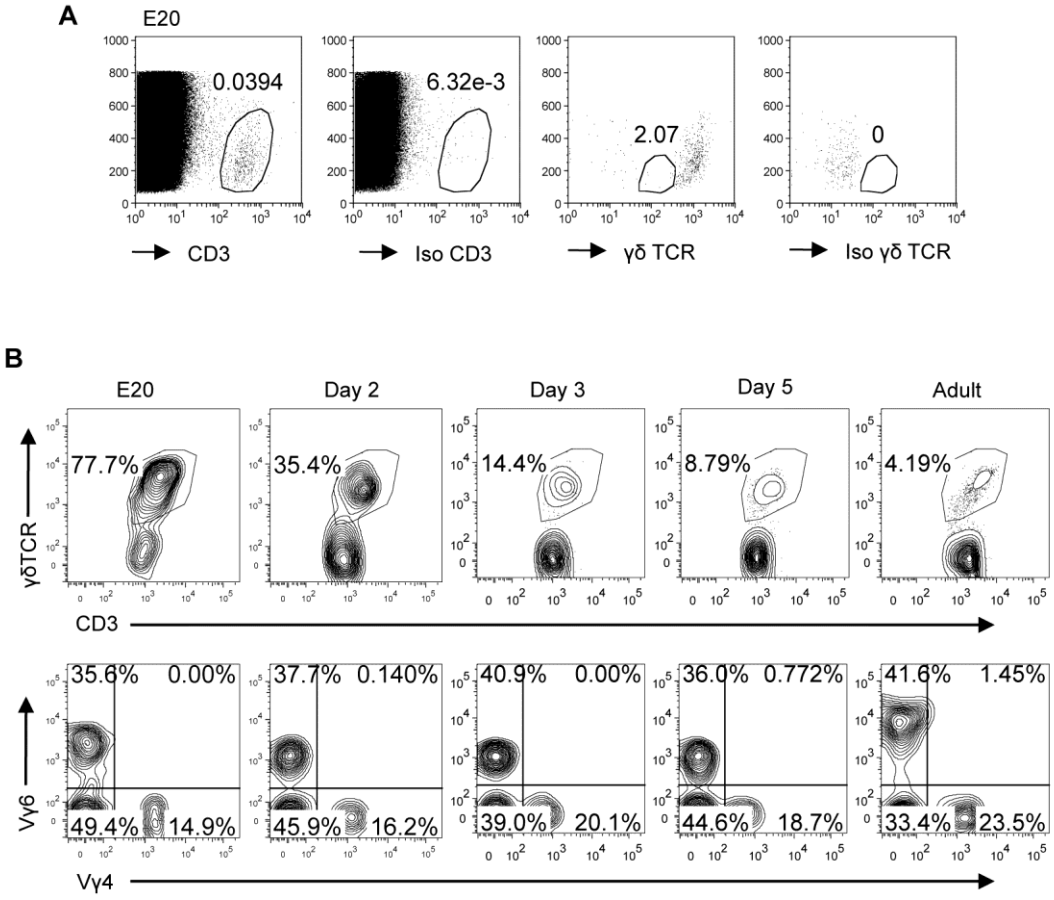
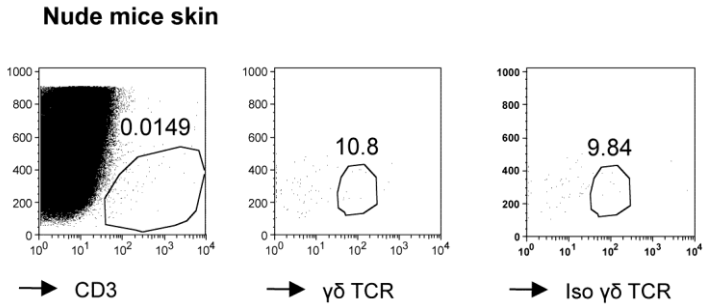
Supplementary Figure 1



