**Table S1. List of antibodies used in this study.**

| Name | Vendor | Cat# |
|---|---|---|
| CTDP1 | Bethyl Laboratories, Inc | A301-172A |
| HSC70 | Santa Cruz Biotechnology | sc-7298 |
| p27 | Santa Cruz Biotechnology | Sc-1641 |
| Cyclin E | Santa Cruz Biotechnology | Sc-247 |
| Cyclin B | Santa Cruz Biotechnology | Sc-166210 |
| Histone H3 | Cell Signaling Technology | 9715 |
| pHistone H3 S10 | Cell Signaling Technology | 9701 |
| β-actin | Santa Cruz Biotechnology | sc-47778 |
| H2AX | Bethyl Laboratories, Inc | A300-082A |
| ɣH2AX (pSer139) | Novus Biologicals | NB100-78356 |
| ATR | Cell Signaling Technology | 13934 |
| pATR S428 | Cell Signaling Technology | 2853 |
| ATM | Cell Signaling Technology | 2873S |
| pATM | R&D System | Af1655 |
| ChK1 | Cell Signaling Technology | 2360 |
| pChk1 S317 | Cell Signaling Technology | 12302 |
| Chk2 | Cell Signaling Technology | 2662 |
| pChk2 T68 | Cell Signaling Technology | 2661 |
| p53 | Santa Cruz Biotechnology | Sc-126 |
| FANCD2 | Abcam | Ab108928 |
| RB | Cell Signaling Technology | 9309 |
| pRB S795 | Cell Signaling Technology | 9301 |
| pRB S780 | Cell Signaling Technology | 8180 |
| pRB S870/811 | Cell Signaling Technology | 8516 |
| Vimentin | Cell Signaling Technology | 5741 |

**Figure S1.**

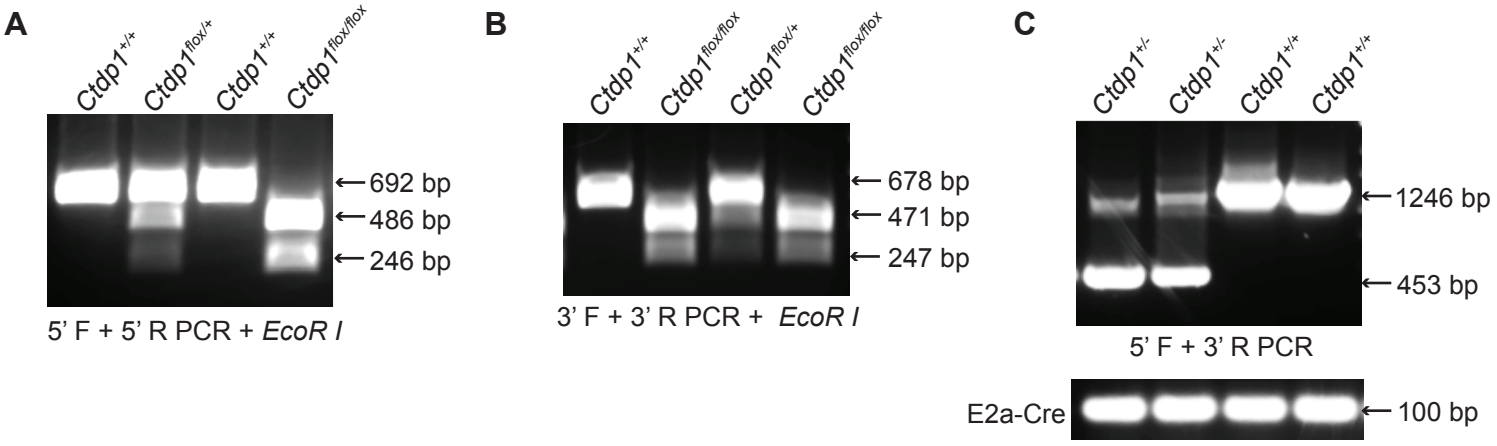
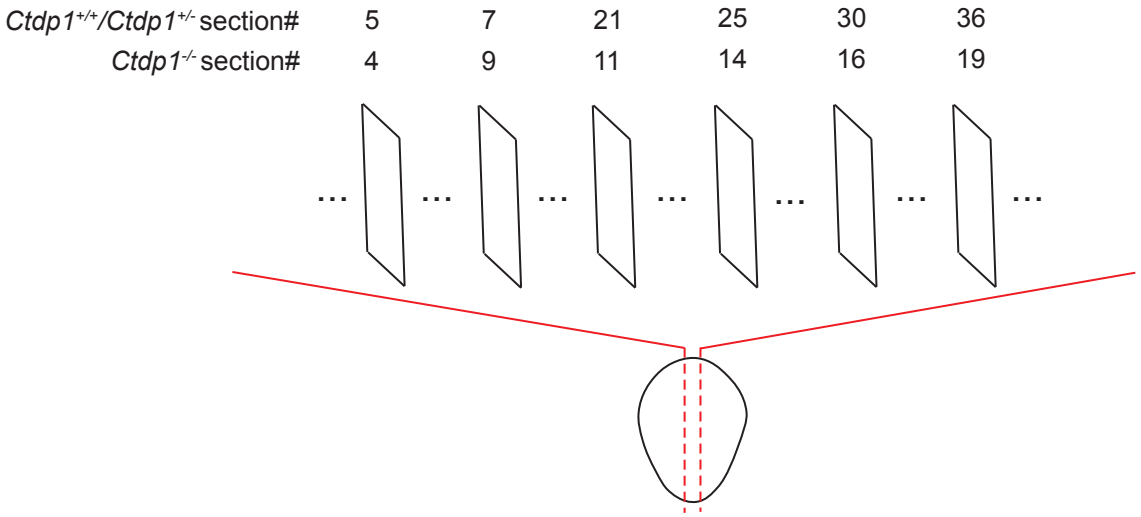



