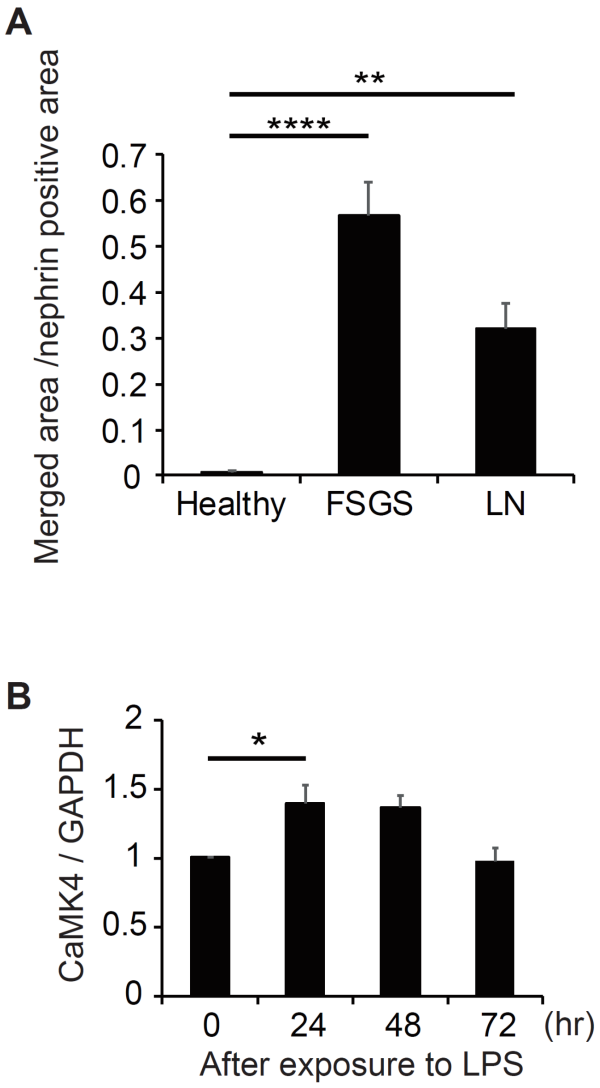
Supplemental Table 1. Patient characteristics

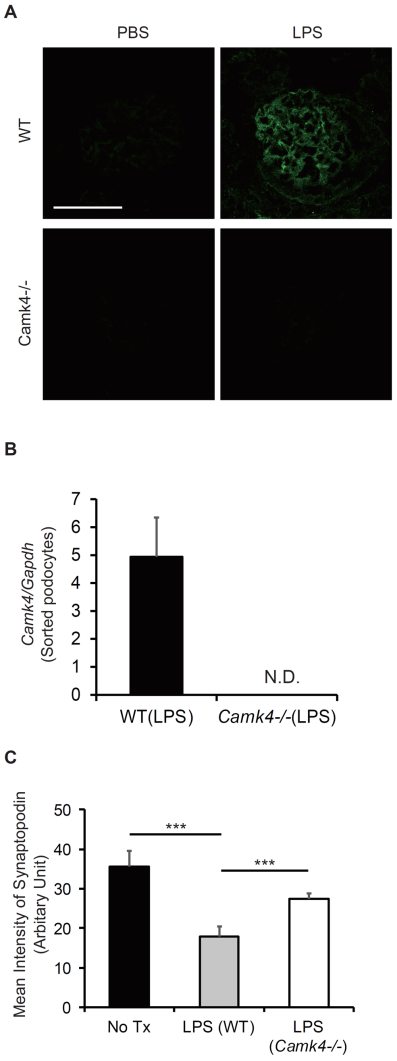
Disease	Race	Gender	Age	ISN/RPS	eGFR (ml/min/1.73 ㎡)	UP/ Urine Cre (g/gCre)
LN	Asian	F	31	IV-G (A/C)	67.3	2.69
LN	Asian	F	23	IV-G (A)	136	16.12
LN	Asian	F	24	IV-G (A)	77.7	3.05
LN	Asian	F	54	IV-G (A/C)	32.1	12.02
LN	Asian	F	57	Ⅲ(A) + V	26.9	3.04
LN	Asian	F	56	IV-G (A)	79.6	2.59
LN	Asian	F	39	Ⅲ(A/C) + V	77.6	2.55
LN	Asian	F	18	IV-G (A)	113.5	6.12
LN	Asian	F	61	IV-G(A/C) + V	37.8	6.06
LN	Asian	F	23	Ⅲ(A/C) ＋V	136.3	17.19
FSGS	Asian	M	83		41.3	13.5
FSGS	Asian	F	48		76.9	1.61
FSGS	Asian	M	50		29.9	3.42
FSGS	Asian	M	86		14.2	4.92
FSGS	Asian	F	59		63.7	1.44
FSGS	Asian	M	50		65.3	2.21
FSGS	Asian	F	76		52.1	3.38
FSGS	Asian	F	61	-	55.7	6.35
FSGS	Asian	M	54	-	83.97	11.2
FSGS	Asian	F	39	-	67.4	7.73

