**Supplementary Fig. 1. Rg-H5N1 specific antibody levels and protection after rgH5N1 infection in the immunized C57BL/6 mice.** C57BL/6 mice (n=5-6) were intramuscularly immunized two times with 3 μg of split virus vaccine (sCal, A/California/2009 H1N1 virus) alone, sCal plus MPL 0.5 μg + CpG 2 μg, or MPL 0.5 μg + CpG 2 μg only. **(A-C)** After boost immunization, the immune sera were taken to measure rgH5N1 specific antibody levels. **(D-E)** The immunized mice were infected with rgH5N1 ($1.5 \times LD_{50}$), and body weight changes and survival rates were monitored for 14 days. All data were shown in mean ± standard deviation (SD).
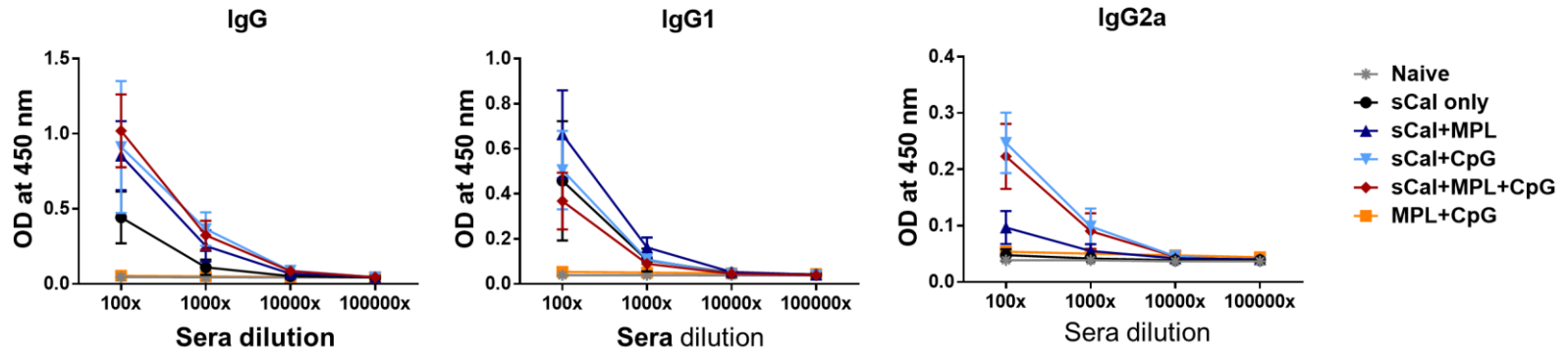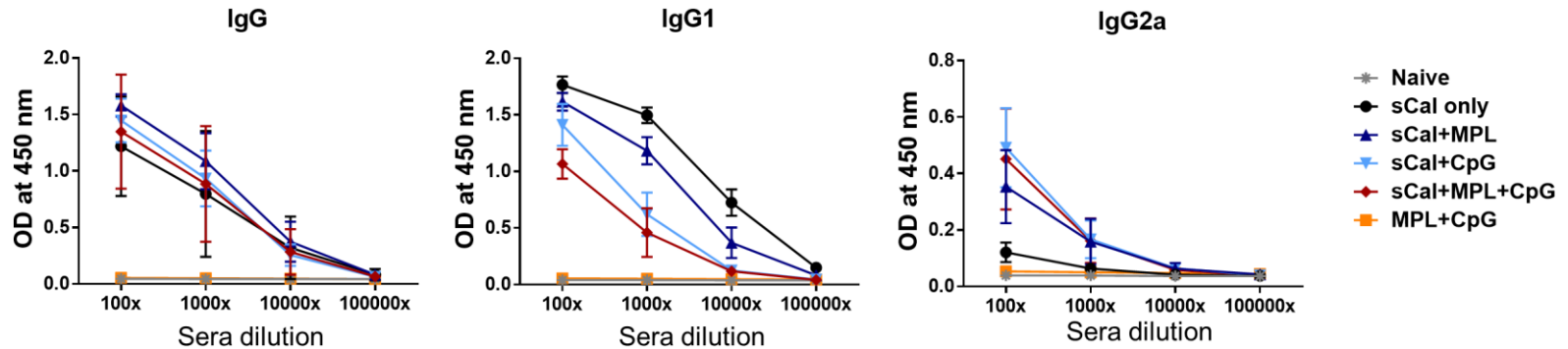
Supplementary Fig. 2. Levels of serum IgG and IgG isotype antibodies recognizing the vaccine strain in BALB/c mice after vaccination. BALB/c mice (n=5) were intramuscularly immunized with 0.3 µg of split virus vaccine (sCal, A/California/2009 H1N1 virus) alone or in the presence of adjuvants two times at a 3-week interval. The doses of adjuvants were as follows: MPL 0.5 µg, CpG 2 µg, or MPL 0.5 µg + CpG 2 µg. The immune sera were taken 2 weeks after each immunization (prime and boost) and A/Cal H1N1 virus-specific antibody levels were measured by ELISA. All data were shown in mean ± standard deviation (SD).