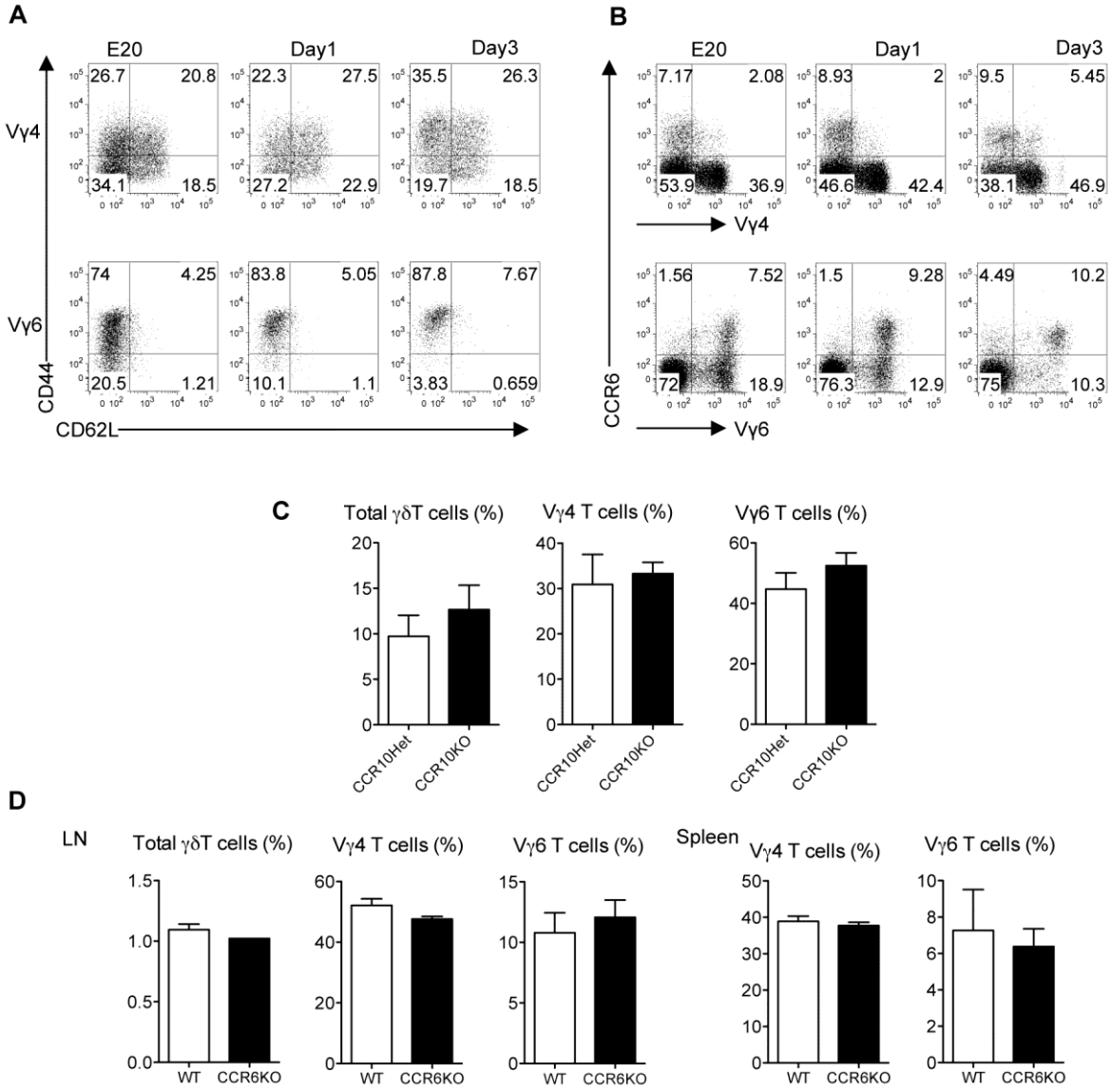
Supplementary Figure 1. Development of dermal and lung γδT cells. (**a**) Whole skin cells from C57Bl/6 WT pups on embryonic day 20 (E20) were stained with CD3 and γδ TCR or matched isotype antibodies and analyzed by flow cytometry. (**b**) Whole lung cell suspensions prepared from different days before and after birth of C57Bl/6 WT mice were stained with CD3, γδ TCR, Vγ4 and Vγ6. The percentage of total lung γδ T cells gated on $CD3^+$ cells as well as Vγ4 and Vγ6 subsets gated on $CD3^+$ $γδTCR^+$ cells were analyzed by flow cytometry.