LN; lupus nephritis
FSGS; focal segmental glomerulonephritis
ISN/RPS; International Society of Nephrology/Renal Pathology Society criteria
eGFR; estimated glomerular filtration rate
UP; urine protein
Cre; creatinine



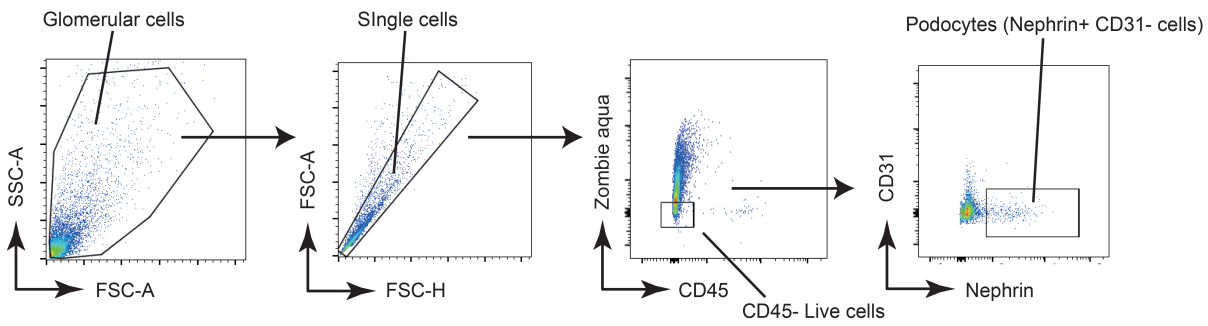
Supplemental Figure 1.

(A) Quantification of CaMK4 expression in podocytes in **Figure 1A** (CaMK4 expression in podocytes is represented by the ratio of merged area to nephrin positive area). Error bars represent the mean ± SEM. (healthy subject; n=6, LN or FSGS; n=10). ** $P < 0.01$, **** $P < 0.0001$ by one-way ANOVA with Tukey's post-test. **(B)** Quantification of the results in **Figure 1D** from three independent experiments. Error bars represent the mean ± SEM. * $P < 0.05$ by one-way ANOVA with Tukey's post-test.



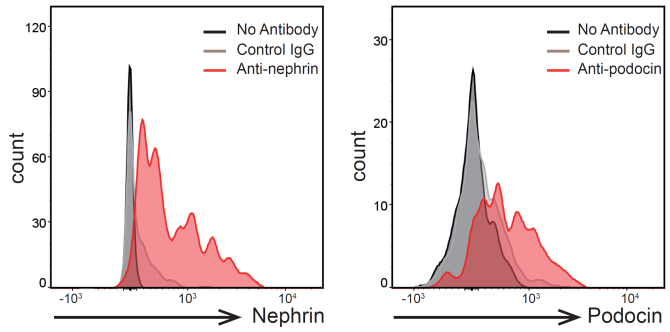
Supplemental Figure 2.