**Figure S1. Genotyping PCR reactions**

**A-B**. The representative genotyping results of the *Ctdp1*$^{flox/+}$ heterozygous intercross using 5'F + 5'R primers (**A**) and 3F' + 3R' primers (**B**). The expected sizes of PCR products after *EcoR I* digestion are indicated. *EcoR I* was used here to further distinguish the floxed allele and wild type allele since the size of their PCR products are similar. **C.** The representative genotyping results of the *Ctdp1*$^{flox/+}$*;E2a-Cre* heterozygous intercross using full length 5'F + 3'R primers and E2a-Cre primers, respectively. The expected sizes of PCR products are indicated. The *Ctdp1*$^{-/-}$ genotype is not shown because there are no viable *Ctdp1*$^{-/-}$ pups.

**Figure S2.**

**A**




**B**

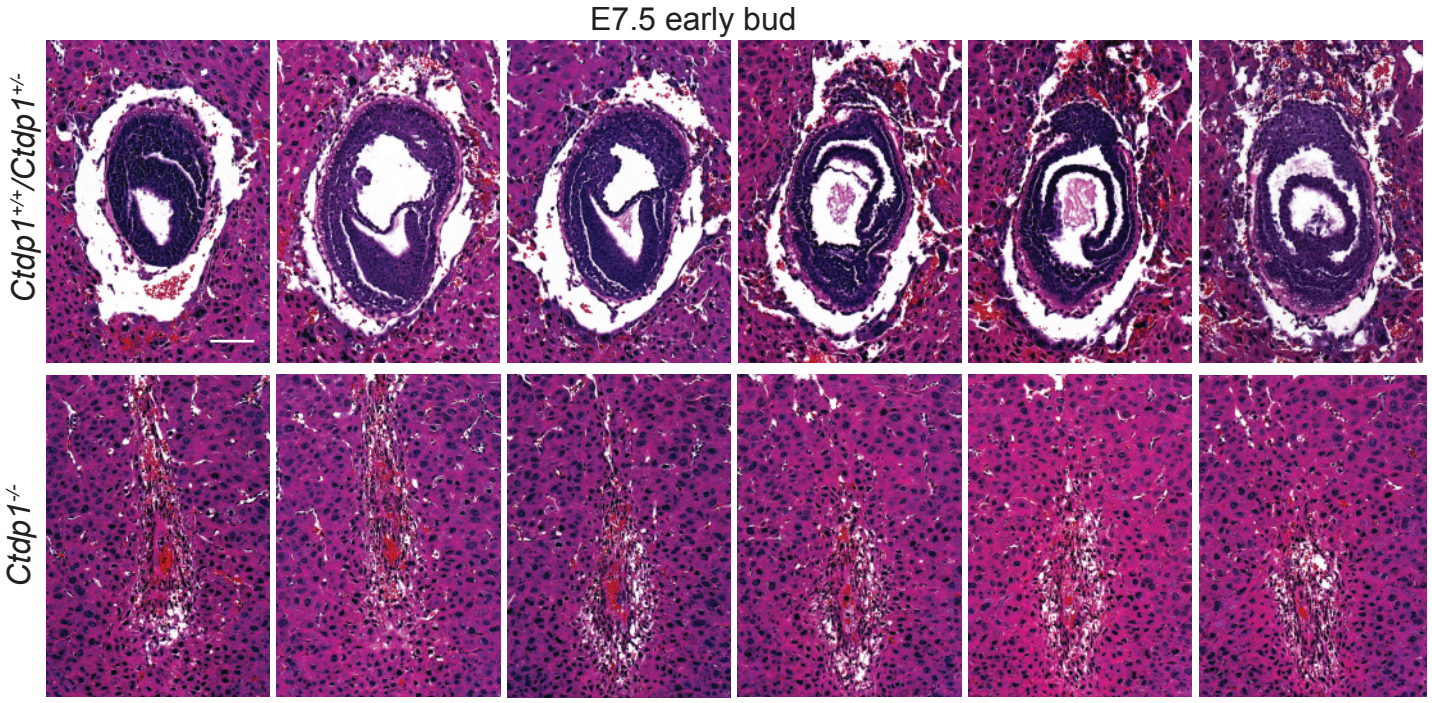



**Figure S2. H&E stained serial sagittal sections of representative mouse embryos at E7.5.**

**A.** Schematic showing the serial sections that were evaluated and their relative location within the maternal decidua corresponding to the H&E sections shown in Figure S1B. **B.** Selected representative serial sections of *Ctdp1*$^{+/+}$/*Ctdp1*$^{+/-}$ and *Ctdp1*$^{-/-}$ embryos within the maternal decidua.