Supplementary Figure 2



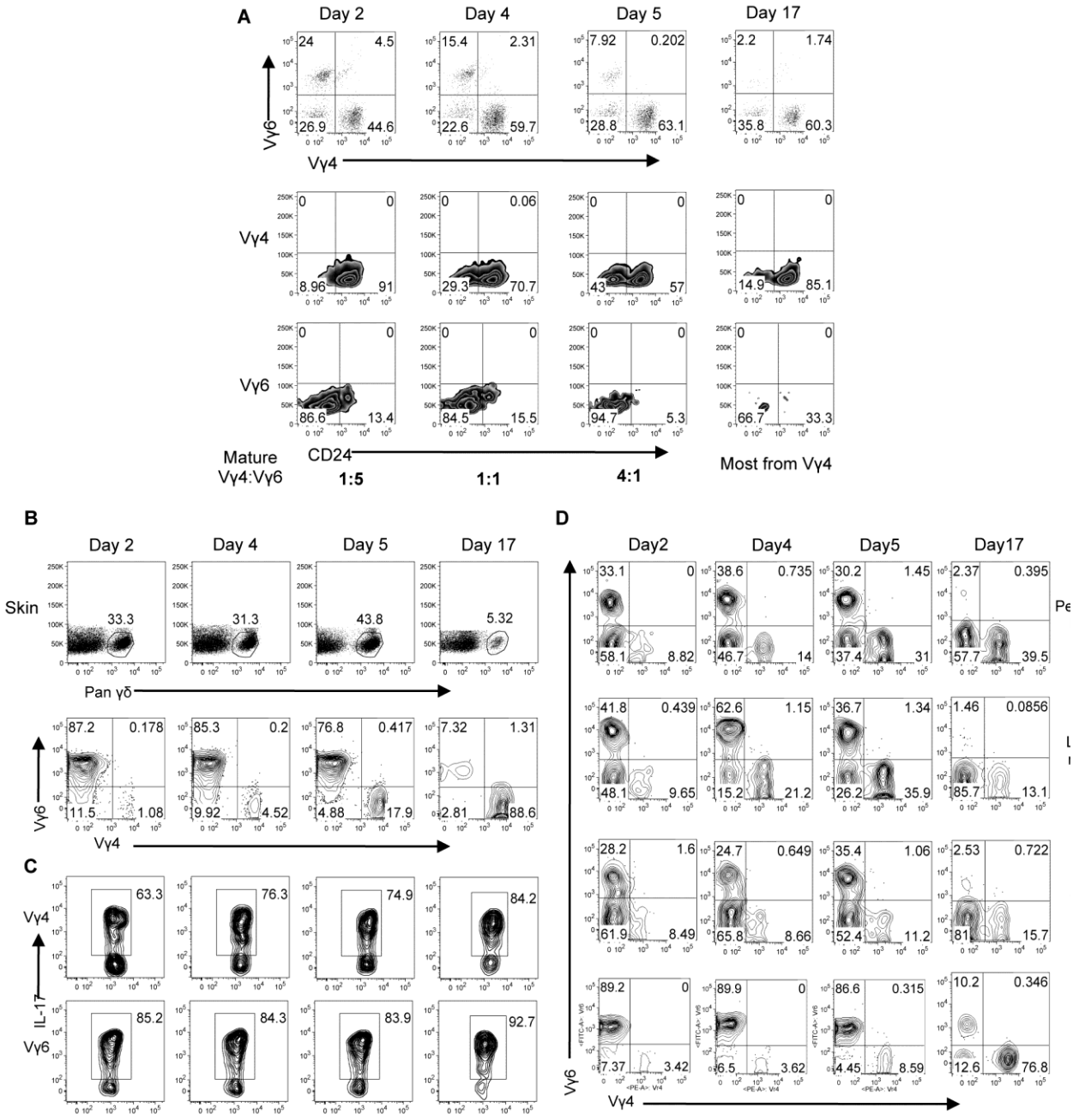
Supplementary Figure 2. Nude mouse skin is lack of dermal γδ T cells. Whole skin cells from nude mice were stained with CD3 and γδ TCR or matched isotype antibodies and analyzed by flow cytometry.

