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Waning of Mpox-Specific Antibodies Among MSM Undergoing MVA-BN Vaccination

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BACKGROUND

- Vaccination with MVA-BN vaccines has been shown to be effective in preventing Mpox and breakthrough infections appear to be infrequent.
- In Taiwan, those born before 1979 were universally vaccinated with the first-generation smallpox vaccines.
- The persistence of vaccine-induced immunity against Mpox is less investigated.

METHODS

- MSM receiving two doses of MVA-BN vaccine without previously Mpox diagnosis were enrolled.
- Blood samples were collected on Months 1, 3, 6, 9, 12, 15, 18 and 24 for all participants after the second dose of vaccination.
- All serum specimens were tested for the presence of anti-A29 and anti-H3 MPVX IgG.
- Participants were followed until breakthrough Mpox infection, death, or loss to follow-up, whichever occurred first.

OUTCOME ASSESSMENT

- Seropositivity of anti-A29 and anti-H3 MPVX IgG at each timepoint.
- The occurrence of breakthrough Mpox infection.

Table 1. Clinical characteristics of the participants

	Total (N=425)	PWH (N=277)	PWoH (N=148)	*p* value
Age (IQR), years	35 (31-41)	38 (34-43)	30 (27-32)	**<0.001**
Born before 1979	68 (16.0)	64 (23.1)	4 (2.7)	**<0.001**
Interval between 2 doses (IQR), days	37 (32-48)	35 (31-46)	40 (35-51)	**<0.001**
CD4 (cells/mm^3)	N/A	644 (509-870)	N/A	N/A
PVL >200 copies/mL	N/A	4 (1.4)	N/A	N/A
Chronic hepatitis B	34 (8.2)	30 (11.0)	4 (2.8)	**0.004**
Anti-HCV positivity	47 (11.2)	46 (16.7)	1 (0.7)	**<0.001**
Acquiring other STIs within a year	251 (59.1)	196 (70.8)	55 (37.2)	**<0.001**

*PWH, people with HIV; PWoH, People without HIV

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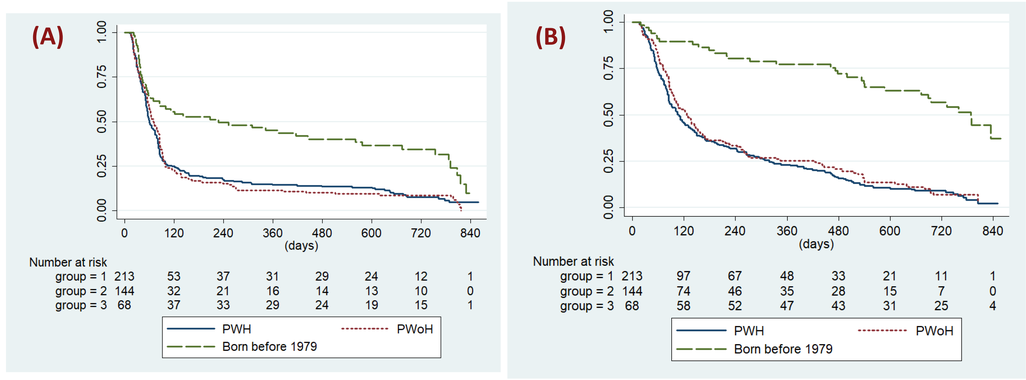


Figure 2. Loss of seropositivity for anti-A29 and anti-H3 MPXV among PWH (Group 1), PWoH (Group 2) and participants born before 1979 (Group 3).

