Supporting Information

Masubuchi et al. 10.1073/pnas.0910292107

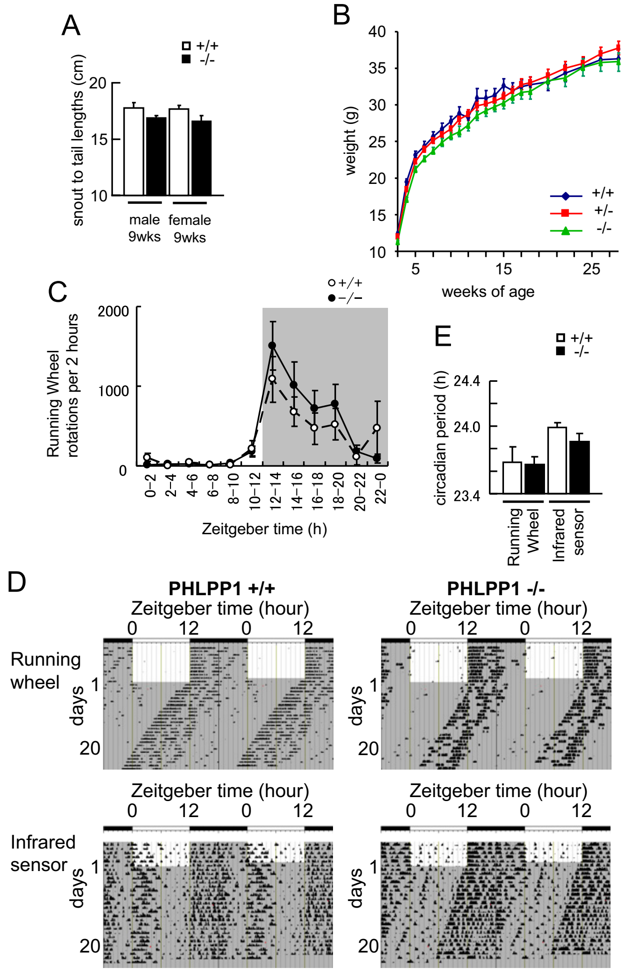

Fig. S1. Growth, daily activity, and circadian activity periods of *PHLPP1*$^{+/+}$ and *PHLPP1*$^{-/-}$ mice. (*A*) Snout-to-tail lengths of 9-week-old animals are indicated by open bars [*PHLPP1*$^{+/+}$ (male, *n* = 5; female, *n* = 3)] and filled bars [*PHLPP1*$^{-/-}$ (male, *n* = 8; female, *n* = 5)] (mean ± SEM). (*B*) Body weights at each week of age are indicated by blue circles (*PHLPP1*$^{+/+}$; *n* = 22–41), red squares (*PHLPP1*$^{+/-}$; *n* = 63–97), and green triangles (*PHLPP1*$^{-/-}$; *n* = 26–52). (*C*) Running wheel rotation counts under light–dark cycle periods are indicated by open circles [*PHLPP1*$^{+/+}$ (*n* = 5)] and filled circles [*PHLPP1*$^{-/-}$ (*n* = 6)] (mean ± SEM). After more than 2 weeks of LD entrainment, rotations during the following 3 days are averaged for each time point from separate animals. (*D*) Double-plotted running wheel and infrared sensor records of *PHLPP1*$^{+/+}$ and *PHLPP1*$^{-/-}$ mice. Mice were entrained in 12:12 light–dark (LD) cycles and placed in constant darkness (DD). Locomotor activities are expressed in the histogram. Periods of darkness are depicted by gray backgrounds. (*E*) Circadian periods derived from running wheel and infrared sensor activity (days 2–21) are indicated by open bars (*PHLPP1*$^{+/+}$) [running wheel (*n* = 5), infrared sensor (*n* = 6)] and filled bars (*PHLPP1*$^{-/-}$) [running wheel (*n* = 6), infrared sensor (*n* = 6)] (mean ± SEM).