Supplementary Figure 3



Supplementary Figure 3. Dermal Vγ6 T cells are mature and express CCR6 in E20 and neonatal pups. CD44, CD62L (**a**) and CCR6 (**b**) expression by Vγ4 or Vγ6 cells on thymocytes (embryonic day20, neonatal day1 and day3) were determined by flow cytometry. Flow plot gated on $CD3^+$ γδTCR^+ cells are representative of three independent experiments with similar results. (**c**) Whole skin cells from CCR10 heterozygous (CCR10Het) or CCR10 deficient (CCR10KO) mice were stained with CD3, γδ TCR, Vγ4 and Vγ6. Percentages of total dermal γδ T cells as well as dermal Vγ4 and Vγ6 cells were analyzed by flow cytometry. Data are shown as mean ± SEM and are representative of two independent experiments with similar results. (**d**) Lymph node cells and splenocytes from C57Bl/6 WT mice or CCR6KO mice were stained with CD3, γδ TCR, Vγ4 and Vγ6. Percentages of total γδ T cells as well as Vγ4 and Vγ6 cells were analyzed by flow cytometry. Data are shown as mean ± SEM and are representative of two independent experiments with similar results.

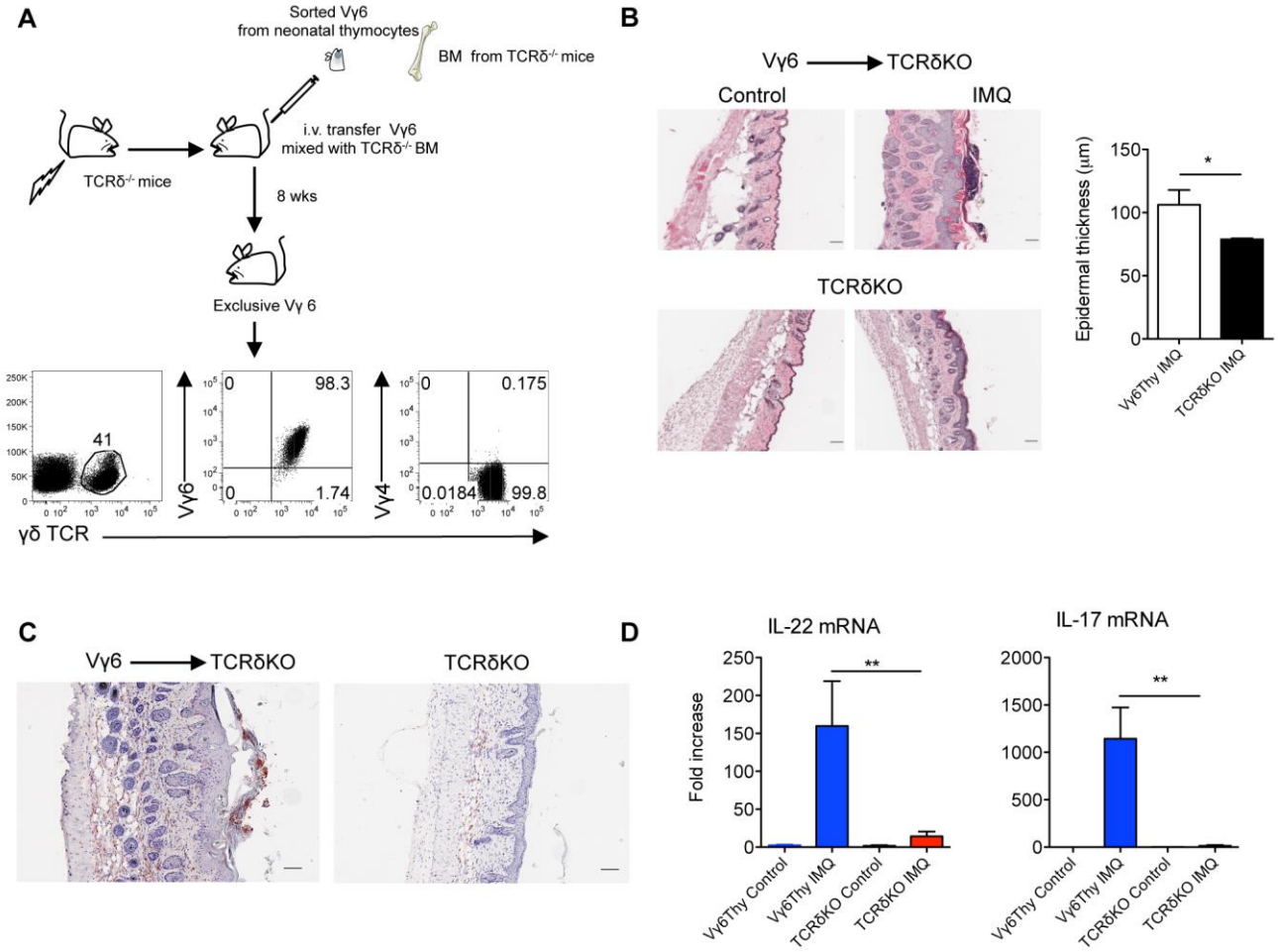
Supplementary Figure 4



Supplementary Figure 4. Extrathymic environment is important for dermal Vγ4 T cells reconstitution and thymic Vγ6 T cells are more competitive than Vγ4 T cells for dermal γδ T cell reconstitution. Thymocytes from WT mice at different days after birth (day 2, day 4, day 5 and day 17) mixed with bone marrow (BM) cells from TCRδ KO mice were transferred into lethally irradiated TCRδ KO mice. The total cell numbers of thymocytes for transfer were adjusted based on Vγ4 T cell percentage in thymocytes at each time point. (**a**) Percentage of Vγ4 and Vγ6 T cells in thymocytes before transfer from donor mice was analyzed by flow cytometry and flow plots were gated on $CD3^+$ γδTCR^+ cells. Percentage of mature Vγ4 and Vγ6 T cells ($CD24^{low}$) from donor mice was also analyzed by flow cytometry. The ratio of mature Vγ4 versus Vγ6 T cells was calculated based on CD24 expression and Vγ4 and Vγ6 percentage.

