South Africa

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

Study Documentation

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Metadata Production

Metadata Producer(s)	Africa Health Research Institute (AHRI)
Identification	DDI.AHRI.SARS.CoV.2

Table of Contents

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Overview

Identification	AHRI.SARS.CoV.2
Version	V1.0.0

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
Unit 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

Scope & Coverage

Keywords	CD8 and CD4 T cell responses, SARV-CoV-2 and HIV infection
Topics	T cell Immunology, SARS-CoV-2 Immune responses
Time Period(s)	2020-2021
Countries	South Africa

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 & Sponsors

Primary Investigator(s)	Thandeka Nkosi, AHRI Caroline Charasa, AHRI Andrea O Papadopoulos, AHRI Tiza L Nguni, AHRI Farina Karim, AHRI Mohomed Yunus S Moosa, UKZN School of Medicine Inbal Gazy: inbal, KRISP

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Other Producer(s)	Africa Health Research Institute (AHRI)
Funding Agency/ies	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

Sampling

Sampling Procedure

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

Data Collection

Data Collection Dates	start 2020-06-01 end 2021-06-30

Data Processing & Appraisal

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

Accessibility

Access Conditions

The representative of the Receiving Organization agrees to comply with the following conditions:

1. Access to the restricted data will be limited to the Lead Researcher and other members of the research team listed in this request.
2. Copies of the restricted data or any data created on the basis of the original data will not be copied or made available to anyone other than those mentioned in this Data Access Agreement, unless formally authorized by the Data Archive.
3. The data will only be processed for the stated statistical and research purpose. They will be used for solely for reporting of aggregated information, and not for investigation of specific individuals or organizations. Data will not in any way be used for any administrative, proprietary or law enforcement purposes.
4. The Lead Researcher must state if it is their intention to match the restricted microdata with any other micro-dataset. If any matching is to take place, details must be provided of the datasets to be matched and of the reasons for the matching. Any datasets created as a result of matching will be considered to be restricted and must comply with the terms of this Data Access Agreement.
5. The Lead Researcher undertakes that no attempt will be made to identify any individual person, family, business, enterprise or organization. If such a unique disclosure is made inadvertently, no use will be made of the identity of any person or establishment discovered and full details will be reported to the Data Archive. The identification will not be revealed to any other person not included in the Data Access Agreement.
6. The Lead Researcher will implement security measures to prevent unauthorized access to licensed microdata acquired from the Data Archive. The microdata must be destroyed upon the completion of this research, unless the Data Archive obtains satisfactory guarantee that the data can be secured and provides written authorization to the Receiving Organization to retain them. Destruction of the microdata will be confirmed in writing by the Lead Researcher to the Data Archive.
7. Any books, articles, conference papers, theses, dissertations, reports, or other publications that employ data obtained from the Data Archive will cite the source of data in accordance with the citation requirement provided with the dataset.
8. An electronic copy of all reports and publications based on the requested data will be sent to the Data Archive.

9. The original collector of the data, the Data Archive, and the relevant funding agencies bear no responsibility for use of the data or for interpretations or inferences based upon such uses.
10. This agreement will come into force on the date that approval is given for access to the restricted dataset and remain in force until the completion date of the project or an earlier date if the project is completed ahead of time.
11. If there are any changes to the project specification, security arrangements, personnel or organization detailed in this application form, it is the responsibility of the Lead Researcher to seek the agreement of the Data Archive to these changes. Where there is a change to the employer organization of the Lead Researcher this will involve a new application being made and termination of the original project.
12. Breaches of the agreement will be taken seriously and the Data Archive will take action against those responsible for the lapse if willful or accidental. Failure to comply with the directions of the Data Archive will be deemed to be a major breach of the agreement and may involve recourse to legal proceedings. The Data Archive will maintain and share with partner data archives a register of those individuals and organizations which are responsible for breaching the terms of the Data Access Agreement and will impose sanctions on release of future data to these parties.

Citation Requirements

Nkosi, T. et al. (2022) “Unsuppressed HIV infection impairs T cell responses to SARS-CoV-2 infection and abrogates T cell cross-recognition.” Africa Health Research Institute. doi: 10.23664/AHRI.SARS.COV.2.

Files Description

Dataset contains 0 file(s)

Variables List

Dataset contains 0 variable(s)