(A) Representative images of immunofluorescence for CaMK4 in PBS-, LPS- treated WT and *Camk4*-defecient (*Camk4-/-*) mice. Scale bar equals 50 μm. **(B)** CaMK4 mRNA expression in podocytes sorted by flow cytometry from LPS- treated WT and *Camk4-/-* mice. Results were normalized to the expression of GAPDH (n=5 in each group). **(C)** Quantification of synaptopodin expression data in **Figure 4C**. Error bars represent the mean ± SEM. *** $P < 0.001$ by one-way ANOVA with Tukey's post-test.



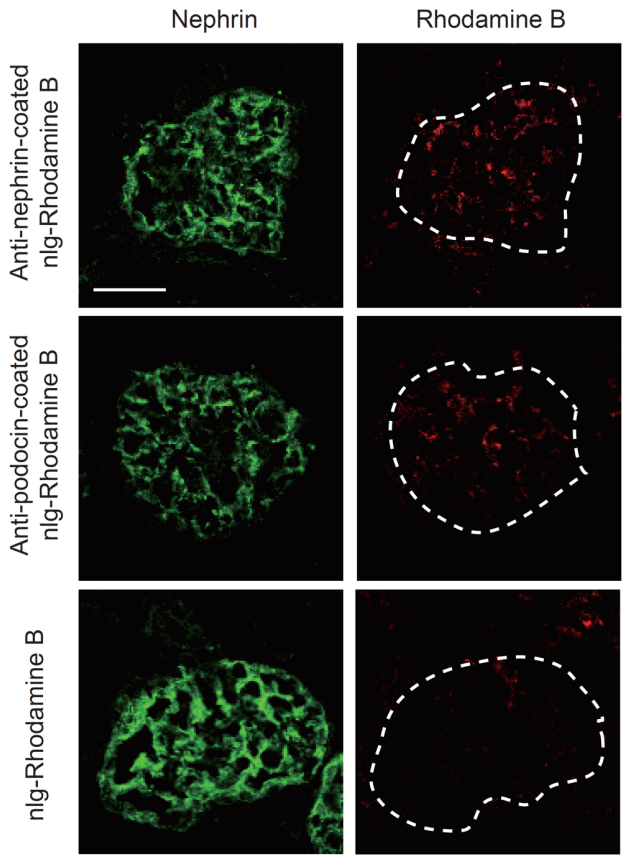
Supplemental Figure 3.

Gating strategy for isolation of podocytes (Live/Single/CD45-/CD31-/Nephrin+ cells) by flow cytometry from PBS-, LPS-, and adriamycin- treated mice, MRL.*lpr*, and MRL/MPJ mice.



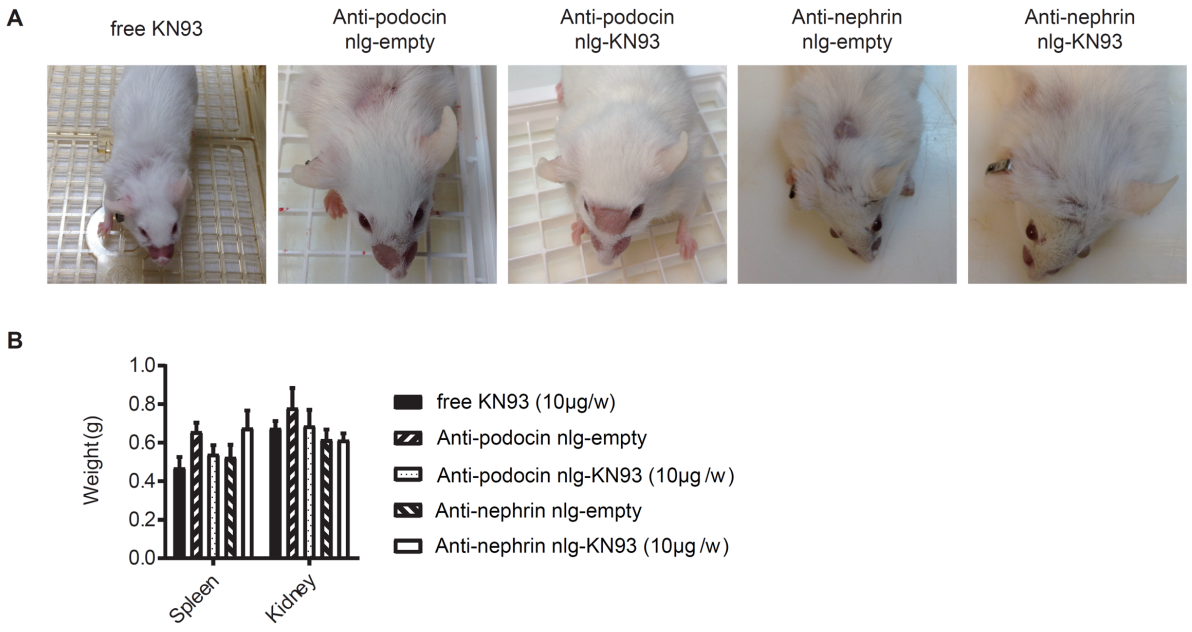
Supplemental Figure 4.