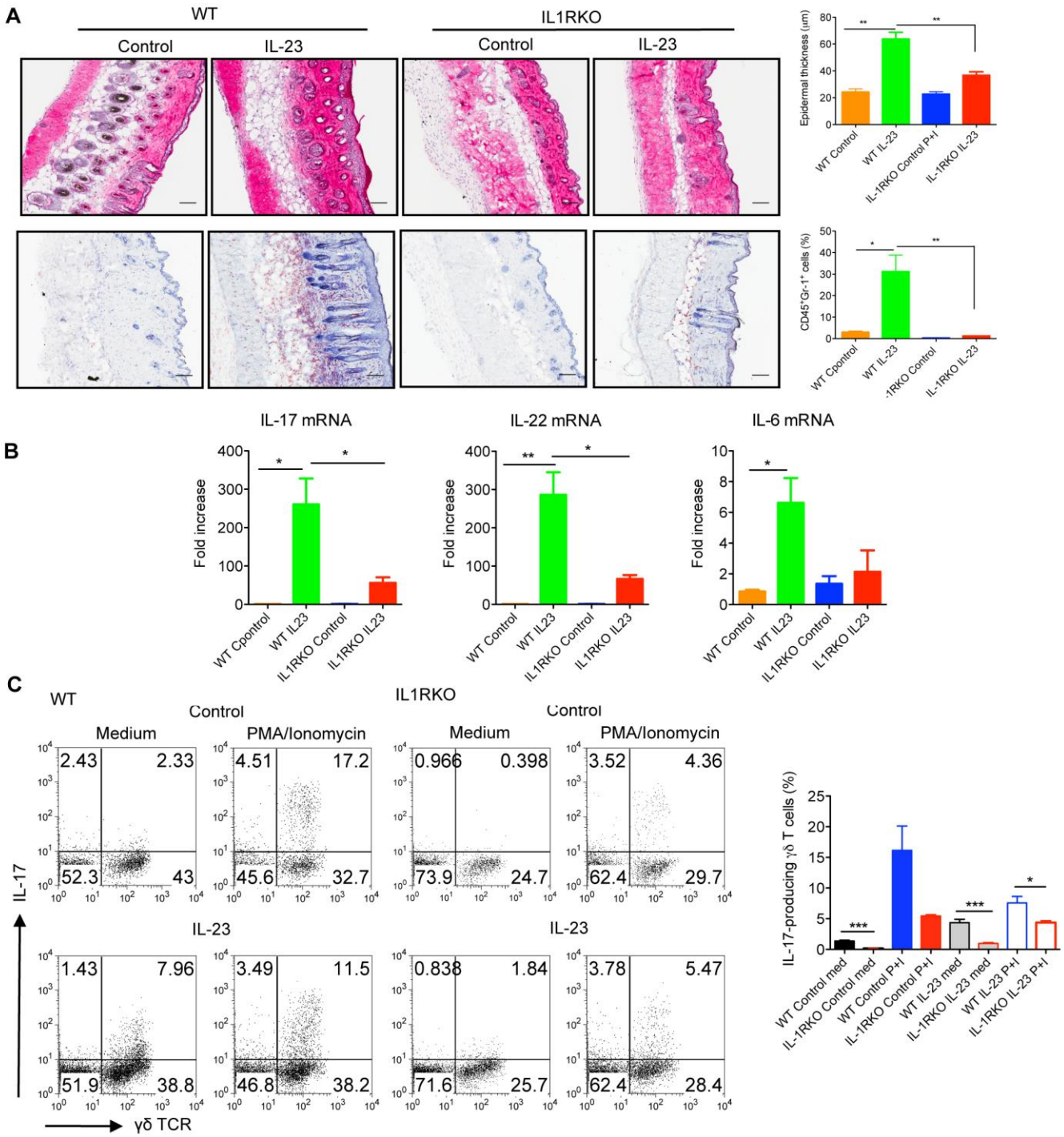
(**b**) After 8 weeks of reconstitution, percentage of total dermal γδ T cells gated on $CD3^+$ cells as well as dermal Vγ4 and Vγ6 T cells gated on $CD3^+$ γδTCR^+ cells were analyzed by flow cytometry. (**c**) Intracellular IL-17 level was also determined by flow cytometry after whole skin cells were stimulated with PMA plus ionomycin. (**d**) Percentages of Vγ4 and Vγ6 T cells in the peripheral blood, lymph nodes, spleen and lung after reconstitution were analyzed by flow cytometry and flow plots were gated on $CD3^+$ γδTCR^+ cells.

Supplementary Figure 5



Supplementary Figure 5. Dermal Vγ6 T cells are pathogenic to induce skin inflammation. (**a**) Sorted Vγ6 neonatal thymocytes from C57Bl/6 WT mice (CD45.2) mixed with bone marrow (BM) cells from TCRδ KO mice were transferred into lethally irradiated TCRδ KO mice. After 8 weeks of reconstitution, recipient mice expressed exclusive Vγ6 dermal γδT cells. (**b**) Mice were treated daily for 5 days with imiquimod (IMQ) or control cream (Control). TCRδKO mice were used as controls. Representative H&E-stained sections are shown and epidermal thickness were measured at day 5. Scale bar, 100 μm. Data are shown as mean ± SEM. *p < 0.05 (unpaired Student's t test). (**c**) Representative Gr-1-stained sections are shown. Gr-1 positive cells are brown. (**d**) IL-17 and IL-22 mRNA levels were measured by qPCR. The figure shows fold changes normalized for β-MG mRNA versus control skin from Vγ6-reconstituted mice. Data are shown as mean ± SEM. **p< 0.01 (unpaired Student's t test).

