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Enhanced immunogenicity of MPG/HIV-1 MPER-V3 nanoparticles using prime-boost strategy in BALB/c mice

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Due to the global pandemic of human immunodeficiency virus type 1 (HIV-1) expanding research and accelerating HIV-1 vaccine development is of serious importance. To trigger potent and strong humoral and cellular immune responses, efficient and powerful HIV-1 preventive vaccine is needed. It has shown that MPER of gp41 and V3 Loop of gp120 are highly conserved regions and they are great targets of bNAbs. Thus, in order to induce potent immunogenicity, we have used the fusion construct of MPER-V3 along with a DNA delivery system (MPG cell penetrating peptide) and a peptide adjuvant (Montanide 720) in mice. The in vivo analysis was performed in BALB/c mice as three vaccination strategies including DNA/DNA, peptide/peptide, and DNA/peptide (prime/boost). Our data showed that the MPG/MPER-V3 complexes were formed as stable non-covalent nanoparticles at the N/P ratio of 10:1 with a size of 110-130 nm. The results indicated that MPG and Montanide improved IgG1, IgG2a and IFN-gamma immune responses in mice. These responses were remarkably higher in heterologous prime/boost and then peptide immunization strategies than DNA immunization. Generally, our study demonstrated that delivery of MPER-V3 fusion as DNA/peptide could be an efficient approach to trigger immune responses as a potent and strong vaccine candidate for HIV-1 infection.