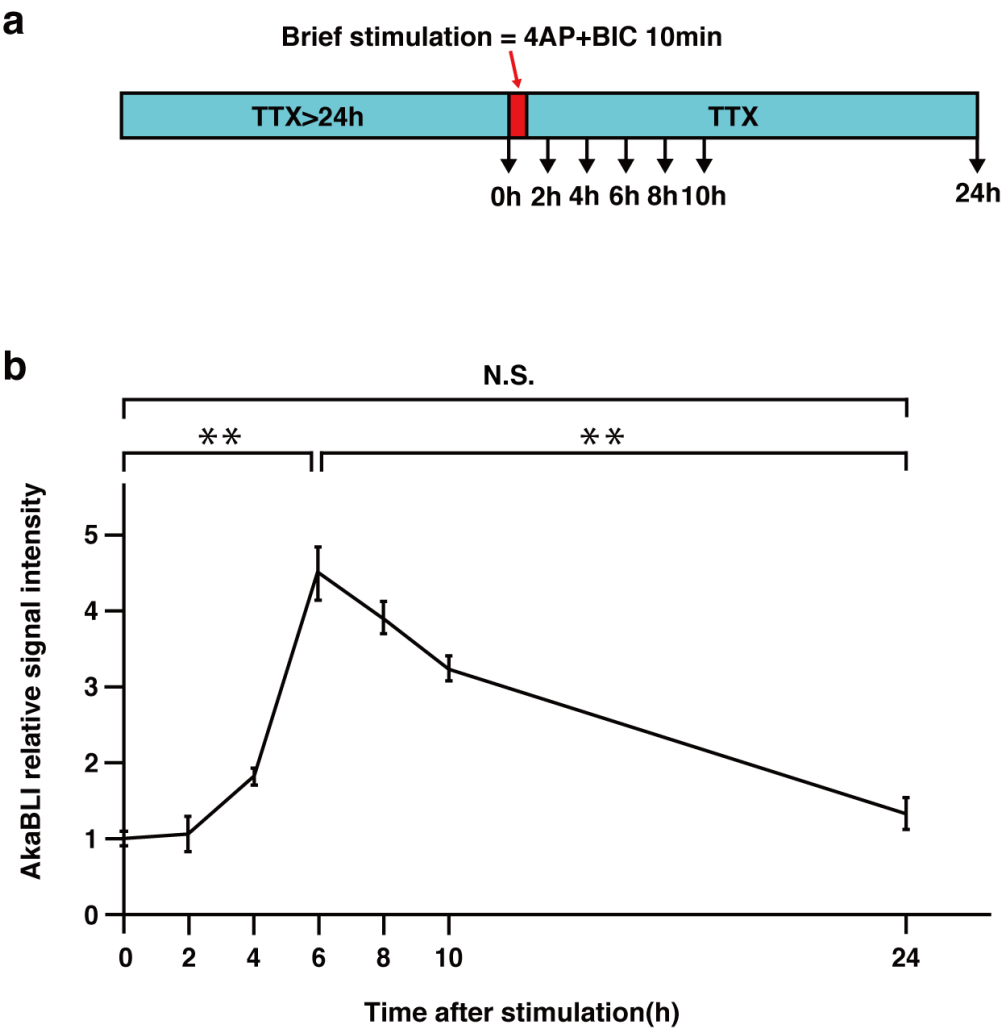


1 **Supplementary Fig. 1**



3 **Supplementary Fig. 1**

4 **BLI of hippocampal neurons stimulated with 4AP+BIC *in vitro***

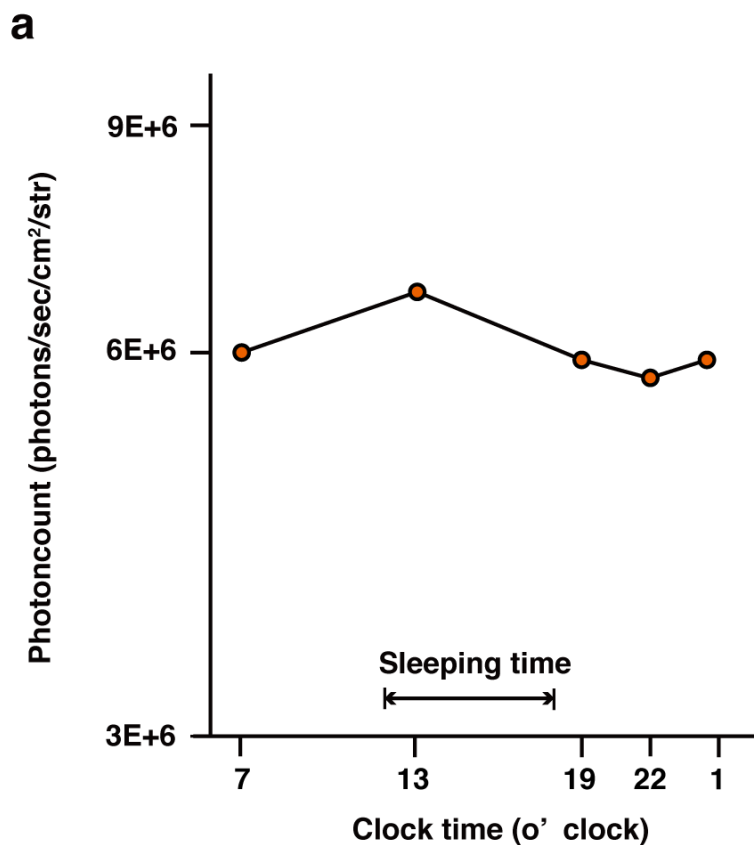
5 **(a)** Scheme of the experiment used to detect the time course of ESAL expression using mouse

6 hippocampal neurons. Before and after brief stimulation, the neurons were silenced with 1uM

7 TTX.

(b) The result of multiple time-point BLI measurements in ESAL-expressing mouse hippocampal neurons. N = 5 independent experiments for 0, 6, 24 hours, and n = 3 for 2, 4, 8, 10 hours. Values are the mean \pm SEM; *p < 0.05, **p < 0.01. Statistical analyses were performed using the two-sided unpaired Student's *t* test. Individual t-values and degrees of freedom: 0 and 6 hours; $t(8) = 10.42$, $p = 6.2 \times 10^{-6}$, 6 and 24 hours; $t(8) = 8.357$, $p = 3.2 \times 10^{-5}$, 0 and 24 hours; $t(8) = 1.568$, $p = 0.16$.

Supplementary Fig. 2



17 **Supplementary Fig. 2**

18 ***In vivo* monitoring of ESAL bioluminescence over the day**

19 **(a)** Representative diurnal transition of luminescence intensity in the cervical spine of an
20 ESAL-expressing NS/PC-transplanted mouse (photons/sec/cm²/str). All the measurements
21 were performed within a week (10–11 weeks after transplantation). Sleeping time in the figure
22 shows a typical example because mice are nocturnal.

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