TCR Convergence in HIV Controllers: Insights into Natural Viral Suppression

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INTRODUCTION

A rare subset of people living with Human immunodeficiency virus (PLWH), known as HIV controllers (HICs), naturally suppress viral replication without antiretroviral therapy (ART). HICs could, offer critical insights into effective immune responses against HIV. Here, we propose an integrated approach including T-cell receptor (TCR) sequencing, CD8+ T cell subset analysis (TN = naïve, TCM = central memory, TEM = effector memory, TEMRA = effector memory CD45RA+), functional assays, and HLA typing to unravel immunological features of HICs.

METHODS

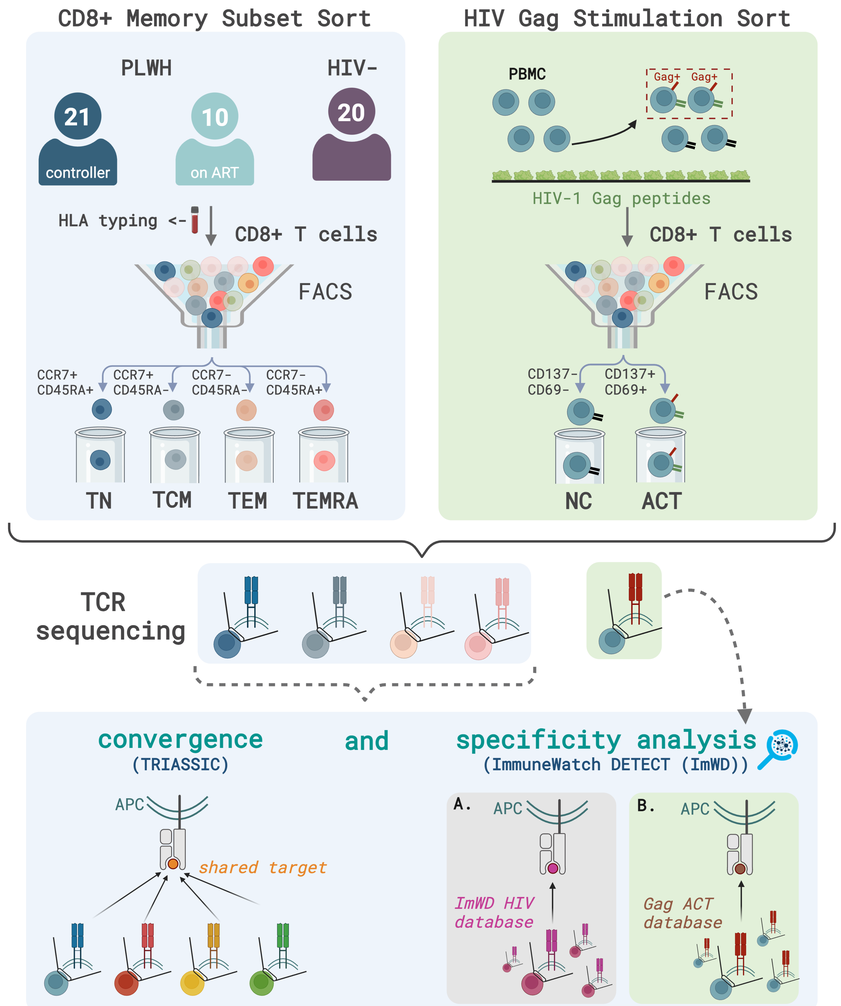


Fig 1. Sample selection and experimental workflow

RESULTS

HIV-Specific TCR Profiles Across CD8+ T Cell Subsets