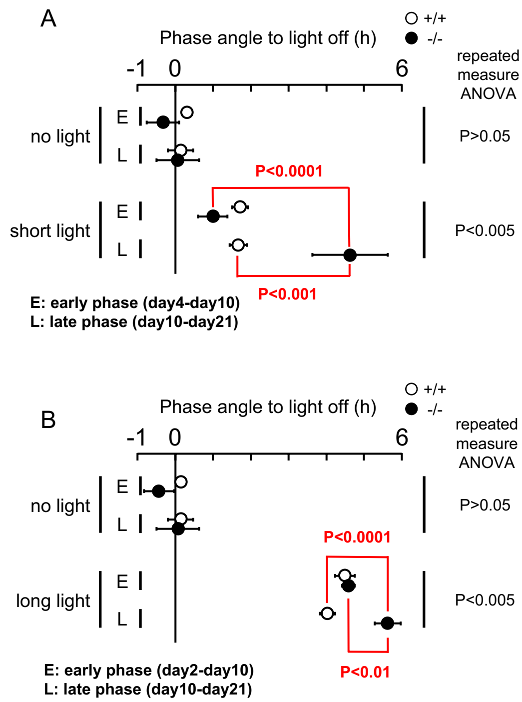

Fig. S2. Phase angle to light offs of *PHLPP1*$^{+/+}$ and *PHLPP1*$^{-/-}$ mice (*A*) Quantification of short-light task-induced changes in activity rhythm phases [no light; $^{+/+}$ (*n* = 6): $^{-/-}$ (*n* = 6), short-light; $^{+/+}$ (*n* = 8): $^{-/-}$ (*n* = 8)] from days 4 to 10 (E, early phase) and days 10 to 21 (L, late phase). (*B*) Quantification of long-light task-induced changes in activity rhythm phases [no light; $^{+/+}$ (*n* = 6): $^{-/-}$ (*n* = 6), long-light; $^{+/+}$ (*n* = 14): $^{-/-}$ (*n* = 14)] from days 2 to 10 (E, early phase) and days 10 to 21 (L, late phase). Extrapolated activity onsets of the early phase and late phase are indicated by open circles (*PHLPP1*$^{+/+}$) and filled circles (*PHLPP1*$^{-/-}$) (mean ± SEM). In each lighting task the effect of genotypes and days in DD are tested statistically by repeated measure ANOVA and Fisher's PLSD.

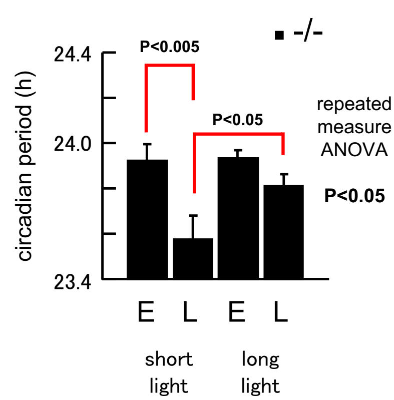

Fig. S3. Delayed change of tau of *PHLPP1*$^{-/-}$ mice after short- or long-light tasks. Circadian periods of activities of early phase (E) (days 4–10 for short-light; days 2–10 for long light) and late phase (L) (days 10–21) are indicated by filled bars (*PHLPP1*$^{-/-}$) (mean ± SEM). The effect of each lighting task and days in DD are tested statistically by repeated measure ANOVA and Fisher's PLSD.