## Figure S3.

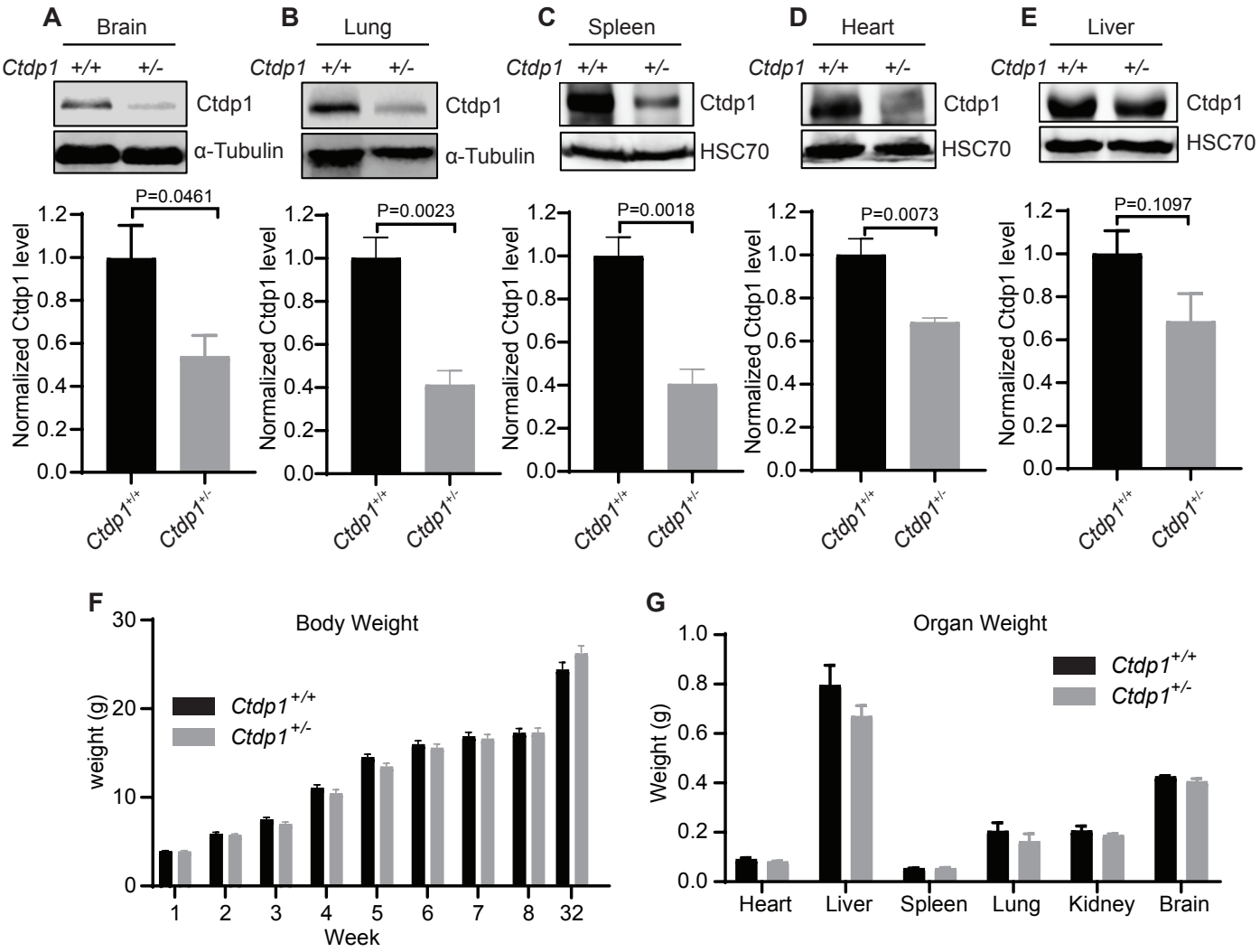



**Figure S3. The Ctdp1 expression, body weight and organ weights of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice.**

**A-E**. Western blot analysis of Ctdp1 expression of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 5 weeks in the brain (**A**), lung (**B**), spleen (**C**), heart (**D**), and liver (**E**). Immunoblotting of α-Tubulin or HSC70 was used as a loading control. Normalized Ctdp1 expression was quantified in 4 mice per group depicted in the bar graphs below the protein blots. Values represent the mean ± SEM. Statistical significance was determined using Student's t-test and the P-values of the comparisons are displayed above the bar graphs. **F.** Body weight of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice from 1-32 weeks. n = 20 per group for weeks 1-8. n = 4 per group at 32 weeks. **G.** Organ weights of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 8 weeks. n = 6 per group.

