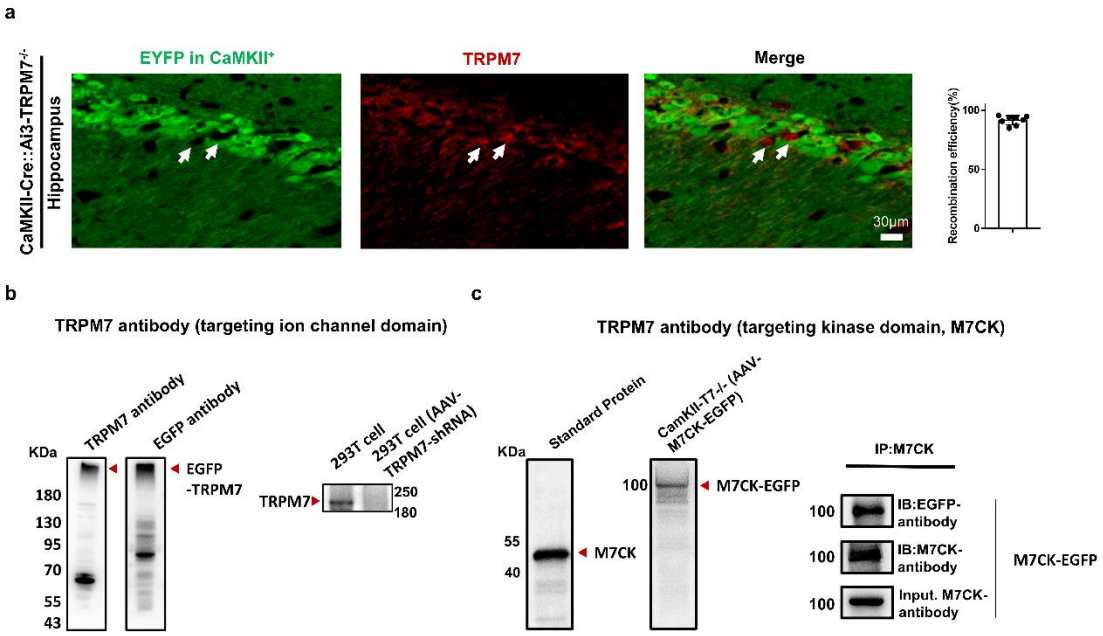


**Supplementary Figure 1**. Recombination efficiency of TRPM7 knockout in CaMKII-TRPM7$^{-/-}$ mice and validation experiments for TRPM7 antibodies. **(a).** CaMKII-TRPM7$^{-/-}$ mice (having CaMKII-promoter dependent Cre expression) were crossed with Ai3 Cre-reporter mice (expressing enhanced yellow fluorescent protein [EYFP] following Cre-mediated recombination) to generate CaMKII-Cre::Ai3-TRPM7$^{-/-}$ mice. These mice should express EYFP in all CaMKII-positive neurons that express Cre and lack TRPM7 expression. Representative fluorescent images of EYFP expression (green) and TRPM7 immunostaining (Using the antibody targeting the ion channel part, red) of CA1 pyramidal neurons from CaMKII-Cre::Ai3-TRPM7$^{-/-}$ mice showing that EYFP-positive (CaMKII-positive) neurons did not have TRPM7 protein expression. Meanwhile, TRPM7 immunostaining signal was detected in cells within the CA1 that were not EYFP-positive, and hence not CaMKII-positive (white arrows). Right: Quantitative analysis of TRPM7 recombination revealed 91.5% recombination efficiency in glutamatergic neurons (n = 8). **(b).** Validation experiments for the Anti-TRPM7 antibody (targeting the ion channel part). Left: Western blot of 293T cell lysate overexpressing EGFP-TRPM7. EGFP-TRPM7 band was detected by the antibody. Same band was also detected by anti-EGFP antibody (middle). Right: Detection of the native full length TRPM7 protein in cell lysate obtained from 293T cells expressing control (scrambled-shRNA) or TRPM7-shRNA. Data suggest that the antibody is able to detect the full length TRPM7. **(c).** Validation experiments for the Anti-TRPM7 antibody (targeting the kinase domain, M7CK). Left: Western blot of a synthesized standard M7CK protein (amino acids 1299-1862) detected by the antibody. Middle: Western blot showing detection of M7CK-EGFP in homogenized brain tissues from CaMKII-TRPM7$^{-/-}$ mice expressing M7CK-EGFP. Right: Co-immunoprecipitation of M7CK-EGFP by using the M7CK antibody, and then detecting it by using EGFP antibody or the M7CK antibody. Data suggest that the antibody is able to specifically detect the kinase domain of TRPM7.