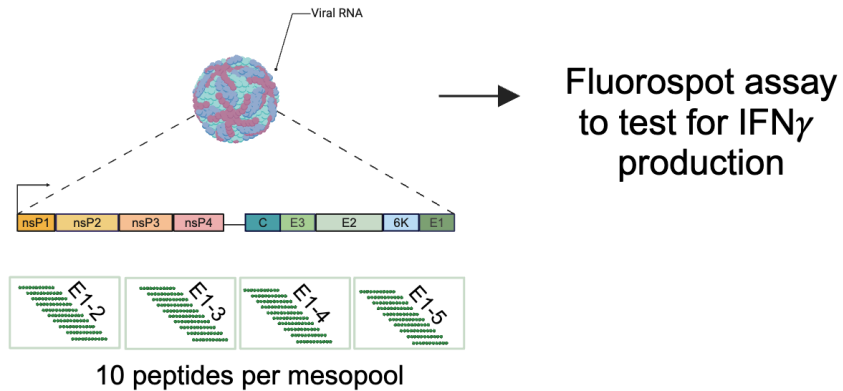
Megapool screening



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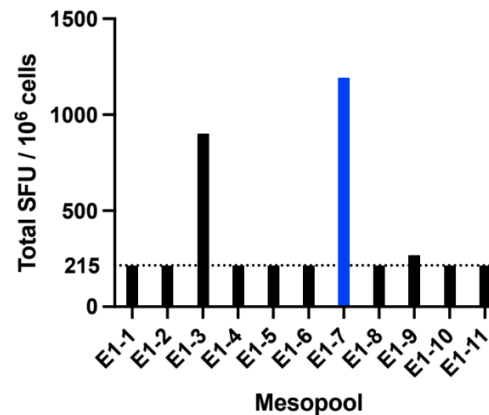