**Figure S4.**

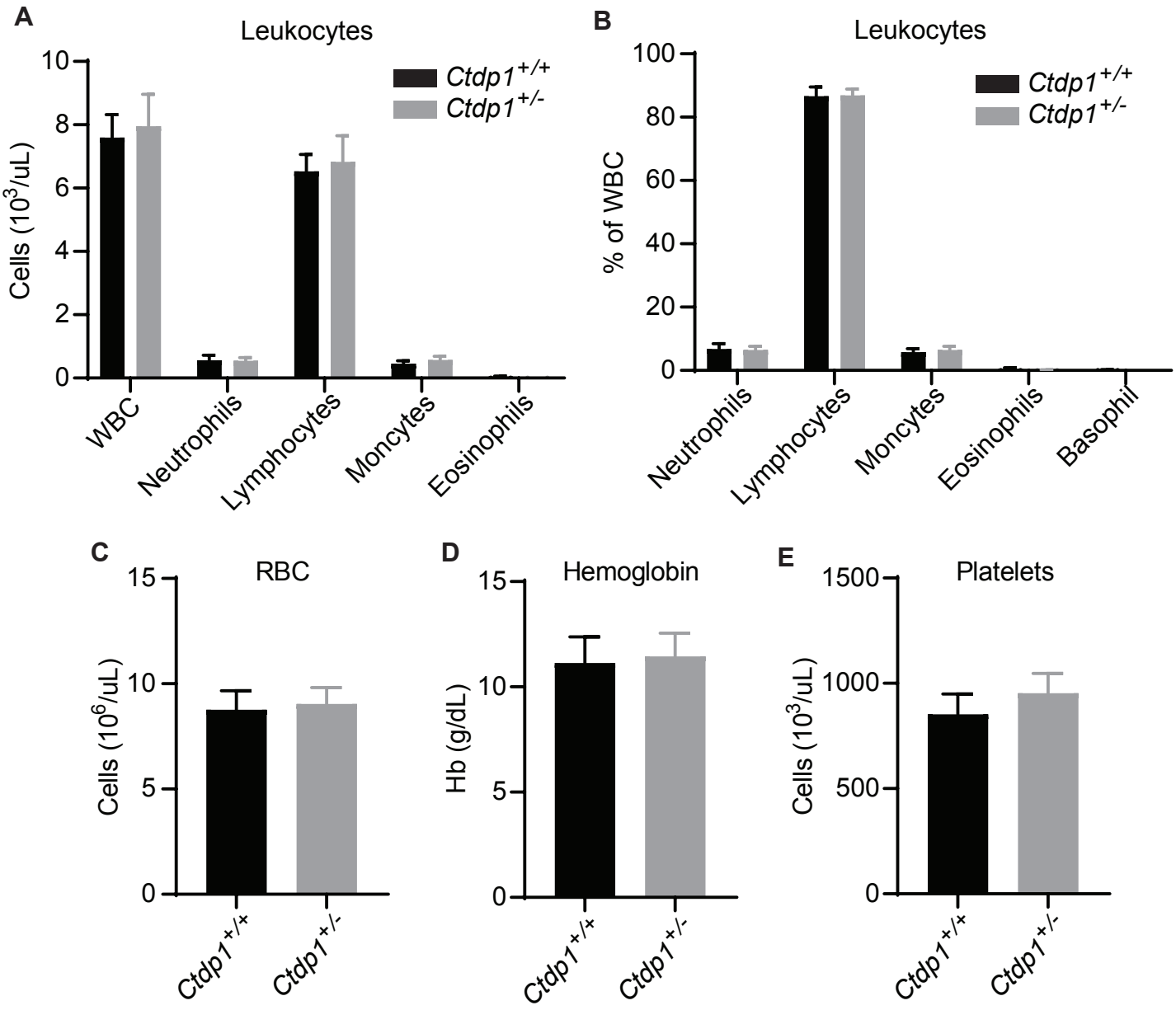



**Figure S4. Complete blood evaluation of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice.**

**A-B.** The numbers (**A**) and percentages (**B**) of different leukocyte groups in the blood of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 8 weeks. **C-E.** The number of red blood cells (RBC) (**C**), value of hemoglobin (**D**), and number of platelets (**E**) in the blood of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 8 weeks. For each of the measurements in panels A-E, n = 6 per group. Data are shown as mean ± SEM.