Podocin and nephrin expression on the surface of human podocytes human podocytes were stained with anti-podocin and anti-nephrin antibodies and analyzed by flow cytometry. Red lines represent cells stained positive with the nephrin or podocin antibodies, gray lines represent staining with control IgG and black lines represent cells in the absence of any antibody.



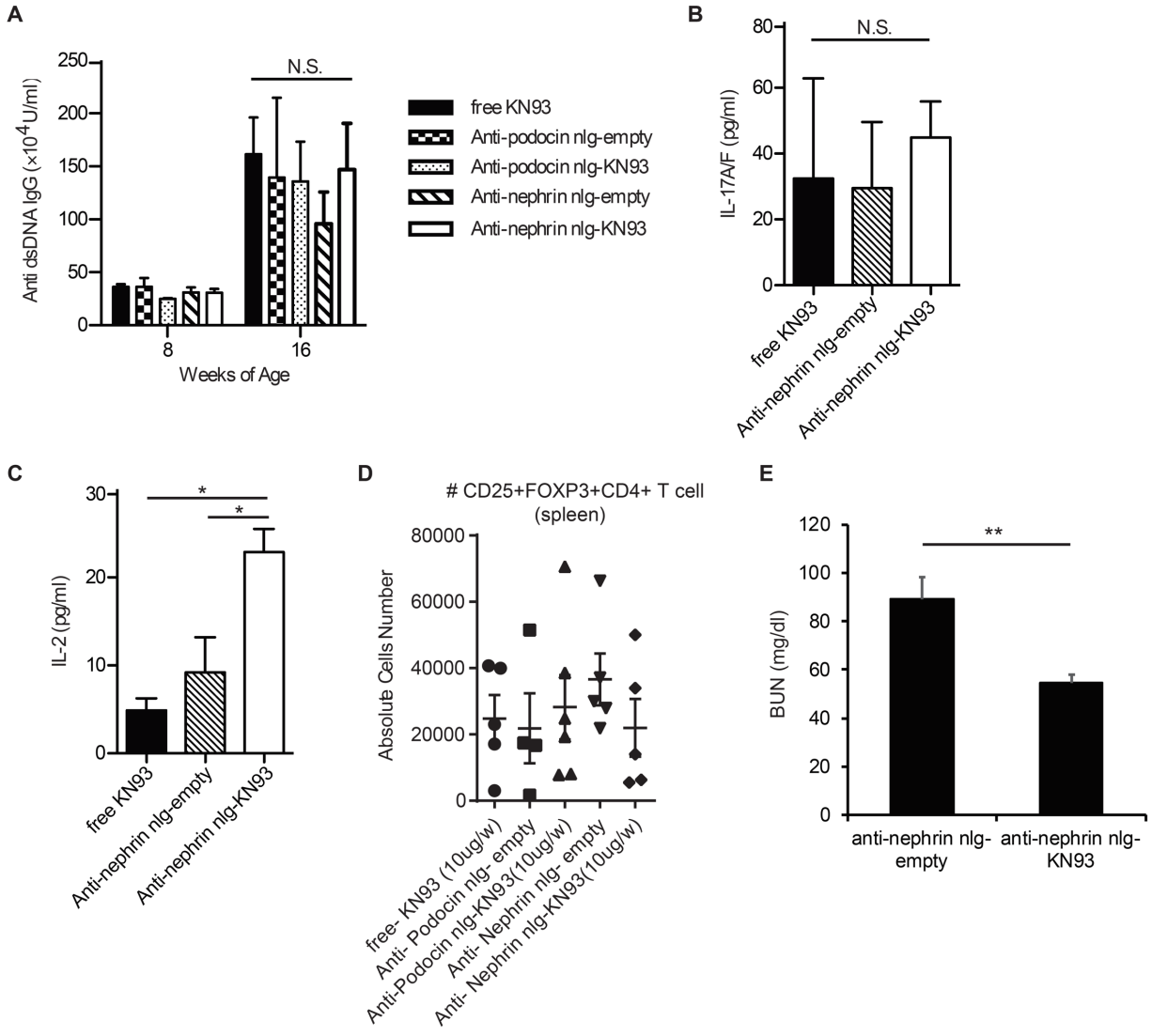
Supplemental Figure 5

Nlg tagged with anti-nephrin or -podocin antibodies accumulated in glomeruli 30 minutes after injection in MRL.*lpr* mice (12 weeks of age). Nephrin expression is in green and nlg loaded with rhodamine B in red. Upper panels