



ORAL PRESENTATION

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Immune control of an SIV challenge by a heterologous and direct mucosal vaccination regimen in rhesus monkeys

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Background

The mucosal surface is the major route for HIV-1 transmission, yet a safe and effective AIDS vaccine through direct mucosal immunization remains elusive.

Methods

Here, we report a novel vaccination regimen consisting of a mucosal prime with replication-competent vaccinia Tiantan rMVTTSIVgpe and an intramuscular boost with non-replicating rAd5SIVgpe expressing SIV Gag, Pol and Env. Twenty Chinese rhesus macaques were used to evaluate its safety, immunogenicity and protective potential.

Results

Compared with three control groups, the rMVTTSIVgpe-rAd5SIVgpe regimen elicited robust cellular immune responses with enhanced magnitude, sustainability and polyfunctionality, and higher titers of neutralizing antibodies against SIVmac1A11. Moreover, one rMVTTSIVgpe-rAd5SIVgpe vaccinated animal was fully protected, while the rest demonstrated 1.74-log and 1.2-log reductions in peak and set-point viral loads upon intrarectal challenge with a high dose (5×10^5 TCID₅₀/animal) of a pathogenic and neutralization-resistant SIVmac239. Importantly, the rMVTTSIVgpe-rAd5SIVgpe vaccinated animals remained healthy up to 850 days post-challenge, while the majority (~75%) of controls progressed to simian AIDS. The protective effect was found to correlate with SIV-specific CD8⁺ T cell ELISpot responses against Gag and Pol, but not Env.

Conclusion

Our findings indicate that vaccine strategy engaging the mucosal surface from the beginning of vaccination may provide protective immunity against HIV-1 infection in humans.

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