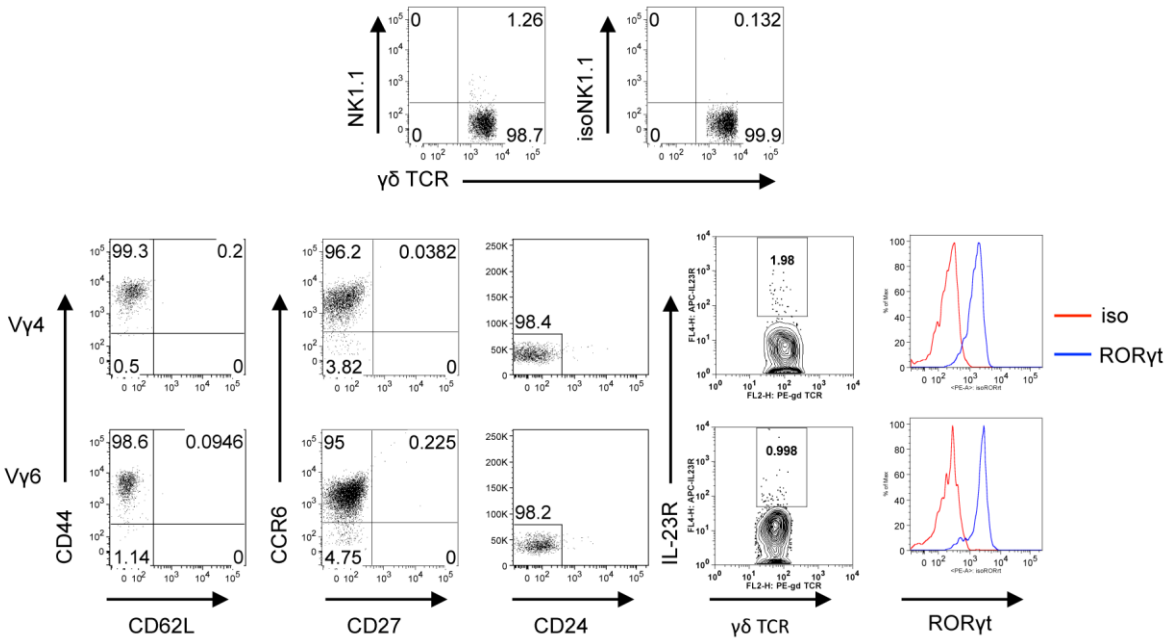
Supplementary Figure 6



Supplementary Figure 6. IL-1R signaling is necessary for IL-23-induced skin inflammation and acanthosis. (**a**) C57BL/6 WT and IL-1RI KO mice received daily intradermal injections with IL-23 or vehicle control for 4 days. Representative H&E-stained sections and frozen sections stained with Gr-1 are shown. Gr-1 positive cells are brown. Skin tissues were also stained with CD45 and Gr-1 assessed by flow cytometry. Epidermal thickness and percentage of $CD45^{+}Gr\text{-}1^{+}$ cells were measured at day 4. Scale bar, 100 μm. Data are shown as mean ± SEM. *p < 0.05, **P<0.01 (unpaired Student's t test). (**b**) IL-17, IL-22 and IL-6 mRNA concentrations were measured by qPCR. The figure shows fold changes normalized for β-MG

mRNA versus control skin from WT mice. Data are shown as mean ± SEM. *p < 0.05, **p< 0.01 (unpaired Student's t test). (**c**) Intracellular IL-17 production by dermal γδ T cells with or without PMA plus ionomycin stimulation was determined by flow cytometry. Flow plots were gated on $CD3^+$ cells. Data are shown as mean ± SEM. *p < 0.05, ***p<0.001 (unpaired Student's t test).

Supplementary Figure 7



Supplementary Figure 7. Phenotype of dermal Vγ4 and Vγ6 T cells. Whole skin cell suspensions prepared from C57Bl/6 WT mice were stained with CD3, γδ TCR, Vγ4, Vγ6 and different surface markers (NK1.1, CD44, CD27, CCR6, CD62L, CD24, and IL-23R) or transcriptional factor RORγt. The percentage of each surface marker and RORγt expression by dermal Vγ4 or Vγ6 γδ T cells were determined by by flow cytometry. Flow plot gated on $CD3^+$ $γδTCR^+$ cells are representative of two or three independent experiments with similar results.