are from kidneys of mice treated with anti-nephrin antibody-coated rhodamine B-loaded nlg, middle panels with anti-podocin antibody-coated rhodamine B-loaded nlg and lower panels with non-antibody-coated rhodamine B-loaded nlg. Scale bar equals 50 μm.



Supplemental Figure 6.

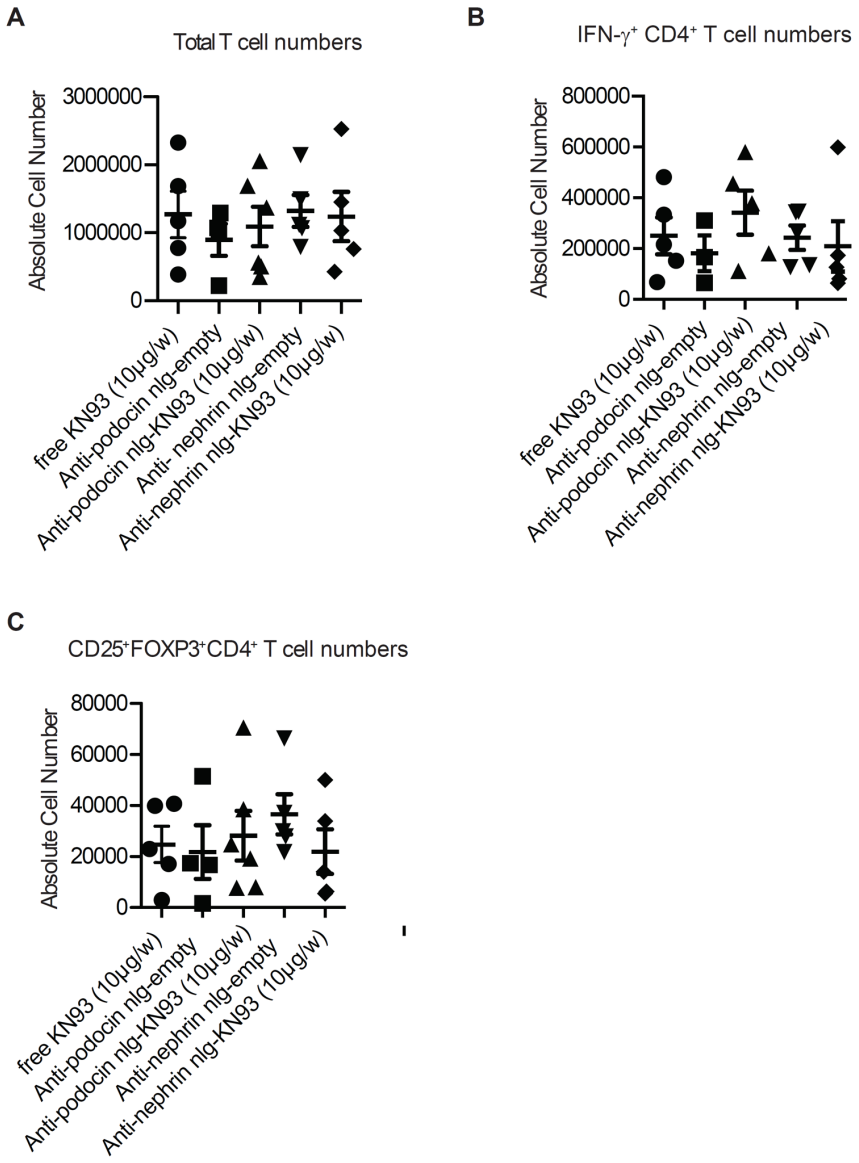
Targeted delivery of KN93 had no significant effects on the skin rash or weight of spleens and kidneys in MRL.*lpr* mice. (**A**) Representative pictures of skin rash of mice in each treatment group (16 weeks of age). (**B**) Mean weight of spleens and kidneys from each treatment group is shown. Error bars represent the mean ± SEM.