**Figure S5.**

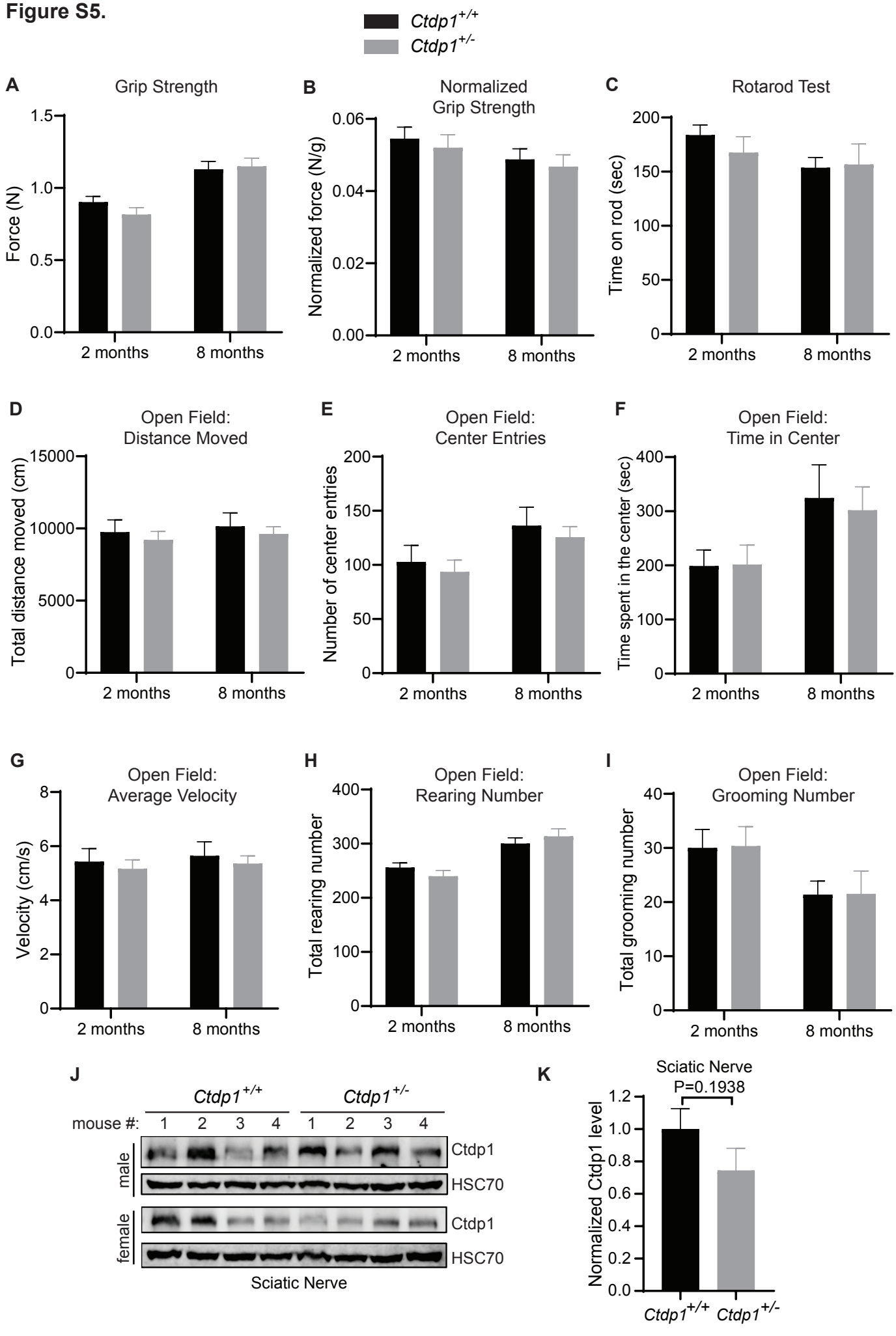
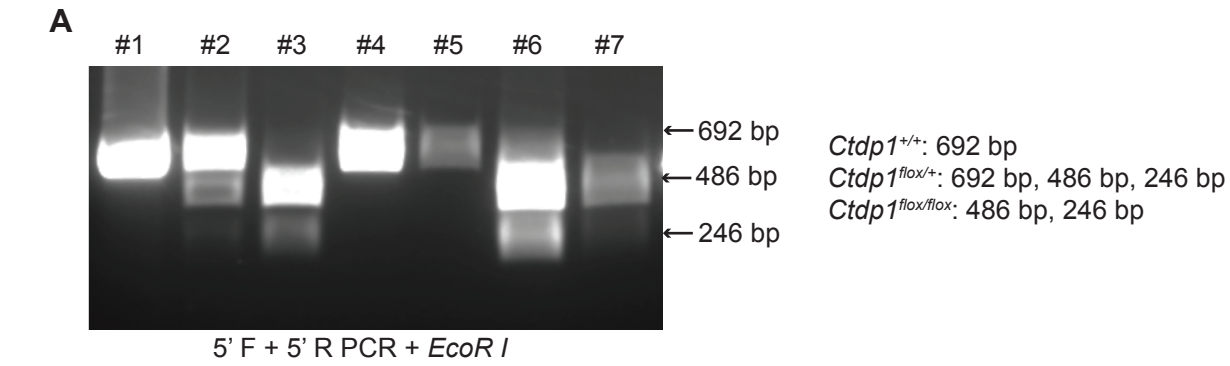


