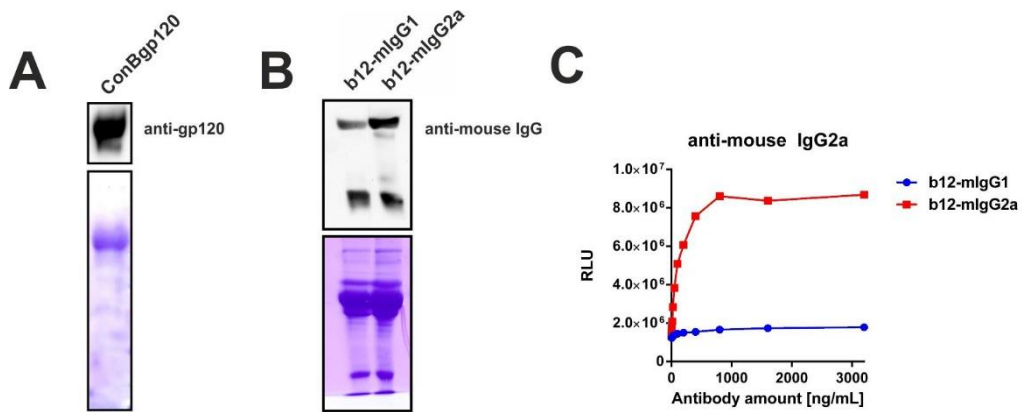
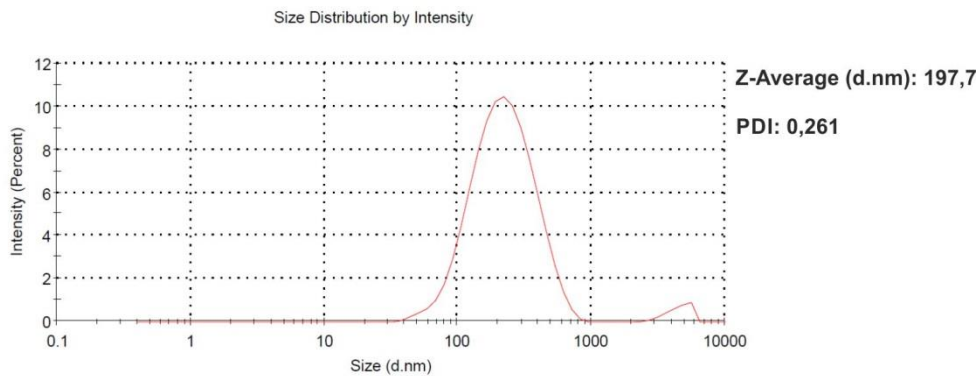


Supplementary Materials:

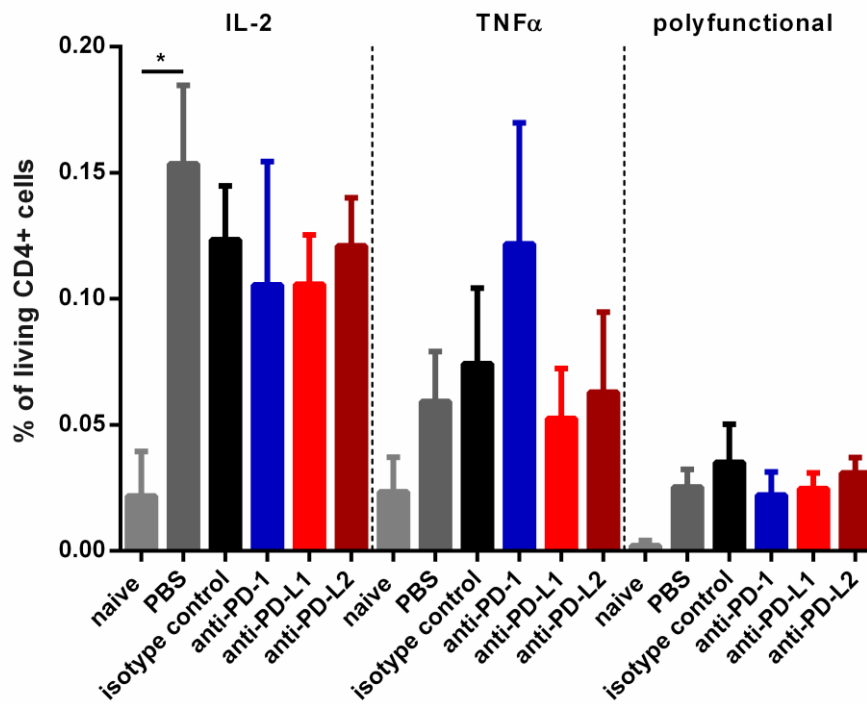


**Figure S1.** Antigen and antibody production for quantitative ELISA. (A) ConBgp120 (coating antigen) produced in 293F cells with quality and purity validated by Western Blot and Coomassie staining. (B) Monoclonal b12 antibody production with murine heavy chains (antibody standard) in 293T cells. Quality and purity was validated by Western Blot and Coomassie staining. (C) Specificity of the produced b12-mIgG2a antibody towards the respective HRP-conjugated anti-mouse IgG2a antibody in a dosage-dependent manner.

