

Impact of Vaccine-induced Immunity on Symptomatic Diseases with the Evolving SARS-CoV-2 virus in People Living with HIV

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Background: Despite the lower pathogenicity of the evolving Omicron variant and vaccine protection, people living with HIV (PLWH) are at risk of severe COVID-19 diseases. This prospective longitudinal study examined the associations of vaccine-induced immunity with symptomatic SARS-CoV-2 infection among PLWH in Hong Kong.

Methods: Adult PLWH with at least 2 COVID-19 vaccine doses were recruited and tested for surrogate virus neutralization test (sVNT) at clinic visits for HIV care. PLWH with at least 2 sVNT records and never reported SARS-CoV-2 infection before January 2022 were analyzed. Risk factors for reported history of SARS-CoV-2 infection were examined in multivariable cox regression model. Factors associated with symptomatic infection (VS asymptomatic) were evaluated in multivariable logistic regression models.

Results: In April 2021 – December 2022, 1602 blood samples of 487 PLWH were collected. The pre-vaccination median CD4 count was 598 cell/ μ L, and 98% had viral load <200 copies/mL. Most (87%) had received COVID-19 booster dose, and 204 (42%) reported SARS-CoV-2 infection in 2022. PLWH who had received inactivated vaccine (adjusted hazard ratio (aHR)=0.47) or heterologous regimen (aHR=0.62) with mRNA vaccine as reference group, booster doses (3rd dose aHR=0.25, 4th dose aHR=0.14, 2nd dose as reference), and higher maximum value sVNT for wild type virus measured (aHR=0.97) were at lower infection risk. Among PLWH with reported infection, 81% (123/152) were symptomatic (all mild presentation), which was associated with higher pre-vaccination CD4 count, pre-COVID-19 sVNT level, and more recent HIV diagnosis.

Conclusion: COVID-19 vaccination was effective against incident infection and severe COVID-19 in PLWH. The relatively “healthier” PLWH and stronger vaccine-induced immunity were paradoxically associated with symptomatic though mild infection, which was similar to people without HIV. The findings demonstrated the impact of vaccine-induced protection in PLWH, which could provide reference for formulating response preparedness for Disease X.