Mesopool screening



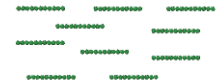
10 peptides per mesopool

Mesopool Response



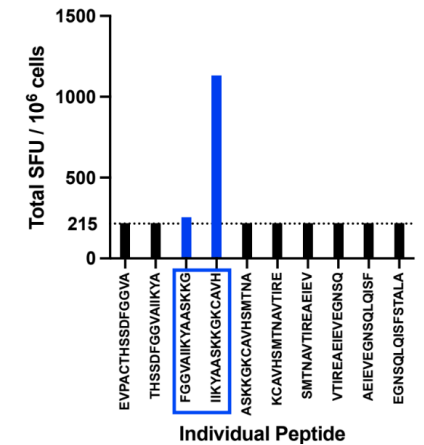
Deconvolution

E1-7

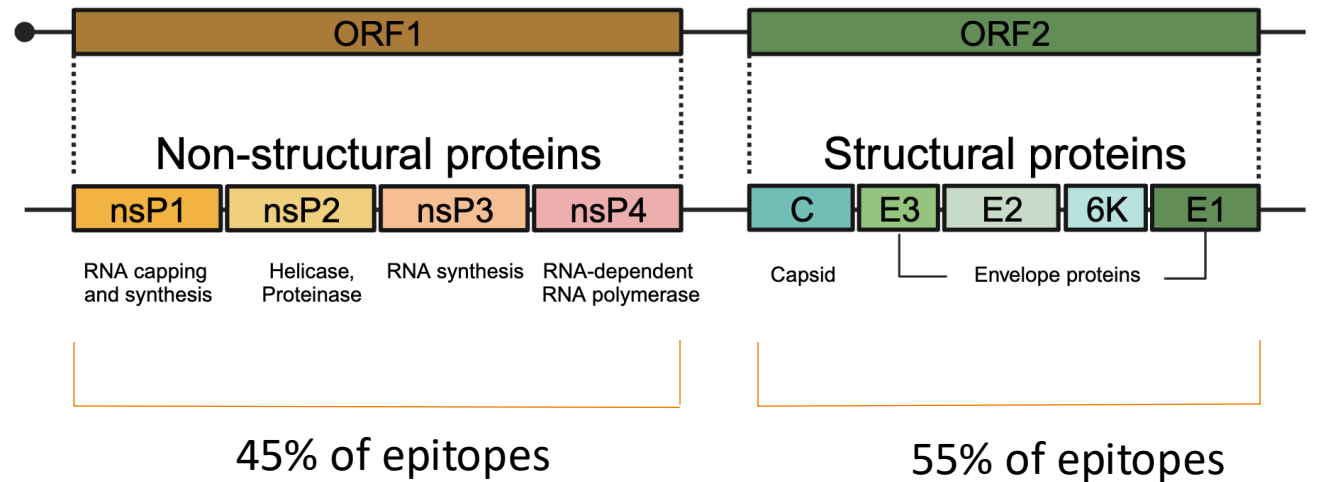
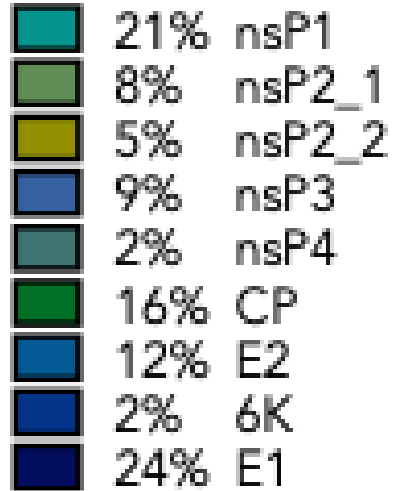
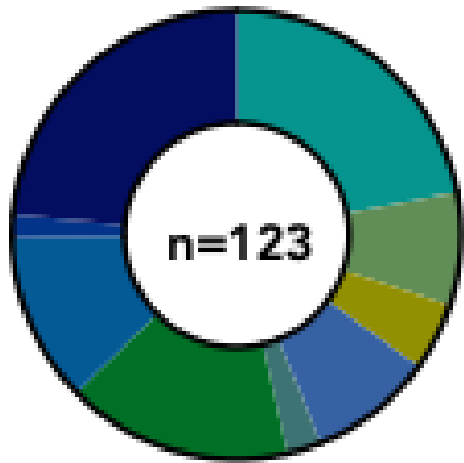


Tested each peptide individually in Fluorospot assay

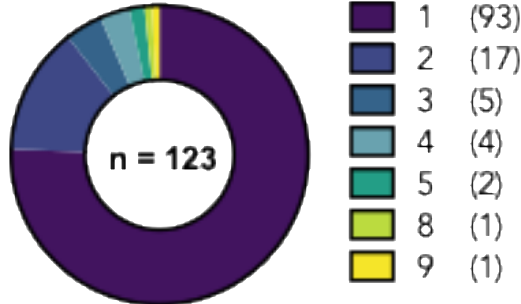
Individual Peptide Response



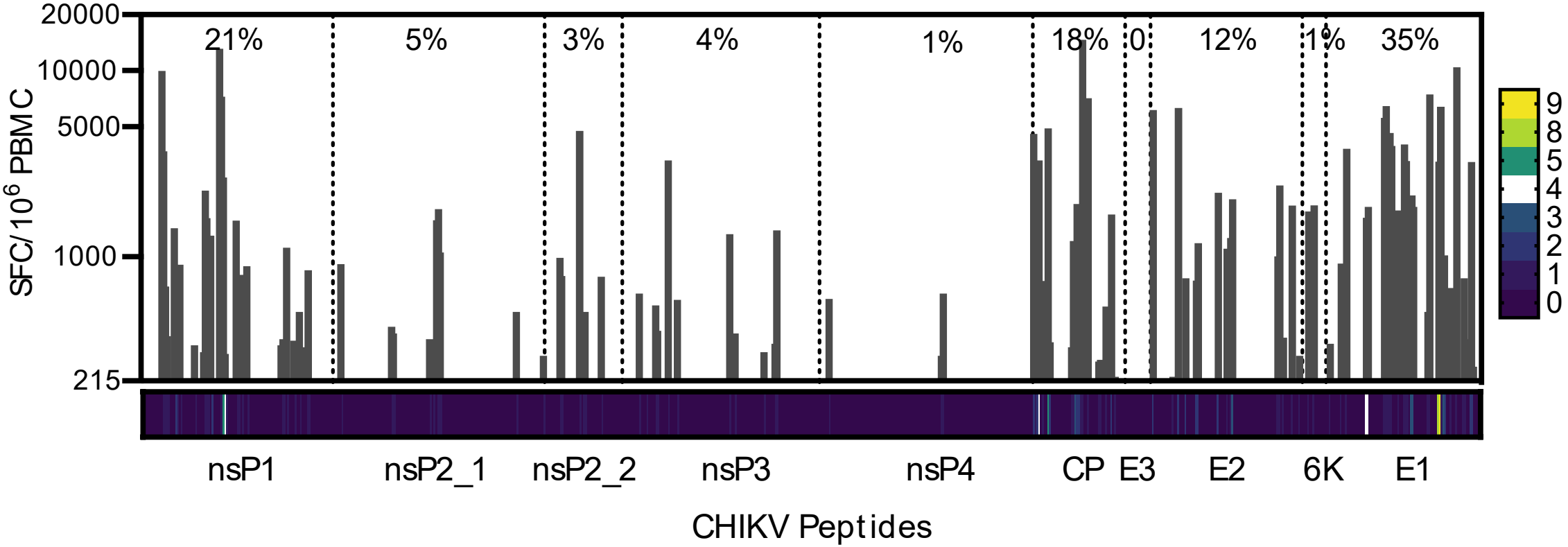
CHIKV epitopes recognized by CD4+ T cells