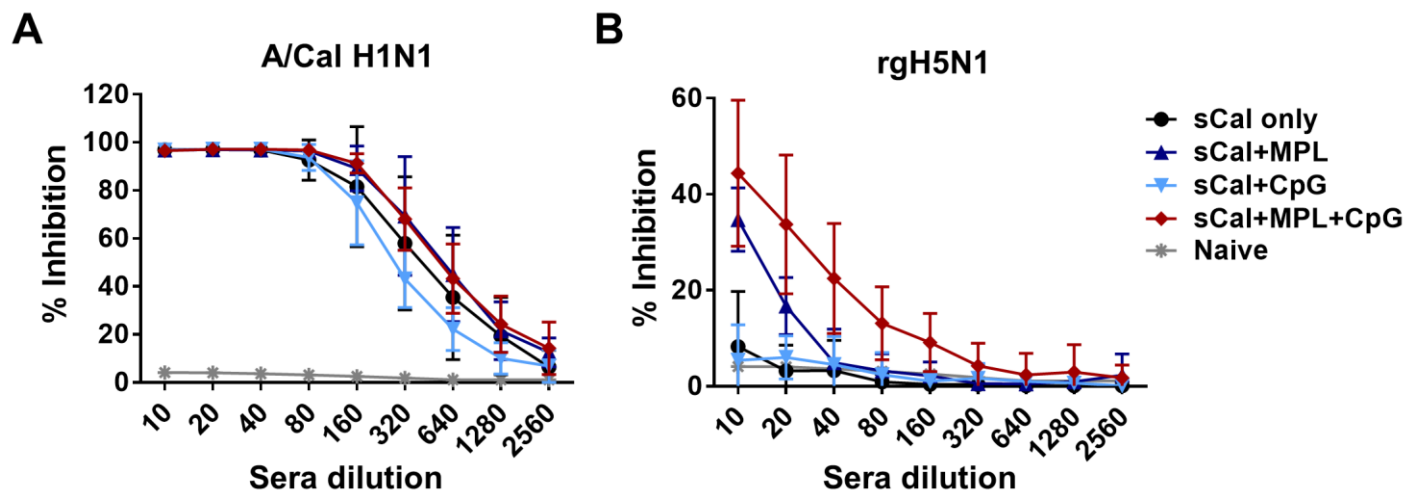
Supplementary Fig. 3. Neuraminidase inhibition (NAI) assay with the immune sera of Balb/c mice. (**A**) NAI titers against homologous A/Cal H1N1 virus. (**B**) NAI titers against heterosubtypic rgH5N1 virus. Percentages of inhibitions were based on the virus only treated wells. All data were shown in mean ± standard deviation (SD).

BAL CD44$^+$NP$_{Tet}^+$
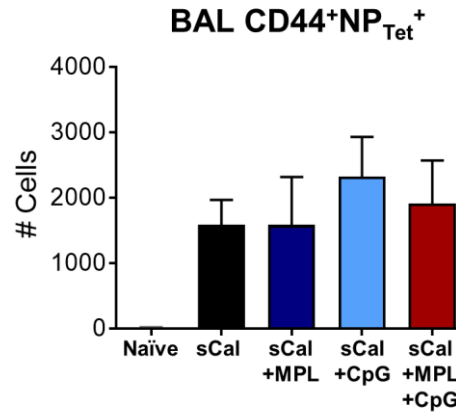
Supplementary Fig. 4. Influenza nucleoprotein (NP)-specific CD8 memory T cells in the immunized Balb/c mice after rgH5N1 infection. Bronchoalveolar lavage (BAL) was collected at day 7 post infection and BAL cells were stained with NP-tetramer to determine antigen-specific T cell responses. CD3$^+$CD8$^+$CD44$^+$NP$_{tet}^+$ cells were shown. All data were shown in mean ± standard deviation (SD).