

Down-regulation of clock genes expression in the suprachiasmatic nuclei (SCN) after short-term propofol anesthesia



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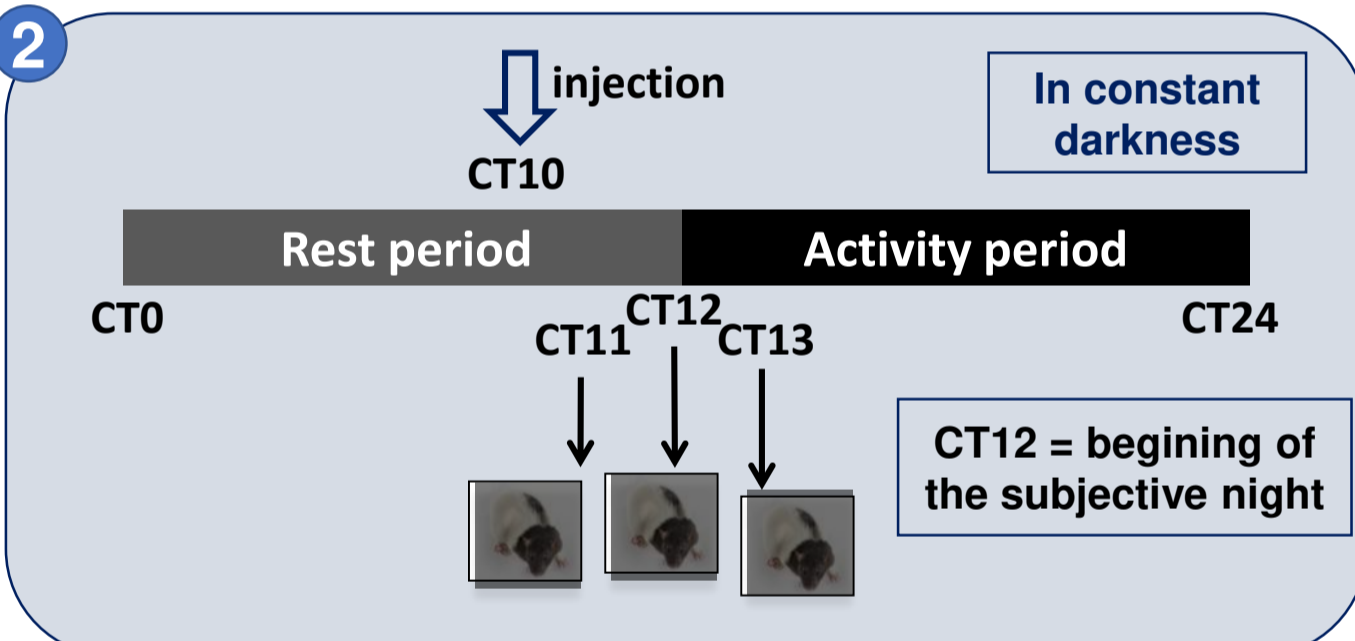
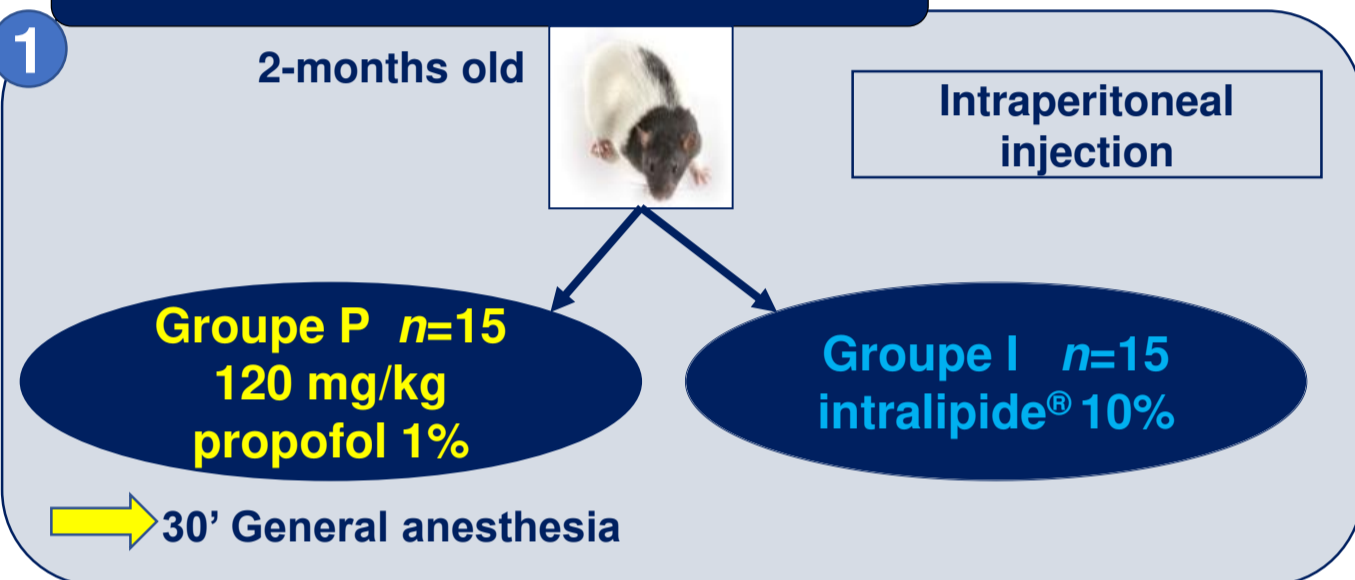
Background & Goal of the Study