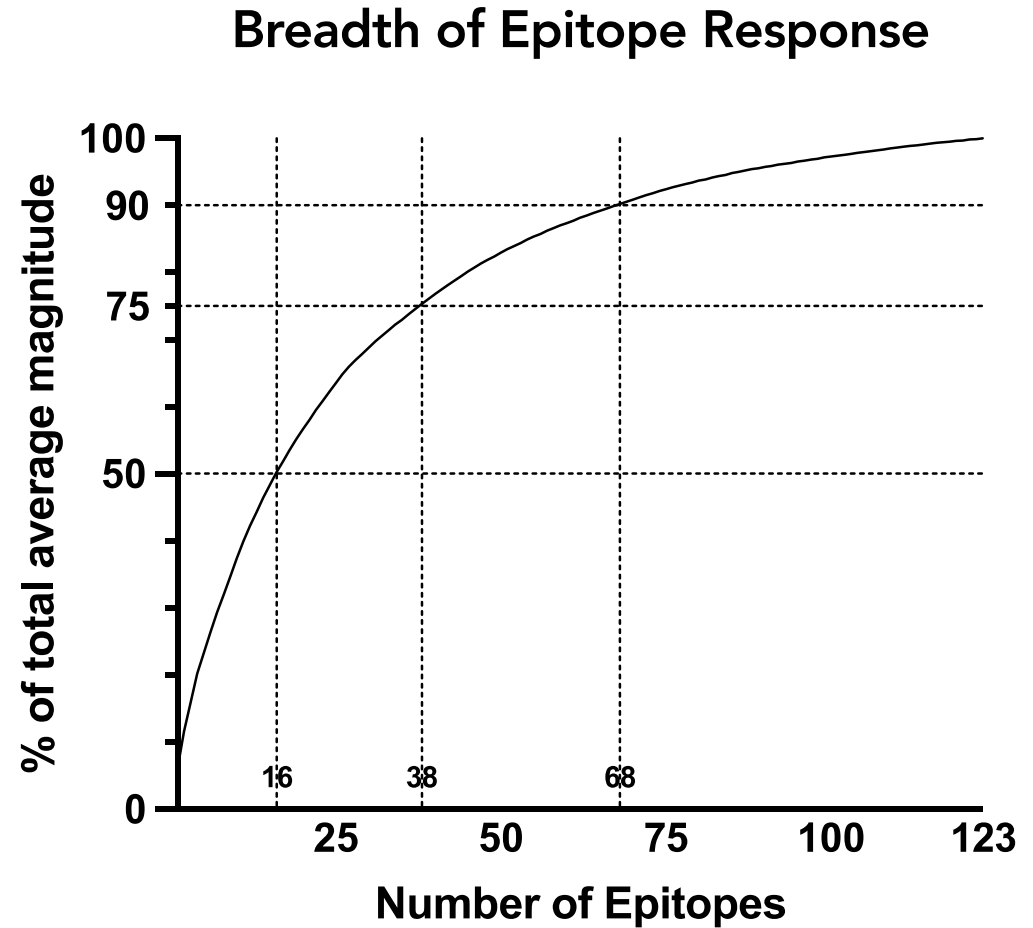
Magnitude of CHIKV-specific CD4+ T cell responses