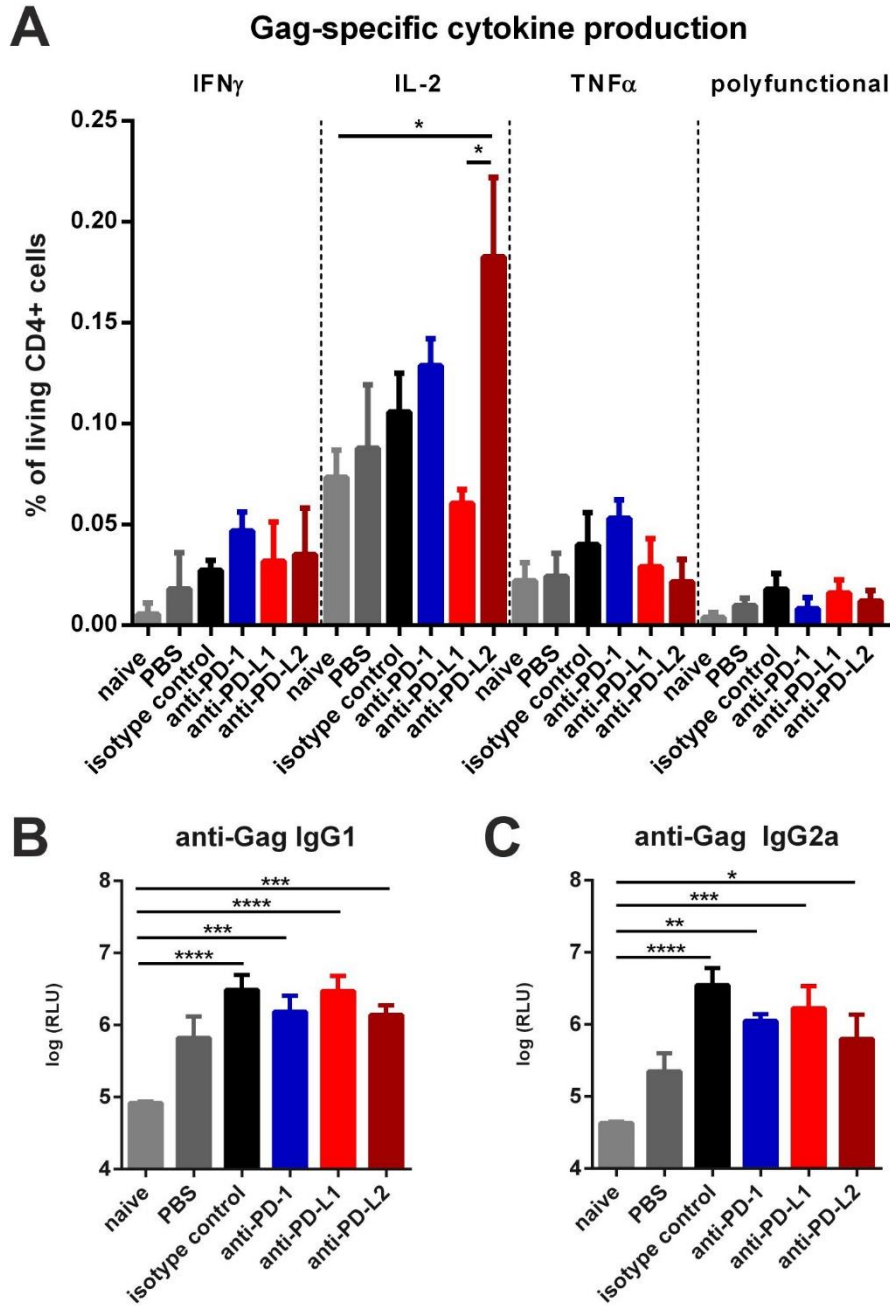


**Figure S2.** Virus-like particle size and homogeneity. VLPs produced in 293T cells and purified over a sucrose cushion containing Env (pConBgp140-GCD) and Gag (Hgpsyn) were diluted in water (1:4000) and measured by ZetaSizer Nano S90 (Malvern Pananalytical, Kassel). Shown are the dynamic size and the particle dispersity index (PDI) of the measured particles.