**Figure S5. Locomotive and behavioral tests in *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice.**

**A.** Measurement of forepaw grip strength in *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 2 and 8 months. **B.** Normalized grip strength value of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 2 and 8 months. **C.** Measurement of motor function and co-ordination using the rotarod test for *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 2 and 8 months. **D-I.** An open field test was performed at 2 and 8 months to evaluate mouse locomotor activity, including the following parameters: total distance moved (**D**), total number of entries in the center area (**E**), time spent in the center area (**F**), average velocity (**G**), total rearing number (**H**), and total grooming number (**I**). For mice at 2 months, n = 6 per group. For mice at 8 months, n = 8 per group. Data are shown as mean ± SEM. **J.** Western blot analysis of the Ctdp1 protein level in the sciatic nerve of *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 8 months. **K.** Quantitation of the Ctdp1 protein level in the sciatic nerve of the *Ctdp1*$^{+/+}$ and *Ctdp1*$^{+/-}$ mice at 8 months. HSC70 was used as a loading control. n = 8 per group. The P-values are displayed above the bar graphs. Data are shown as mean ± SEM.

**Figure S6.**



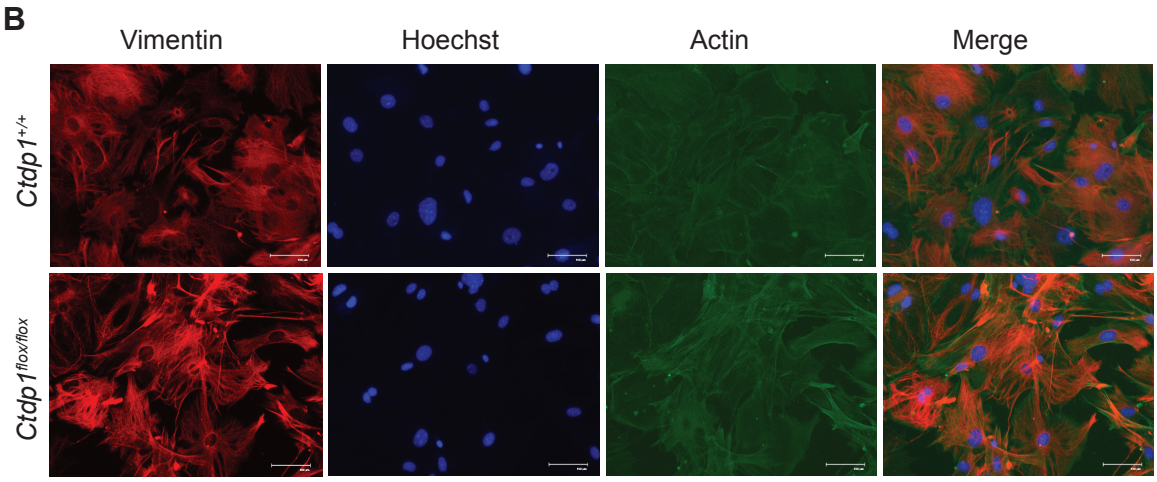




**Figure S6. The *Ctdp1*$^{+/+}$ and *Ctdp1*$^{flox/flox}$ MEFs were successfully isolated.**

**A.** Genotyping of the seven embryos derived from a *Ctdp1*$^{flox/+}$ male and a *Ctdp1*$^{flox/+}$ female breeding. #1 and #3 were selected to establish *Ctdp1*$^{+/+}$ and *Ctdp1*$^{flox/flox}$ MEFs, respectively. **B.** Immunofluorescence staining of vimentin (fibroblast marker), actin (cytoskeletal marker), and Hoechst (nucleus marker) in *Ctdp1*$^{+/+}$ and *Ctdp1*$^{flox/flox}$ MEFs. Scale bar = 100 µm.