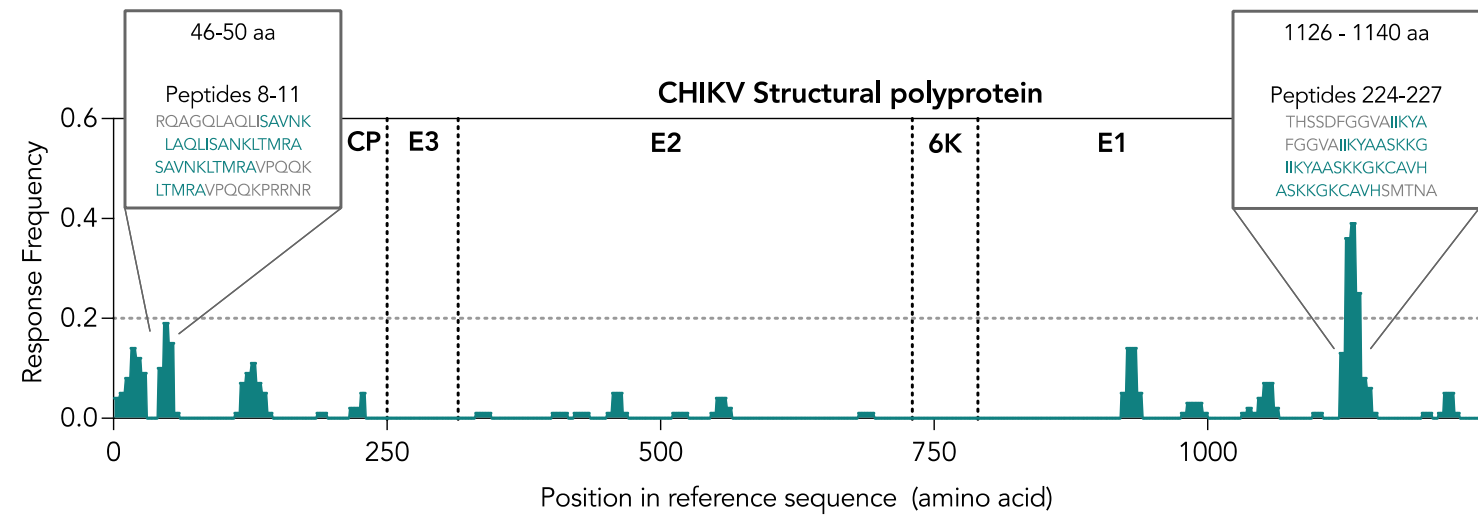
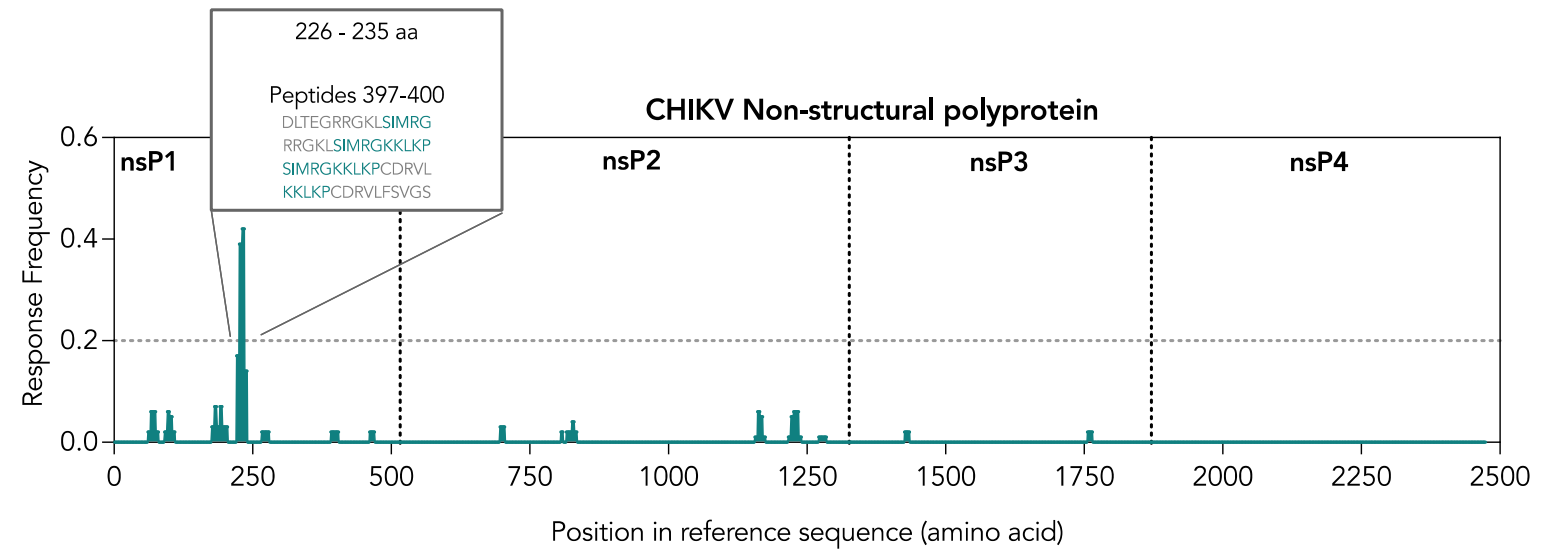
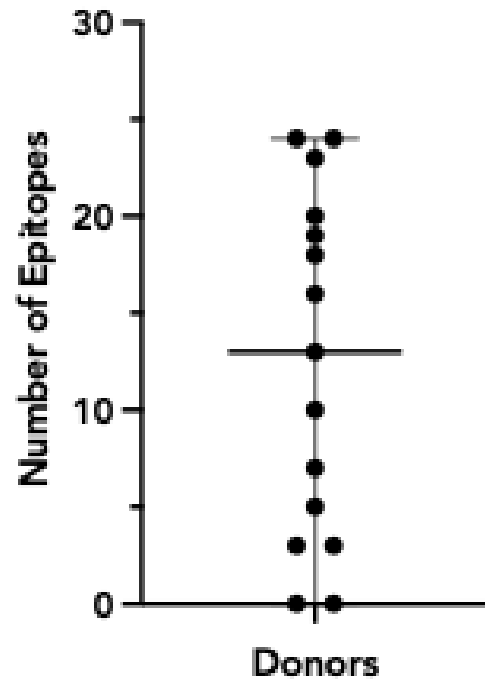
Parenteses indicate number of epitopes recognized