General anesthesia induced by propofol triggers phase-advances of circadian rhythms controlled by the master clock (Suprachiasmatic nuclei, SCN) only at certain times of the day (late resting period and early active period).¹

Anesthesia induced by propofol has been associated with a subsequent reduction of *Period2* (*Per2*) mRNA levels in the whole brain.² The acute effects of propofol anesthesia *per se* on the SCN molecular clockwork remain unclear.

Here we aim to study expression of the clock genes *Per1* and *Per2* in the SCN of rats exposed to constant darkness after a single-dose injection of propofol or vehicle when the SCN clock is shifted by propofol.

Materials and methods



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Cryostat: 20- μ m brain coronal sections at the SCN level.

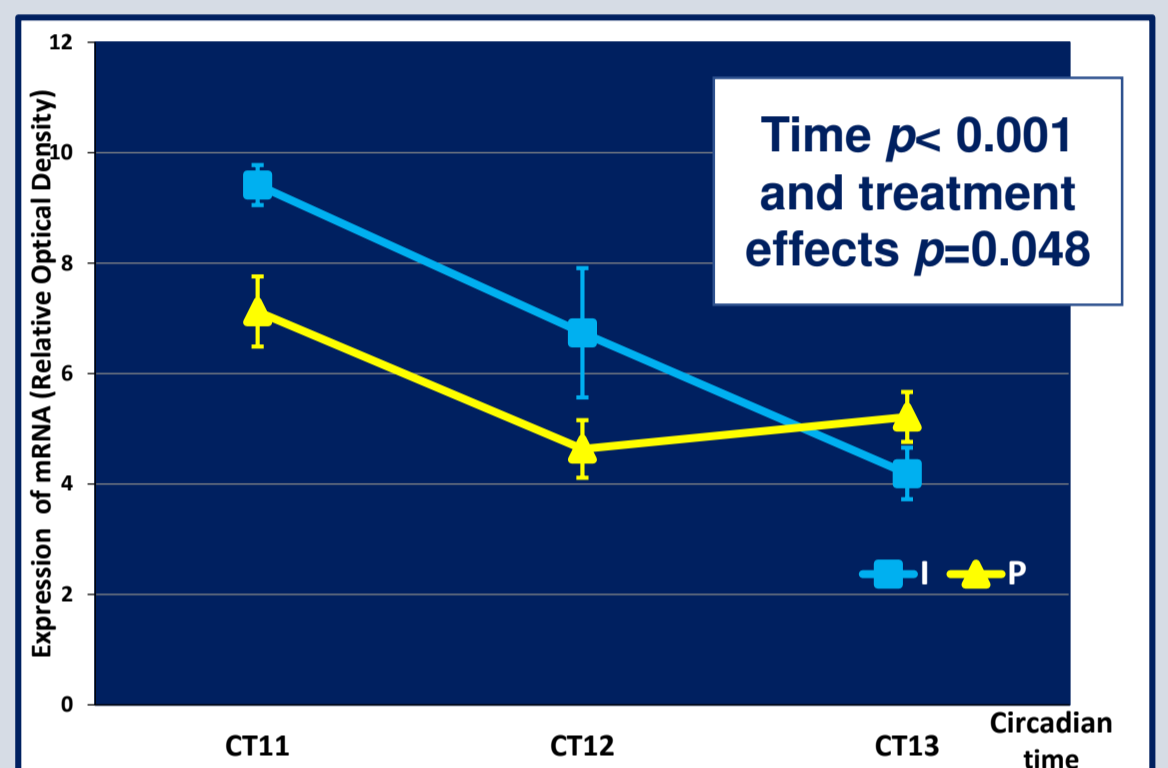
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Expression of *Per1* and *Per2* mRNA by radioactive *in situ* hybridization.
Quantification with NIH-ImageJ® software.