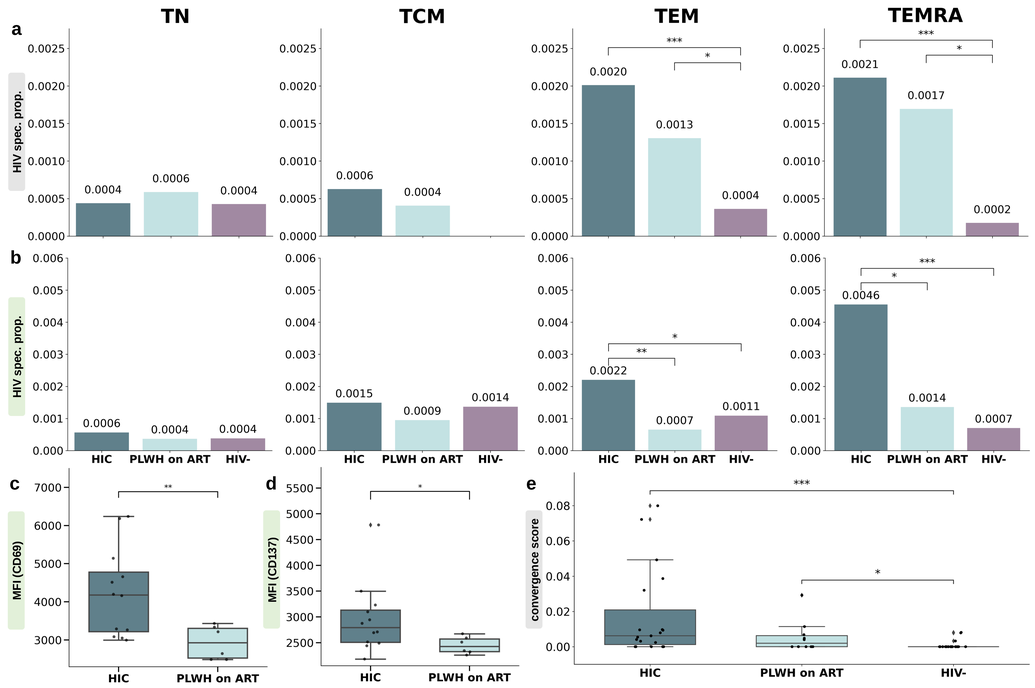


Fig 2. (a-b) Proportion of HIV-specific TCRs from (a) the ImWD HIV database & (b) the Gag ACT database. (c-d) MFI of activation markers post-Gag stimulation. (e) HIV-specific TCR convergence score in TEM(RA).

Mapping HIV-Specific TCR Convergence Scores Across HLA Types

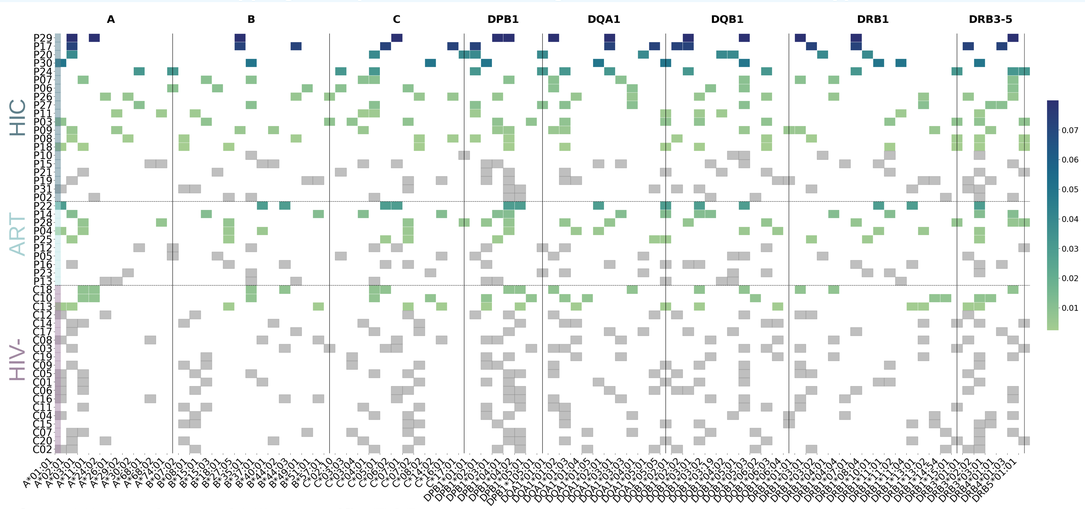


Fig 3. HLA typing and HIV-specific TCR convergence scores in TEM(RA) across patients.

CONCLUSION

Our data reveal that HICs possess a unique, highly functional HIV-specific TEM(RA) TCR repertoire. We identified novel TCR clusters, enhanced CD8+ T cell activation, and HLA associations, highlighting the power of our integrated immuno-informatic approach.

These findings provide crucial insights into natural HIV control and pave the way for TCR-based biomarkers and immunotherapies.

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