## Figure S7.

**REPAIR TEMPLATE with Genomic Sequence**

LoxP
EcoRI
Target Exons
5' LoxP forward Primer
5' LoxP reverse Primer
3' LoxP forward Primer
3' LoxP reverse Primer

TGCTGGCTTTGCCTTGGCAGCACCTTGAACAGTTTCCCCAGGAAAGAATCCTTTTTGTTTTCCAGCTGTC
TTTCCTCATGCCCTAGATATGTTGAGTATTCTTCTTCTCCAGTATTTCTGGAGGACATAATGCTTTTTGT
CTTCACTGTAAAGACAGCAGATCACCTGCAGTGTTGACAGTTGCCTGCTTTTCTTATGCTCTATGTAGAT
GACCACTGATTCTTAAATGATCTCTATTCATTCTGCAATGTAGGTGGTGGGTGGCTGTTGCTATTTTTTG
TTTGTTTCCATGTAACTGCAGTTGGTTTACTGGGAGAATGGACTCTTGTGCTGACTAGTGACTGCCGTAT
CTGACATAACTTCGTATAGCATACATTATACGAAGTTATGAATTCTGCAGGTATGACCTAGAGCCCAGTT
TCTCATGTTTTCTTTTTTTAAAAGAAAGACAGCATTCACGTAGCTGTCTGTACAGGAGAGTTGTGTGCTA
GGATAGTAGTGTTGGTAACCACTTGCTGAAATCATACCACCACATTCACAGTTATGACAGATGTGCCTTT
CCACACAATGTTAACCAAACCCTTTCCACTCTTACAGGCTGCAGAGTAAAAATGGAAGGCAGCAGGTCCC
CCTTTCCACAGCGACGGTTTCCATGGTGCACAGTGTGCCGGAGTTGATGGTGAGCTCTGAGGTGAGCAGA
GGACTCTGGAGCGTGGATTGATAGGCAGCCCCATCTGAATACTGACTGCTTCCTAAGATGTAGCTCCGCT
GGCTGCCCGTTTCCTTTTTTCCGTTCATAAACAACTGTCTCTCCATGGATGCTTGGAAGCCCCACAGCTC
TTAGTTTTGTAGATTAGTCACCTTCTTGGTACTGCTGACACAGCAGCAGGGGTGGCCTGCATTCCCCTTG
AGCCAGACTTTCCTTAGAAATGCTGTGACAGGCTCCTAACAGGAAGCAGTGCTATGGCTAGGAACTTGTT
TGTGCTCTTTTCTTAATAAAATTGAATTACGTTTTGAATCCAAATATATATACTTTGTCATTTTTCTCAT
TTACTTTTTGACTTTAGCAAGCTGAGAAACTAGGAAGAGAGGATCAGCAGCGACTACATCGAAACAGAAA
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AACAAAGTGAGTGACTCCAGCTTTTCCCTTGGGAATTCATAACTTCGTATAGCATACATTATACGAAGTT
ATTGGCTCTCACAAGAGTGTCCATTTCCAAGTACACTCTCTTGTGTTAAGTGAGTTCCTGGGAACCCTAT
ATGTGGGAGGCAGGTCAGTCAGCTGCTGTGGGCAGACTTCACATAGCTGTGTCTGGGCTGGGCCAGGTGG
CACGGGAAGTGCTCTCTCTCTTCCTGTTGGCATTAGCTTCTGTGTCAGGTTGGCTCACACTTACTAGGGC
CCTTCAAGATAGAAGAGTTCAGAAACAGTCGCTGTGGAAACGGGGACCTGCTGCCTTCCATTTTTACTCT
GCAGCCTATAAGAGTGGAAAGGGTTTGGTTAACACTGCTGGGGGCATGCTCTTGGGAAGAGGTGTGTGTA
GAGTGCCTTAGAGTTAGATGTCTAGAACAAGAGGATATCTGAGGCCATGTT

**Primers**

5' LoxP forward Primer: 5'-GTGACATTTCTGTCGTCTAGTGGA-3'
5' LoxP reverse Primer: 5'-CTAATCAGTGGAAGAACCATGACG-3'
3' LoxP forward Primer: 5'-CAGCCAGCGGAGCTACATCTTAGG-3'
3' LoxP reverse Primer: 5'-CCCTAGTAAGTGTGAGCCAACCTG-3'

**Figure S7. Depiction of the *Easi*-CRISPR repair template used to generate the floxed *Ctdp1* allele.** The location of the *loxP* sites, targeted exons 3 and 4, *EcoRI* restriction site, and primer sites for PCR genotyping are highlighted.