75% of average positive IFN γ response in chronic patients is elicited by 38 epitopes



Response frequency reveals immunodominant regions



Conclusions (II)

1. What are the CD4+ T cell epitopes of CHIKV that are recognized in chronic CHIKVD?

- Using fluorospot assay, we detected 123 epitopes in individuals suffering from chronic CHIKVD
- About 4% epitopes were identified in at least 5 individuals
 - Specific regions in nsP1 and E1 protein were highly recognized.
- 75% of IFN γ response detected was elicited by 38 epitopes
- Same epitopes are recognized in chronic vs recovered

2. Is there still virus present in these chronic patients?

- No virus could be detected in plasma or joint tissue

3. If there is no virus present, what do CD4+ T cells recognize to mediate potential pathogenicity?

- Are CD4⁺ T cells cross-reactive with self?

Weiskopf Lab



*La Jolla,
California*



Weiskopf Lab

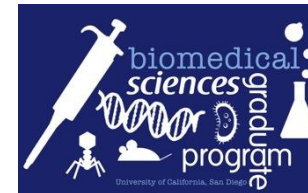
Rimjhim Agarwal
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Amparo Martinez Perez
Calvin Ha
John Villalpando
Aliyah Nevarez

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Alessandro Sette
Alba Grifoni
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SPARK AWARDS FOR
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