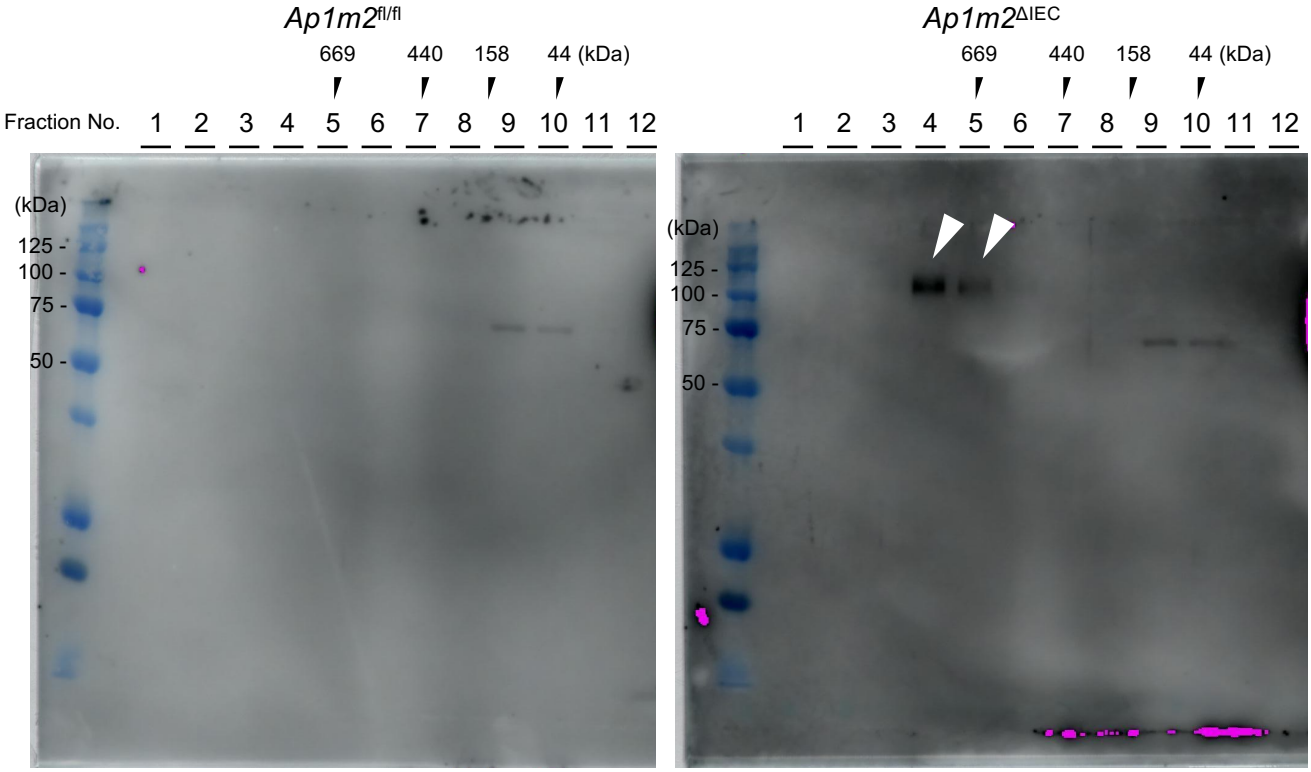
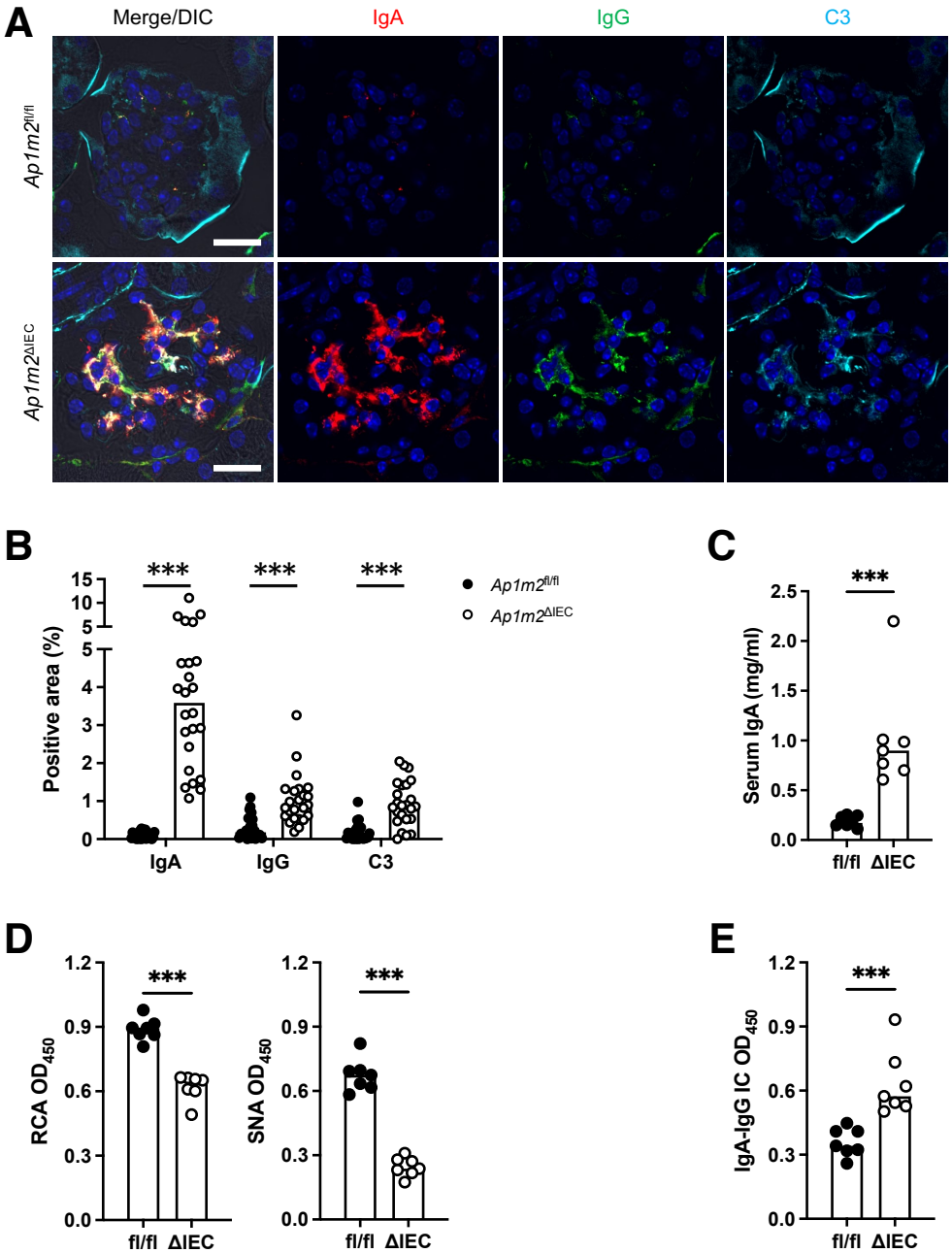
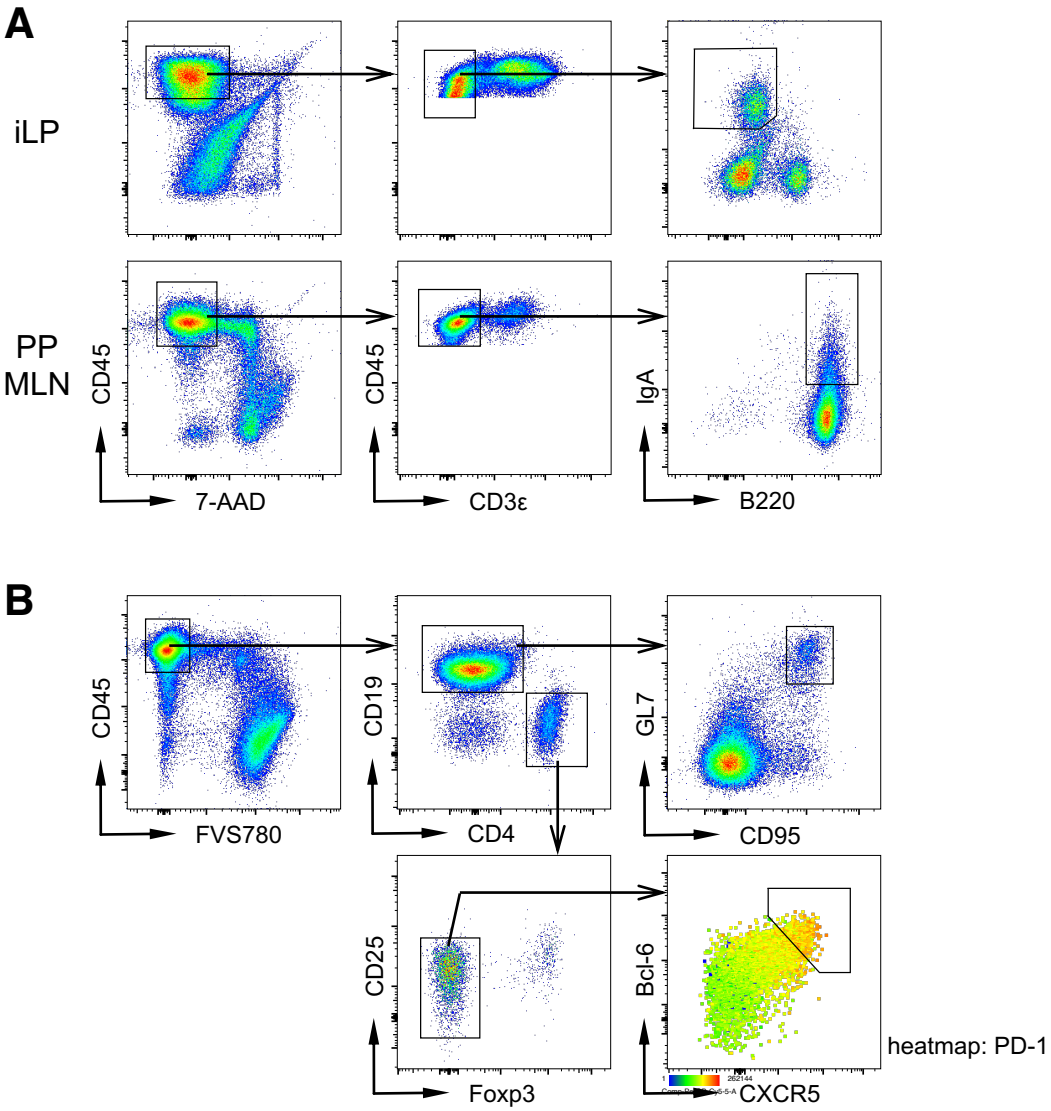


Supplementary figure 1 The high molecular weight of IgA fraction contains secretory components.
The fractions from the size exclusion chromatography shown in Figure 2C were conducted to western blotting with SDS-PAGE in a reduced condition. Secretory components of IgA were detected by anti-pIgR antibody.



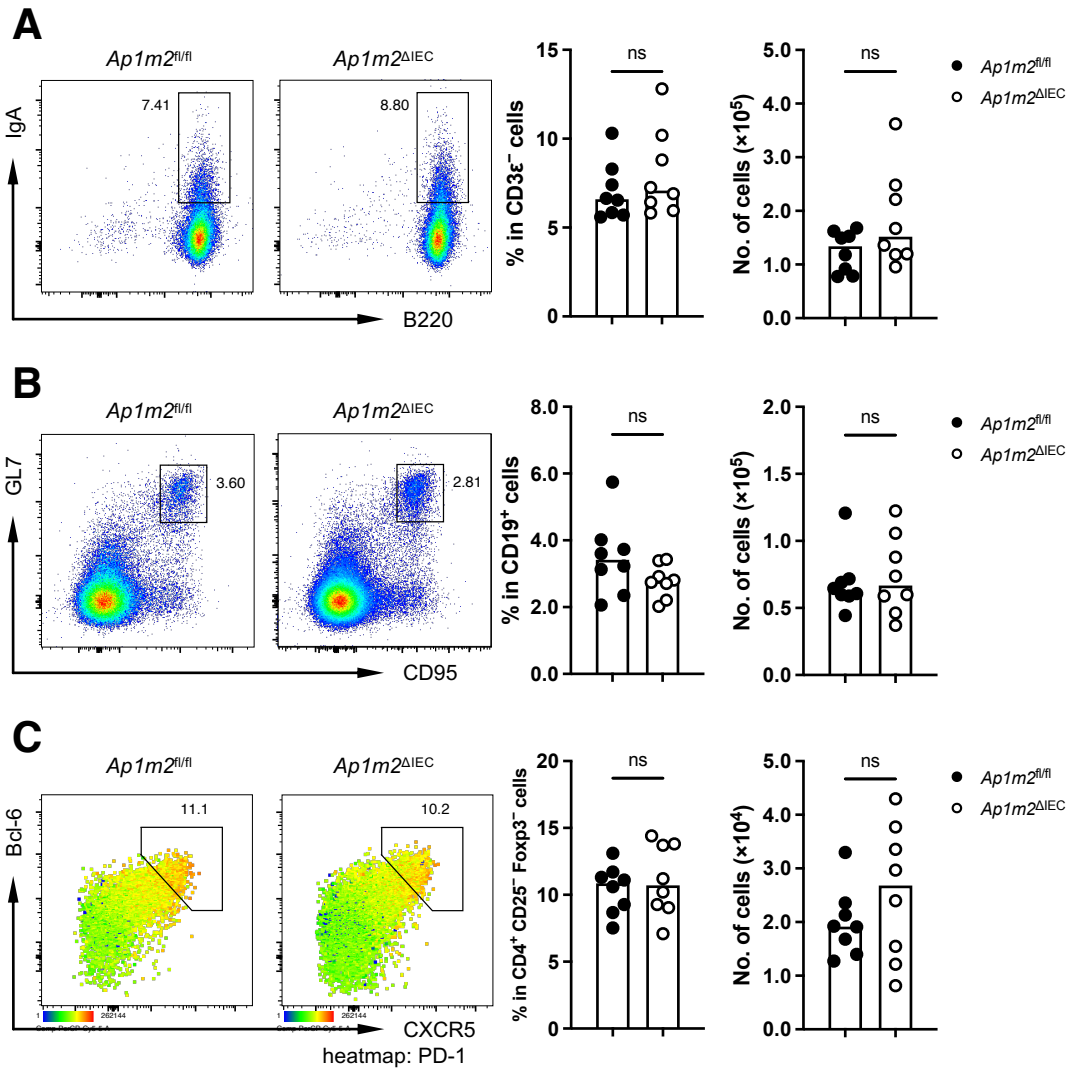
Supplementary figure 2 *Ap1m2*$^{\Delta IEC}$ male mice display the renal deposition of IgA-IgG immune complex similar to *Ap1m2*$^{\Delta IEC}$ female male.

