South Africa - Unsuppressed HIV infection impairs T cell responses to SARS-CoV-2 infection and abrogates T cell cross-recognition

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Report generated on: July 5, 2022

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Overview

Identification

ID NUMBER
AHRI.SARS.CoV.2

Version

VERSION DESCRIPTION
V1.0.0

Overview

ABSTRACT
In some instances, unsuppressed HIV has been associated with severe COVID-19 disease, but the mechanisms underpinning this susceptibility are still unclear. Here, we assessed the impact of HIV infection on the quality and epitope specificity of SARS-CoV-2 T cell responses in the first wave and second wave of the COVID-19 epidemic in South Africa. Flow cytometry was used to measure T cell responses following PBMC stimulation with SARS-CoV-2 peptide pools. Culture expansion was used to determine T cell immunodominance hierarchies and to assess potential SARS-CoV-2 escape from T cell recognition. HIV-seronegative individuals had significantly greater CD4+T cell responses against the Spike protein compared to the viremic PLWH. Absolute CD4 count correlated positively with SARS-CoV-2 specific CD4+ and CD8+ T cell responses (CD4 r= 0.5, p=0.03; CD8 r=0.5, p=0.001), whereas T cell activation was negatively correlated with CD4+ T cell responses (CD4 r= -0.7, p=0.04). There was diminished T cell cross-recognition between the two waves, which was more pronounced in individuals with unsuppressed HIV infection. Importantly, we identify four mutations in the Beta variant that resulted in abrogation of T cell recognition. Together, we show that unsuppressed HIV infection markedly impairs T cell responses to SARS-Cov-2 infection and diminishes T cell cross-recognition. These findings may partly explain the increased susceptibility of PLWH to severe COVID-19 and also highlights their vulnerability to emerging SARS-CoV-2 variants of concern.

KIND OF DATA
Experimental data

UNITS OF ANALYSIS
The study measured differences in Immune responses to SARS-CoV-2 among three COVID-19 patient groups namely HIV negative, HIV positive but fully suppressed and HIV positive with unsuppressed infection

TOPICS

Topic	Vocabulary	URI
T cell Immunology, SARS-CoV-2 Immune responses	Africa Health Research Institute	AHRI

KEYWORDS
CD8 and CD4 T cell responses, SARV-CoV-2 and HIV infection

Coverage

GEOGRAPHIC COVERAGE
KwaZulu-Natal

UNIVERSE
COVID-19 patient groups namely HIV negative, HIV positive but fully suppressed and HIV positive with unsuppressed infection. All the study participants were recruited in KwaZulu-Natal

Producers and Sponsors

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FUNDING

Name	Abbreviation	Role
Howard Hughes Medical Institute	HHMI	Funded the principal investigator Funded the principal investigator Funded the principal investigator Funded the principal investigator
The Bill and Melinda Gates Foundation	BMGF	Funded the cohort

Metadata Production

METADATA PRODUCED BY

Name	Abbreviation	Affiliation	Role
Africa Health Research Institute	AHRI		

DDI DOCUMENT ID

DDI.AHRI.SARS.CoV.2

Sampling

Sampling Procedure

The studies are exploratory. The study included COVID-19 patients with and without prior HIV infection

Questionnaires

No content available

Data Collection

Data Collection Dates

Start	End	Cycle
2020-06-01	2021-06-30	N/A

Data Processing

Data Editing

Immune responses data was generated using LSR Fortessa flowcytometer. Data was analysed on FlowJo v10.7.2 software. Differences between groups were considered to be significant at a P-value of <0.05. Statistical analyses were performed using GraphPad Prism 8.0 (GraphPad Software, Inc., San Diego, CA

Data Appraisal

No content available

Documentation

Technical documents

DDI:AHRI.SARS.CoV-2

Title	DDI:AHRI.SARS.CoV-2
Author(s)	Sweetness H Dube
Date	05/07/2022
Country	South Africa
Language	English
Publisher(s)	Sweetness H Dube
Filename	AHRI.SARS.CoV-2.pdf