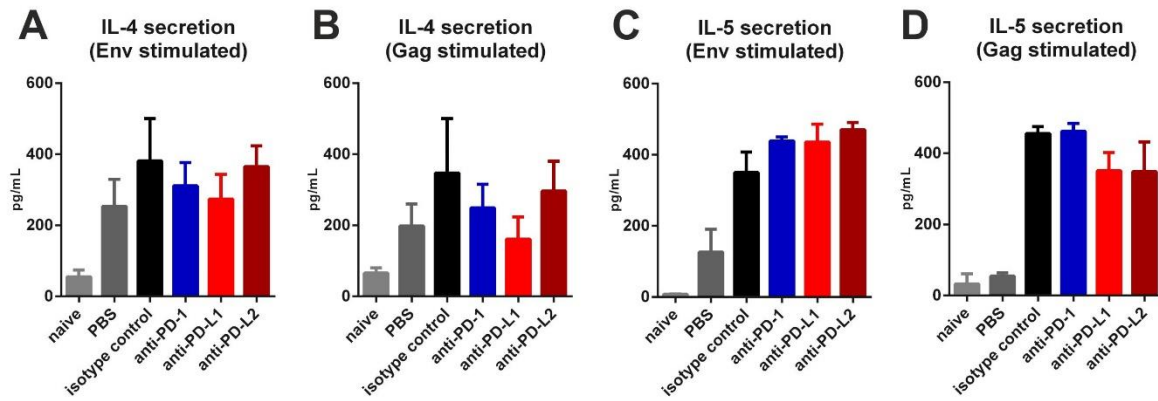
### Env-specific cytokine production



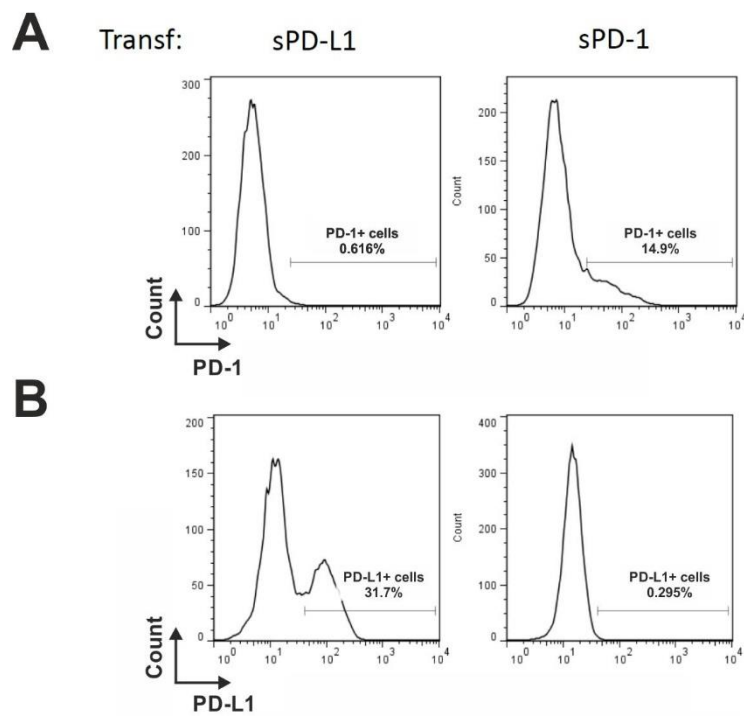
**Figure S3.** Env-specific CD4 T cell responses. Living Env-specific CD4 T cells secreting IL-2, TNF $\alpha$  or those cytokines simultaneously with IFN $\gamma$  (polyfunctional) in the spleen of BALB/c mice two weeks after immunization. Shown are mean values with SEM ( $n = 4$ ) and significant differences between the groups (one-way ANOVA analyses followed by Tukeys multiple comparison test; \*  $p < 0.05$ ).



**Figure S4.** Gag-specific CD4 T cell responses. (A) Living Gag-specific CD4 T cells secreting IFN $\gamma$ , IL-2, TNF $\alpha$  or all three cytokines simultaneously (polyfunctional) in the spleen of BALB/c mice two weeks after immunization. Shown are mean values with SEM ( $n = 4$ ) and significant differences between the groups (one-way ANOVA analyses followed by Tukeys multiple comparison test;  $* p < 0.05$ ). Gag-specific IgG1 (B) and IgG2a (C) antibody responses in the sera of BALB/c mice six weeks after priming. Shown are mean values with SEM ( $n = 4-6$ ) and significant differences between the groups (one-way ANOVA analyses followed by Tukeys multiple comparison test;  $*p < 0.05$ ,  $**p < 0.01$ ,  $*** p < 0.001$ ,  $**** p < 0.0001$ ).



**Figure S5.** Antigen-specific  $T_H2$  cytokine production. Env- and Gag-specific secretion of IL-4 (A,B) and IL-5 (C,D) after three-day culture of splenocytes of BALB/c mice two weeks after immunization and two days after the last CPI treatment. Shown are mean values with SEM ( $n = 2-4$ ), as depicted partly in Fig. 3C (naïve and PBS).



**Figure S6.** Expression of soluble ectodomains. 293T cells were transfected with the expression plasmids encoding for sPD-1 or sPD-L1. Cells were fixed and permeabilized. PD-1 expression was validated with an anti-PD-1 PE-Cy7 antibody (A), PD-L1 expression could be detected by Rat-anti-PD-L1 and subsequent anti-Rat IgG FITC antibody staining (B).