Capturing Primary and Secondary Anti-Yellow Fever Vaccine Response to Investigate the Dynamics of Antigen-Specific T Cells

Minervina *et al.* Primary and Secondary Anti-Viral Response Captured by the Dynamics and Phenotype of Individual T-Cell Clones (2020) eLife (doi: 10.7554/eLife.53704)

BACKGROUND

One of the best-established models of acute viral infection in humans is Yellow Fever (YF) vaccination. While much is known about the immune response to the primary vaccination, only limited data on the response to the booster vaccination with YFV17D exists. In this study, Minervina *et al*. track the concentrations and phenotypes of individual T-cell clones in response to primary and secondary YF immunization — the model for acute infection in humans — showing their large diversity.

STUDY DESCRIPTION

Blood samples were collected from two healthy donors (M1 male age 26 and P30 male age 39) on multiple time points before and after YFV17D vaccine immunization. HLA-A02 Dextramer®, loaded with the NS4B241-222 peptide (LLWNGPMAV) from YFV17D, was used for epitope-specific T-cells isolation in donor blood by magnetic beads or FACS.

RESULTS

Using an HLA-A*0201 (LLWNGPMAV) MHC I Dextramer® reagent, NS4B-specific CD8+ T cells were isolated for latter characterization of clonotype and phenotype by single-cell multi-omics in donor samples. YF-specific CD8+ T cells could be found in the blood of both vaccinated individuals with gradually increasing frequency over time (**Fig. 1 a, b**). Furthermore, it was evident that the frequency of YF-specific T cells increased after enrichment with magnetic beads (**Fig. 1 c**).

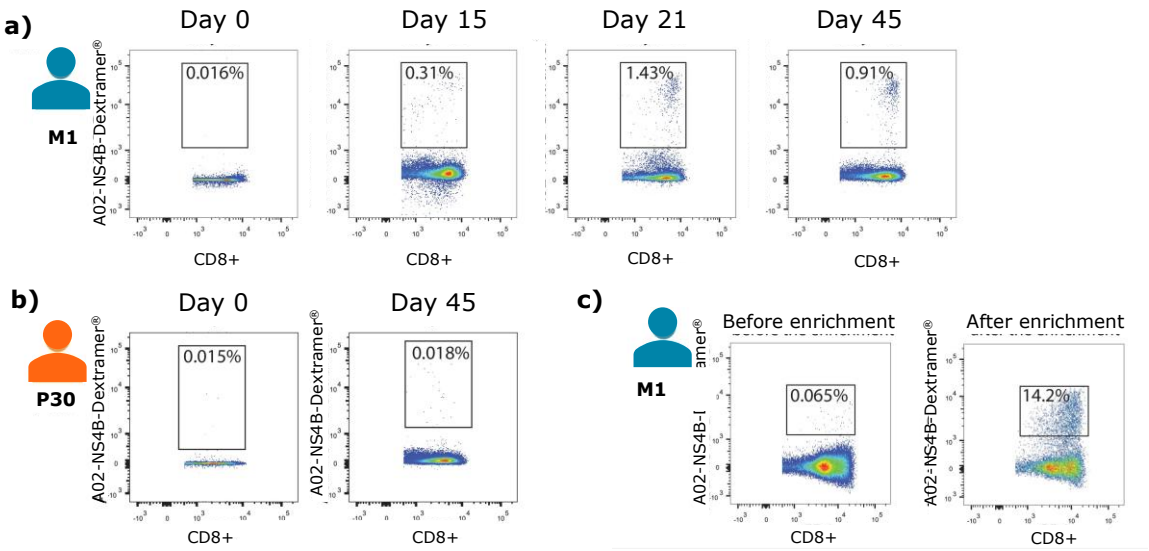

Fig. 1: Isolation of NS4B-specific T cells.
Isolation of NS4B-specific T cells of donor M1 a) and b) donor P30 on different timepoints after YF vaccination. c) Number of NS4B-Dextramer®-positive cells before (left) and after (right) enrichment on the magnetic beads. FACS was performed on donor M1 before the second immunization.

CONCLUSIONS

- YF-specific CD8+ T-cells could be found in the blood of both vaccinated individuals with gradually increasing frequency over time
- Application of an HLA-A*0201 (LLWNGPMAV) MHC I Dextramer® reagent enabled isolation of NS4B-specific CD8+ T cells for latter characterization of T-cell responses using single-cell multi-omics to YF vaccination in two individuals (M1 and P30)