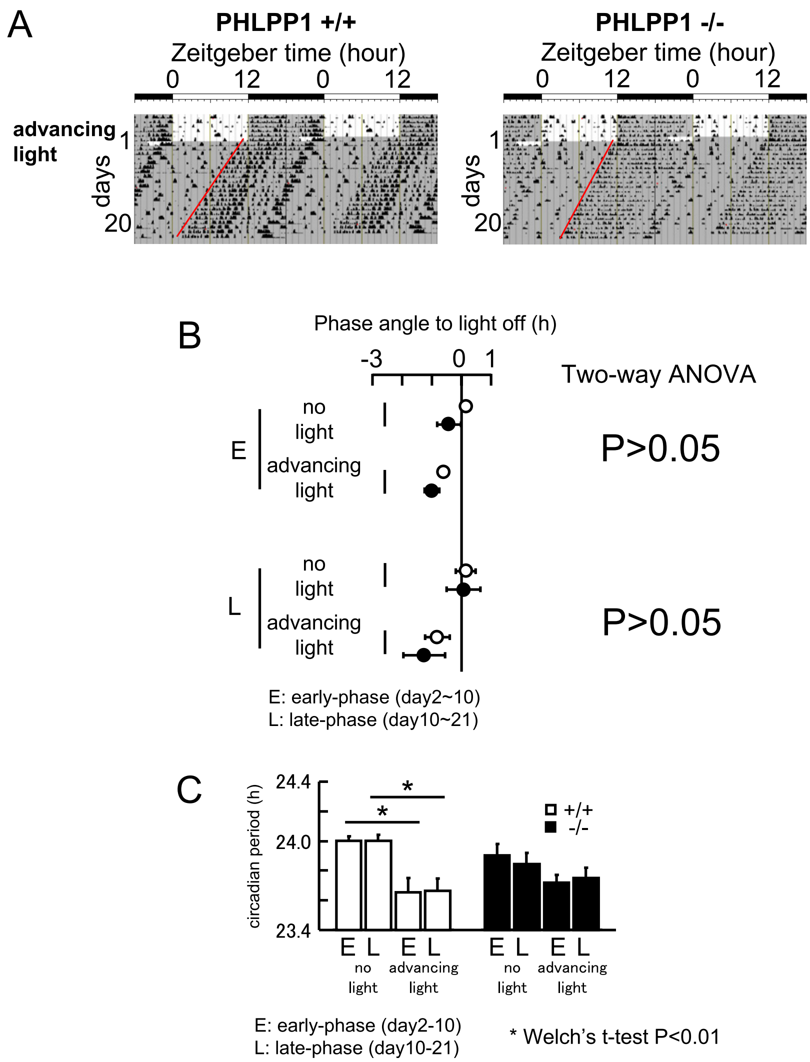

Fig. S4. Effect of phase advancing light on circadian period in PHLPP1-null mice. (*A*) Double-plotted activity records of *PHLPP1*$^{+/+}$ and *PHLPP1*$^{-/-}$ mice. Mice were entrained in 12:12 light–dark (LD) cycles and then placed in constant darkness (DD) from the light off (ZT12), on day 1. After 8 h in DD, a 4-h light pulse (from ZT20 to ZT24) was administered to *PHLPP1*$^{+/+}$ and *PHLPP1*$^{-/-}$ mice (advancing light). Locomotor activities were monitored by infrared sensors and are expressed in the histogram. Periods of darkness are indicated by gray backgrounds. Red regression lines estimate the phase shift from days 10 to 21. (*B*) Quantification of advancing-light task induced changes in activity rhythm phases [no light; $^{+/+}$ ($n = 6$): $^{-/-}$ ($n = 6$), advancing light; $^{+/+}$ ($n = 8$): $^{-/-}$ ($n = 6$)] from days 2 to 10 (E, early phase) and days 10 to 21 (L, late phase). Extrapolated activity onsets of early phase and late phase are indicated by open circles (*PHLPP1*$^{+/+}$) and filled circles (*PHLPP1*$^{-/-}$) (mean ± SEM). (*C*) Circadian period during days 2–10 (E, early phase) and from days 10 to 21 (L, late phase) are indicated by open bars (*PHLPP1*$^{+/+}$) and filled bars (*PHLPP1*$^{-/-}$) (mean ± SEM). *$P < 0.01$ (Welch's *t* test).