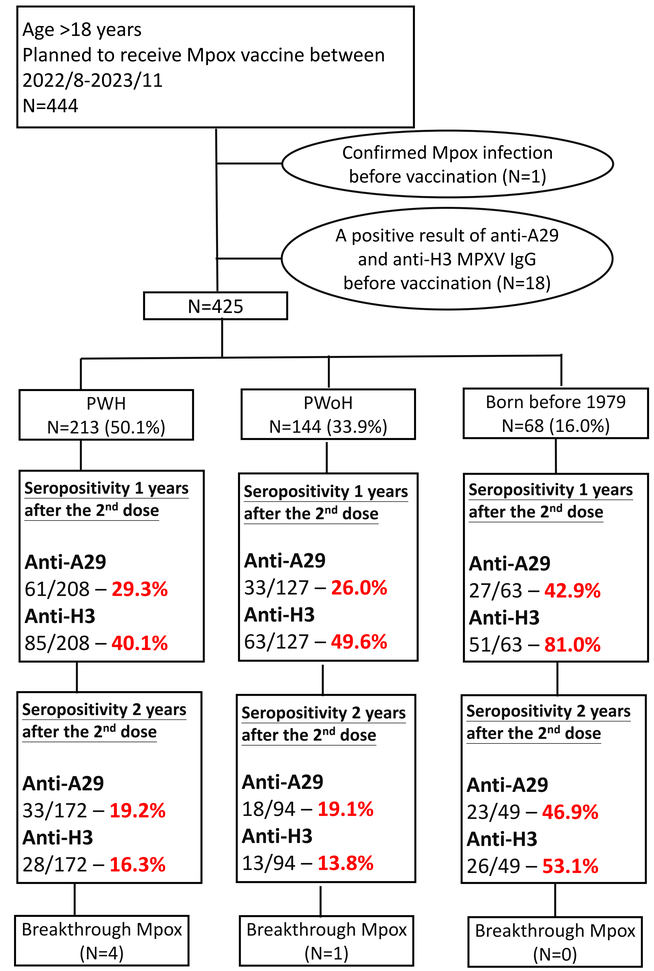
RESULTS

- The study flow and participants' characteristics are shown in **Figure 1** and **Table 1,** respectively.
- Smallpox-vaccinated participants had more sustained seropositivity for anti-A29 and anti-H3 MPXV IgG anti after MVA-BN vaccination **(Figure 2)**.
- After 2 years of observation, those without smallpox vaccination achieved a 13-20% rate of seropositivity for anti-A29/anti-H3 IgG, while those with prior smallpox vaccination remained a 45-55% rate of seropositivity **(Figure 1)**. Those with prior smallpox vaccination were less likely to lose seropositivity for anti-H3 (OR, 0.15; 95% CI, 0.07-0.31).
- Five participants had breakthrough Mpox infection **(Table 2)**.
- There were 20 participants who had a ≥4-fold increase of both anti-A29 and anti-H3 MPXV IgG titer during follow-up, suggesting asymptomatic Mpox infection; among them, 12 (60%) and 7 (35%) participants were non-responders to anti-A29 and anti-H3L MPXV IgG, respectively, within the first 6 months after completing the vaccination.

Table 2. Clinical characteristics of the five participants with breakthrough Mpox infections

	Case 1	Case 2	Case 3	Case 4	Case 5
Age	36	40	40	36	30
HIV status	+	+	+	+	-
CD4 (cells/mm^3)	579	782	789	654	N/A
HIV RNA load (copies/mL)	Undetectable	Undetectable	Undetectable	Undetectable	N/A
Chemsex	ketamine, GHB, amphetamine	N/A	amphetamine	N/A	N/A
DoxyPEP use	Yes	Yes	No	Yes	Yes
Concurrent new STI	NG, HSV	N/A	NG	N/A	MH
Tecovirimat	+	+	+	-	-
Interval between Mpox vaccination and infection	325	808	882	966	847
Antibody response after MVA-BN vaccination	Non-responder	Non-responder	Non-responder	Anti-H3 – 1:100 (D24 after dose 2)	Non-responder

Figure 1. Study population.



CONCLUSIONS

- We found that anti-A29 and anti-H3 antibodies waned with time following MVA-BN vaccination.
- Breakthrough Mpox infections may occur in vaccine non-responders and responders, suggesting that active surveillance remains warranted.