IMMUNE RESPONSE AFTER TWO YEARS FROM MVA-BN VACCINATION BY HIV INFECTION AND CD4 CELL COUNT

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BACKGROUND

The current mpox resurgence raised the question of the residual immune protection conferred by the MVA-BN vaccination received during the 2022 outbreak. Available data on long-term immune response after MVA-BN are scarce, especially in PWH with low CD4 count, who are at high risk of severe and prolonged mpox and a possible impaired vaccine immune response. We described humoral, and T-cell immune responses elicited up to two years from MVA-BN vaccination, stratifying results according to HIV infection and CD4 count to provide elements to establish the need for a vaccine boost.

METHODS

Blood samples from people receiving a primary two-dose course of MVA-BN were prospectively collected at the time of each dose administration (T1-T2) and then after 1 (T3), 6 (T4), 12 (T5) and 24 (T6) months.

Neutralizing antibodies (nAbs) were assessed by a 50% plaque reduction neutralization test and interferon-γ producing MVA-BN specific T-cells by ELISpot assay.

Data at T6 were stratified according to HIV infection and CD4 count (<350 and >350). Kruskal-Wallis with Dunn tests, Wilcoxon, and Mann-Whitney tests were used for statistics.

Table 1. Main characteristics of study population

Characteristics		Total N= 40
Sexual orientation, n (%)	Bisexual	0 (0.0)
	Transgender	1 (2.5)
	MSM	39 (97.5)
Age, years	Median (IQR)	41.5 (35, 45)
PrEP use, n (%)	No	27 (67.5)
	Yes	11 (27.5)
	Not reported	2 (5.0)
>=1 STI over previous year, n (%)	Yes	9 (22.5)
	Syphilis	2 (5.0)
	Gonorrhoea	5 (12.5)
	Chlamydia	4 (10.0)
	HPV	1 (2.5)
PLWH		20 (50.0)
	PLWH on effective ART	19 (95.0)
CD4 cell count[&], cells/mm^3, n (%)	<350	9 (45.0)
	>350	11 (55.0)

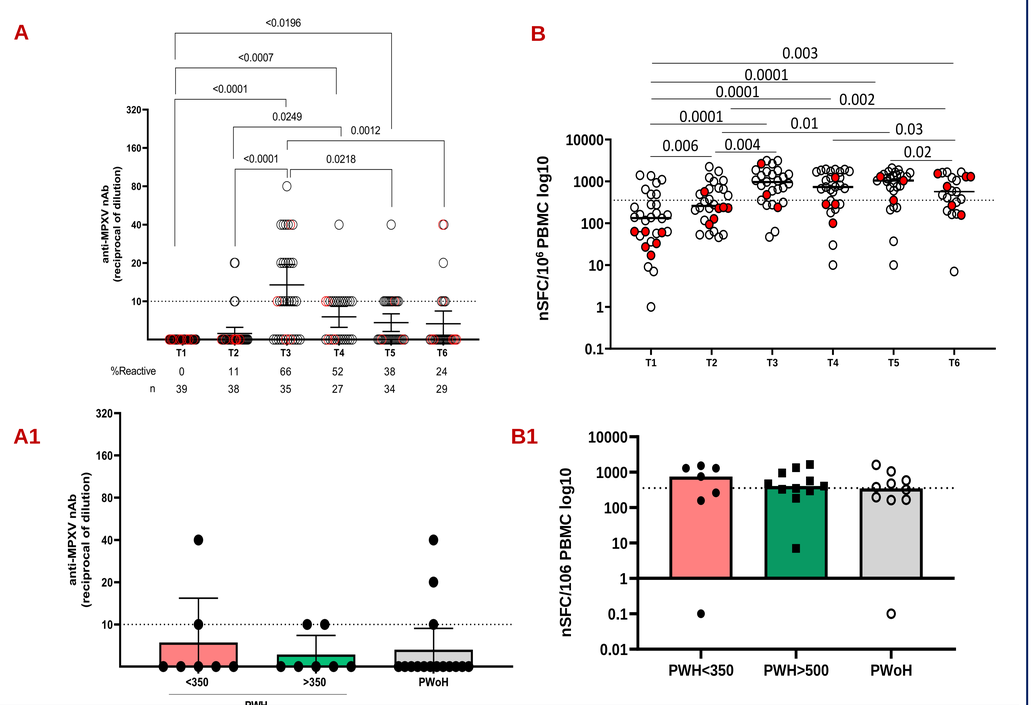
[&]In PLWH; MSM: men who have sex with men; IQR: interquartile range; PrEP: pre-exposure prophylaxis for HIV infection; STI: sexually transmitted infection; HPV: human papillomavirus; PLWH: people living with HIV; ART: antiretroviral therapy.

Two years after receiving two doses of MVA-BN in people not primed for smallpox, regardless of HIV infection and CD4 count, a poor neutralizing response was detected, while T-cell response persisted despite being substantially diminished.

RESULTS

All the 40 people enrolled were MSM, not primed for smallpox during childhood, with a median age of 41.5 years (IQR 35-45). Among the 20 (50%) PWH, 9 (45%) had a CD4 count <350 mmc (Table 1). After peaking one month from vaccination, nAb titers progressively dropped in the following time points, with less than 25% of sera reactive at two years (T6). The MVA-BN-specific T-cell response raised early after vaccination, remained stable until one year, and significantly decreased at two years (p=0.02). At two years, no evidence for a difference was detected between PWoH and PWH with CD4 count <350 or >350, both for cellular and neutralizing response (Figure 1).

FIGURE 1. Longitudinal evaluation of MPXV-specific neutralising antibodies (nAbs) (A) and MVA-BN T-cells specific response (B) in PWH and PWoH from MVA-BN vaccination up to two years.



Red dots show PWH with a CD4 count<350. Dot lines represent the detection limit for nAbs (1:10) and median values of T-cell response evaluated in 10 healthy controls matched for age and sex. Two-year results are detailed for nAbs (A1) and T-cell (B1) according to HIV infection and CD4 count (> and < 350 mmc). Geometric mean nAbs titers (GMT-95% CI) are shown for each time range or study group.

CONCLUSIONS

Two years after receiving MVA-BN, regardless of HIV infection and CD4 count, a poor neutralizing response was detected, while T-cell response persisted despite being substantially diminished. A booster MVA-BN dose at least two years after the primary cycle seems necessary both to reactivate the humoral response and recall the residual cellular response, accounting for most of the clinical protection observed so far.

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