Supplemental Figure 7

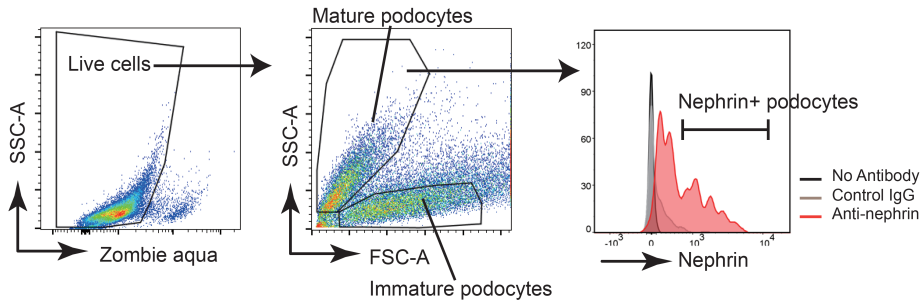
Targeted delivery of KN93 to podocytes in MRL.*lpr* mice does not affect serum anti-DNA antibody titers and IL-17 production. (**A**) Anti-dsDNA antibody titers in 8 or 16-week old mice, (**B**) IL17A/F and (**C**) IL-2 levels in the sera of 16 weeks old mice. (**D**) $CD25^{+}FOXP3^{+}CD4^{+}$ cells in the spleen of mice treated as indicated. (n=5) Error bars represent the mean ± SEM. N.S.; not significant, * $P < 0.05$ by one-way ANOVA with Tukey's post-test. (**E**) BUN level of mice

treated with anti-nephrin antibody coated nlg either empty or loaded with KN93 (n=5). Error bars represent the mean ± SEM. ** $P < 0.01$ by student *t*-test.



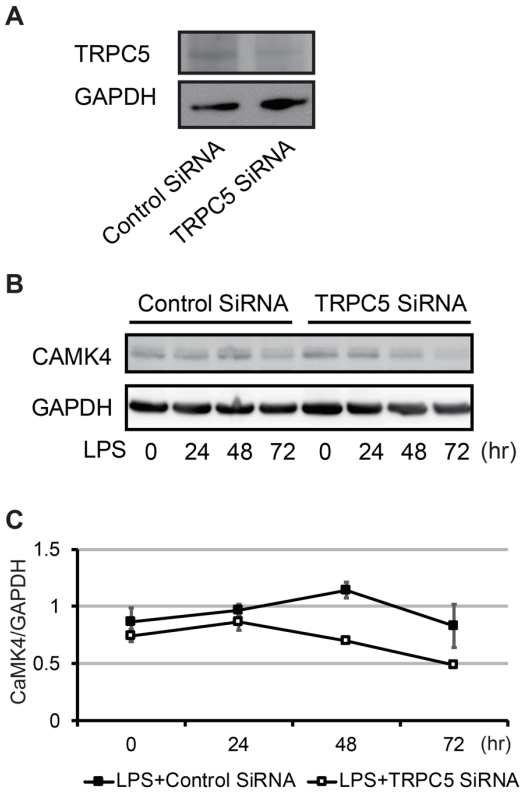
Supplemental Figure 8.