(A) Immunofluorescence images of IgA (red), IgG (green), complement C3 (cyan), and nuclei (blue) in the kidney from *Ap1m2*$^{fl/fl}$ and *Ap1m2*$^{\Delta IEC}$ male mice. Scale bars: 20 μm. (B) Quantitative data of (A): the percentage of IgA$^+$, IgG$^+$, or C3$^+$ area in a glomerulus area. n = 24, four glomeruli each from six different mice. (C) IgA concentration in the serum from *Ap1m2*$^{fl/fl}$ and *Ap1m2*$^{\Delta IEC}$ male mice is measured by ELISA. n = 7 from two independent experiments. (D) Quantification of galactose or sialic acid in the serum IgA glycans by lectin-binding assay. 100 ng serum IgA is reacted with *Ricinus communis* agglutinin I (RCA) or *Sambucus nigra* lectin (SNA), and the optical density (OD) is measured. n = 7 from two independent experiments. (E) Quantification of IgA-IgG immune complex (IC) in the serum. Serum IgA-IgG immune complex captured by anti-IgG antibody is detected with anti-IgA antibody and the OD is measured. n = 7 from two independent experiments. Bars represent the median. ***$p < 0.001$ (unpaired, two-tailed Mann-Whitney test)

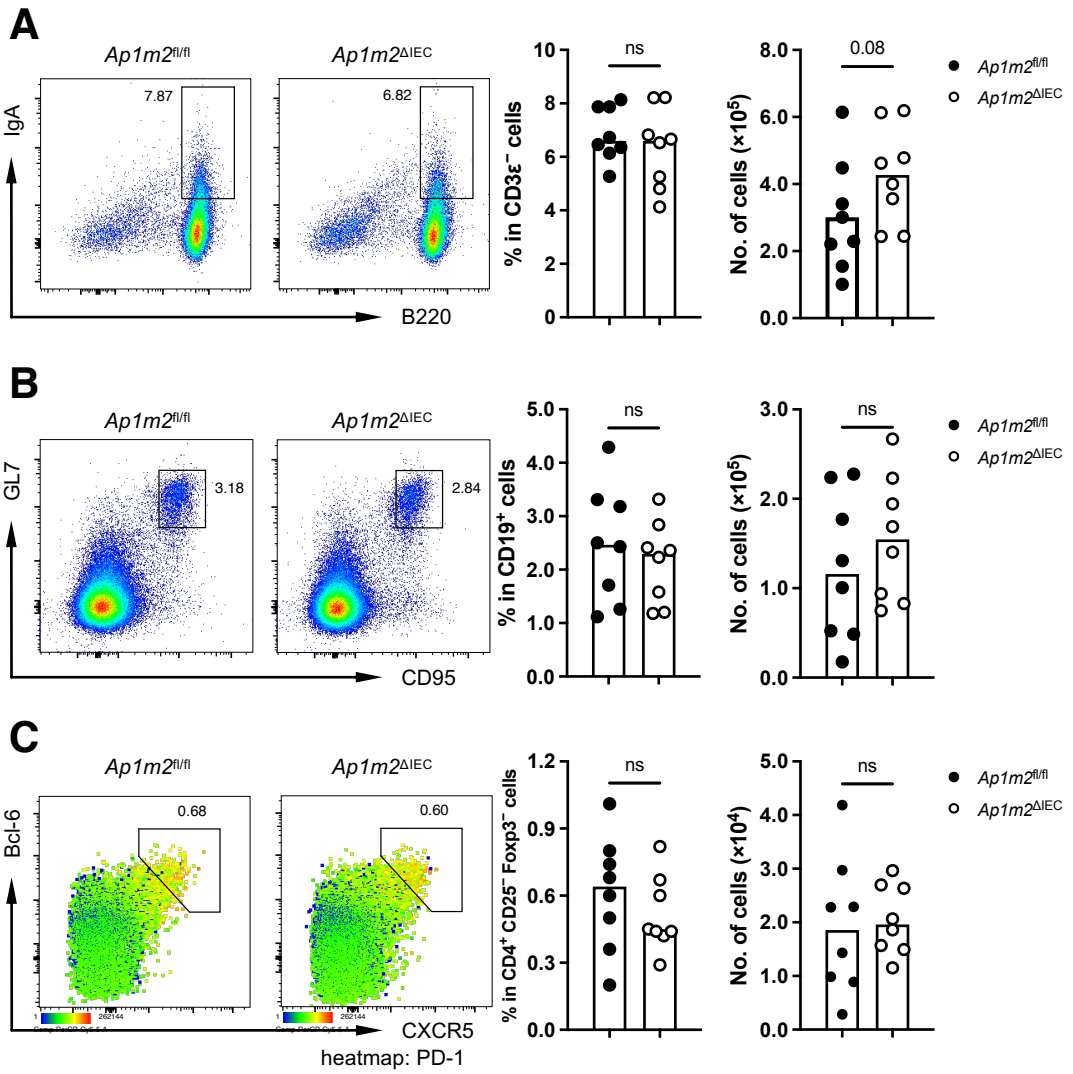


Supplementary Figure 3 Flow cytometry analysis of immune cell subsets in the intestinal lamina propria, Peyer's patches, and mesenteric lymph nodes.

(A) Gating strategy to analyze IgA^+ B cells in the ileal lamina propria (iLP), Peyer's patches (PP), and mesenteric lymph nodes (MLN). (B) Gating strategy to analyze germinal center B cells and follicular helper T cells in the Peyer's patches and mesenteric lymph nodes.



Supplementary Figure 4 The composition of immune cells in the ileal Peyer's patches of *Ap1m2*$^{\Delta IEC}$ mice.
(A)–(C) The frequency and the number of IgA$^+$ B cells (A), germinal center B cells (CD19$^+$, CD95$^+$, GL7$^+$) (B), and follicular helper T cells (CD4$^+$, CD25$^-$, Foxp3$^-$, CXCR5$^+$, Bcl-6$^+$, PD-1$^+$) (C) are measured by flow cytometry. Leucocytes are isolated from the ileal Peyer's patches of *Ap1m2*$^{fl/fl}$ and *Ap1m2*$^{\Delta IEC}$ female mice. n = 8 from two independent experiments. Bars represent the median. ns: not significant (unpaired, two-tailed Mann-Whitney test)



Supplementary Figure 5 The composition of immune cells in the mesenteric lymph nodes of *Ap1m2*$^{\Delta IEC}$ mice.
(A)–(C) The frequency and the number of IgA$^+$ B cells (A), germinal center B cells (CD19$^+$, CD95$^+$, GL7$^+$) (B), and follicular helper T cells (CD4$^+$, CD25$^-$, Foxp3$^-$, CXCR5$^+$, Bcl-6$^+$, PD-1$^+$) (C) are measured by flow cytometry. Leucocytes are isolated from the mesenteric lymph nodes of *Ap1m2*$^{fl/fl}$ and *Ap1m2*$^{\Delta IEC}$ female mice. n = 8 from two independent experiments. Bars represent the median. ns: not significant (unpaired, two-tailed Mann-Whitney test)