Fig. S1. Yap1 mutants (yap1−/−) suffered from growth retardation during juvenile but developed normal kidneys. (A) Schematic diagram of yap1 gene structure and CRISPR-induced mutation. The CRISPR site was designed to target the 1st exon. A mutant line with 4-bp deletion was generated for phenotype analysis. Solid boxes indicate coding regions and open boxes indicate untranslated regions. The underlined sequence shows the CRISPR site. The PAM sequence is shown in blue, and the altered sequence is shown in red. (B) Morphology of adult fish at 65 dpf. The mutant fish (yap1−/−) exhibited smaller body sizes than WT fish. Scale bar: 1 cm. (C) Statistical analysis of body weights of yap1−/− fish and WT siblings from 45 to 85 dpf. * P <0.05; ** P <0.01; ns, not significant by unpaired two-tailed Student’s t-test, mean±s.e.m. (n=10). (D) Statistical analysis of body lengths of yap1−/− fish and WT siblings from 45 to 85 dpf. * P <0.05; ** P <0.01 by unpaired two-tailed Student’s t-test, mean±s.e.m. (n=10). (E) H&E staining of paraffin sections in yap1−/− fish and WT siblings at 90 dpf. Scale bars: 100 μm and 20 μm, respectively.
Fig. S2. Wwtr1 mutants (wwtr1<sup>−/−</sup>) developed normal kidneys. (A) Schematic diagram of wwtr1 gene structure and CRISPR-induced mutation. The CRISPR site was designed to target the 1st exon. A mutant line with 7-bp deletion and 293-bp insertion was generated for phenotype analysis. Solid boxes indicate coding regions and open boxes indicate untranslated regions. The underlined sequence shows the CRISPR site. The PAM sequence is shown in blue, and the altered sequence is shown in red. (B) Morphology of wwtr1<sup>−/−</sup> fish and WT siblings at 90 dpf. Scale bar: 1 cm. (C) H&E staining of paraffin sections in wwtr1<sup>−/−</sup> fish and WT siblings at 90 dpf. Scale bars: 100 μm and 20 μm, respectively.
Fig. S3. Knockdown of yap1 and wwr1 using CRISPR/Cas9 system. (A) Phenotypes of yap1 crispants and control. The yap1 crispants exhibited pericardial edema, pronephric cyst and curved body. Scale bars: 1 mm and 0.5 mm, respectively. (B) The mRNAs of yap1 and wwr1 could both rescue the phenotypes of yap1 crispants. Different letters indicate statistical significance by one-way ANOVA, mean±s.e.m. (n=3). (C) Phenotypes of wwr1 crispants and control. The wwr1 crispants exhibited pronephric cyst and curved body. Scale bars: 1 mm and 0.5 mm, respectively. (D) The mRNAs of yap1 and wwr1 could both rescue the phenotypes of wwr1 crispants. Different letters indicate statistical significance by one-way ANOVA, mean±s.e.m. (n=3).
**Fig. S4. Functional analysis of Yap1 in zebrafish kidneys.** (A) Immunofluorescent staining of cryostat sections in stk3−/− larvae and WT siblings at 15 dpf labeling Yap1, PKCζ and DAPI. Merged images are shown with Yap1 staining in green, PKCζ in red and DAPI in blue. Dotted line loops represent renal tubules. Scale bar: 20 μm. (B) Morphology and fluorescent signal of larvae at 3 dpf. Scale bar: 1 mm. (C) Statistical analysis of embryonic defects in Yap1 OE fish and WT fish. *** P<0.001 by unpaired two-tailed Student’s t-test, mean±s.e.m. (n=5). (D) Western blot for Yap1 in different genotypes. The weak band in yap1−/− was likely a non-specific reaction. (E) Morphology and fluorescent signal of Yap1 OE fish and WT controls at 60 dpf. Scale bar: 1 cm. (F) Yap1 OE could rescue the phenotype of yap1−/−;wwtr1−/− fish. Scale bars: 1 mm and 0.5 mm, respectively.
Fig. S5. Phenotype analysis of Wwtr1 OE fish. (A) Wwtr1 OE could rescue the phenotypes of yap1<sup>+/−</sup>;wwtr1<sup>+/−</sup> fish. Scale bars: 1 mm and 0.5 mm, respectively. (B) Western blot for Wwtr1 in different genotypes. (C) H&E staining of paraffin cross sections in Wwtr1 OE larvae and WT controls at different time points. Asterisk: enlarged Bowman’s space. Arrowhead: pronephric tubule dilation. Scale bar: 50 μm. (D) Morphology and fluorescent signal of Wwtr1 OE fish and WT controls at 65 dpf. Scale bar: 1 cm.
Fig. S6. Phenotype analysis of Wwtr1 OE fish (continued). (A) H&E staining of paraffin sagittal sections in Wwtr1 OE fish and WT controls at different time points. Scale bar: 100 μm. (B) H&E staining of paraffin frontal sections in Wwtr1 OE fish and WT controls at different time points. Scale bar: 100 μm.
| Gene name | Primer name | Primer sequence (5’ to 3’) | Application |
|-----------|-------------|----------------------------|-------------|
| stk3      | 3226        | TAGGATGTATGTCTGCATACGG     | sgRNA       |
|           | 3227        | AAACCGTATGCGAGACATACAT     |             |
|           | 3228        | GTCTCTCGGCATCACATCCA       | Genotyping  |
|           | 3229        | AGACTCCTCTCATGTCCTCC       |             |
| yap1      | 3220        | TAGGGAGACTCCGAGACCGATC     | sgRNA       |
|           | 3221        | AAACGATCGGTCTCGAGTCTC      |             |
|           | 3222        | CATGGATCCGAAACCAGCACA      | Genotyping  |
|           | 3223        | GGACGATGGGTTTTTTCGAGG      |             |
|           | 4681        | GCCGCGTGAAGAATGAG          |             |
|           | 4682        | TCGGGGAGACCTCGAGACCG       |             |
|           | 4683        | TCGGGGAGACCTCGAGGGC        |             |
| wwtr1     | 5796        | TAGGTTGGGGAGTTGGCTCACCAGG | sgRNA       |
|           | 5797        | AAACCGGGAGACTCCACTCCACA    |             |
|           | 5928        | ACCAGTCCTCGATGTG           | Genotyping  |
|           | 5929        | GAATGTCCAGTAATAACGAAC      |             |
Table S2. Primary antibodies used in this study

| Antibody name                        | Source                  | Catalogue number | Dilutions     |
|--------------------------------------|-------------------------|------------------|---------------|
| Anti-YAP1 antibody                   | Abcam                   | ab81183          | 1:200 (IF)    |
|                                      |                         |                  | 1:500 (WB)    |
| PKC 𝜖 Antibody (H-1)                 | Santa Cruz              | sc-17781         | 1:50 (IF)     |
| YAP/TAZ (D24E4) Rabbit mAb           | Cell Signaling Technology | #8418           | 1:200 (IF)    |
|                                      |                         |                  | 1:500 (WB)    |
| Phospho-Histone H3 (Ser10) Antibody  | Cell Signaling Technology | #9701           | 1:500 (IF)    |
| Monoclonal Anti-Tubulin, Acetylated antibody produced in mouse | Sigma-Aldrich | T6793 | 1:500 (IF) |
| β-Actin Antibody                     | Cell Signaling Technology | #4967           | 1:1000 (WB)   |

IF, immunofluorescence; WB, western blotting.