Targeted delivery of KN93 to podocytes did not affect the total numbers of infiltrating T cells or those producing IFNγ or expressing FOXP3. Each dot represents the number of (**A**) infiltrating total T cells ($CD90.2^+$), (**B**) $IFN\gamma^+$ $CD4^+$ cells, (**C**) $FoxP3^+$ $CD4^+$ cells in the kidneys of mice treated as indicated. Error bars represent the mean ± SEM. * $P < 0.05$ by one-way ANOVA with Tukey's post-test.



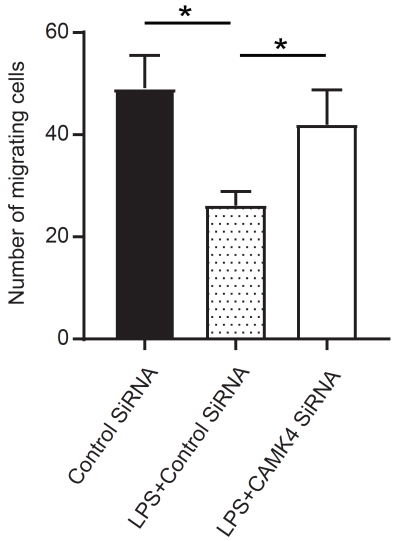
Supplemental Figure 9.

Gating strategy for identification of Nephrin^{+} human podocytes



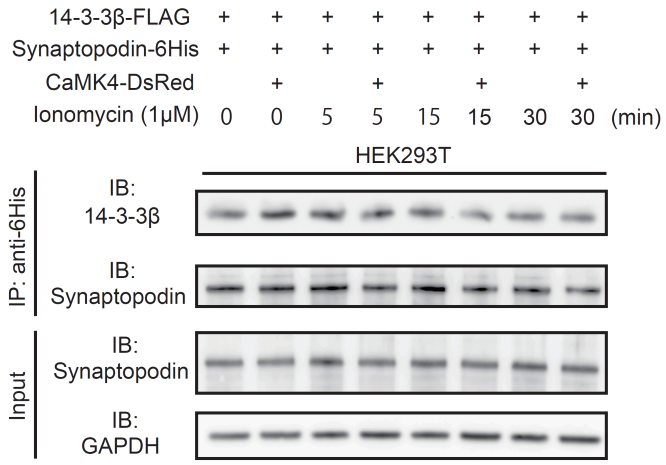
Supplemental Figure 10

(**A**) Western blotting analysis of TRPC5 expression in human podocytes treated with control or TRPC5 SiRNA. (**B**) Western blotting analysis of CaMK4 expression in human podocytes treated with control or TRPC5 SiRNA for the indicated times. Three independent experiments were performed. (**C**) Quantification of the results in **B**.



Supplemental Figure 11.

Transwell migration experiments using human podocytes after exposure to LPS for 72 hours with control or CaMK4 SiRNA. Error bars represent the mean ± SEM (n=3 independent experiments). * $P < 0.05$ by one-way ANOVA with Tukey's post-test.



Supplemental Figure 12.

Immunoprecipitation and immunoblot analysis of 14-3-3β and synaptopodin. Co-transfected HEK293T cells were stimulated with ionomycin for the indicated times. Cell lysates were immunoprecipitated with anti-6His antibody, and then analyzed by immunoblotting with anti-14-3-3β and anti-synaptopodin antibodies. The data are representative of three independent experiments.