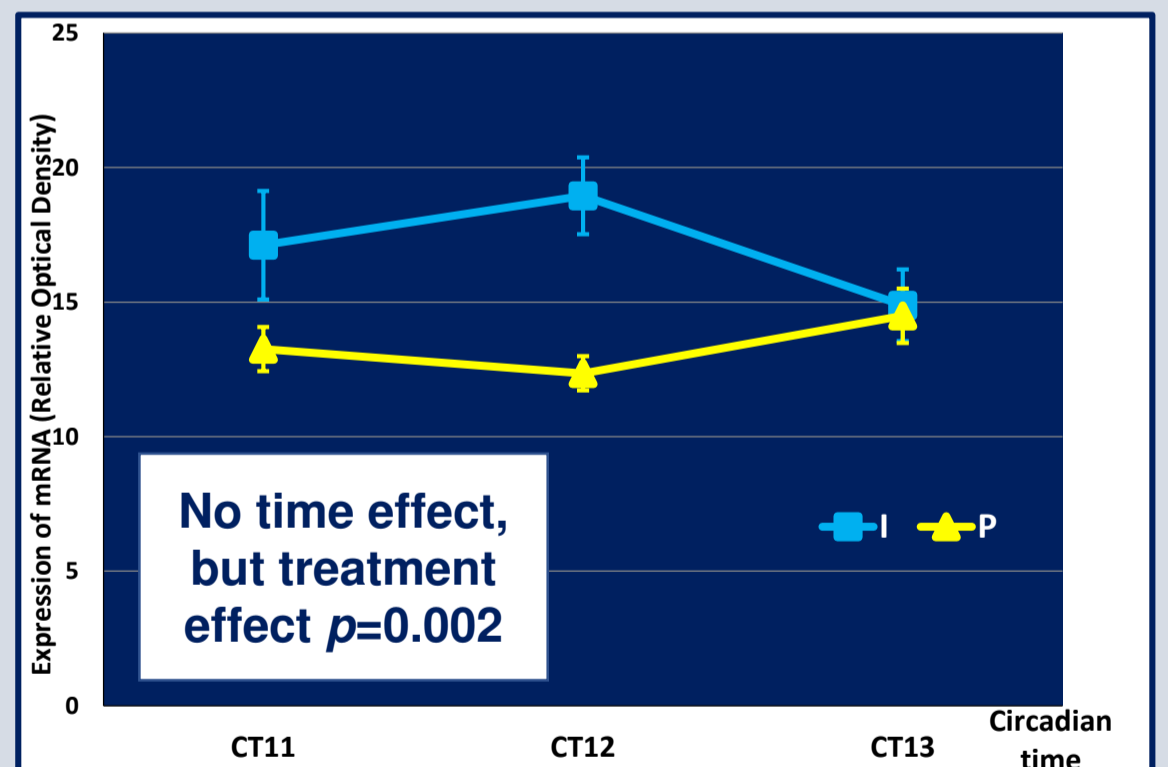
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Data were analyzed with 2-way ANOVA (SPSS®).

Results



Effect of propofol on the expression of *Per1* mRNA in the SCN of rats at different circadian times (*n*=27).



Effect of propofol on the expression of *Per2* mRNA in the SCN of rats at different circadian times (*n*=26).

(P = propofol group, I = Intralipide® group)

Discussion

The expression of *Per1* and *Per2* in the SCN is decreased during 2 hours after propofol general anesthesia (single-dose). In the absence of light (constant darkness experiment), hypothermia and concomitant surgery, such down-regulation of *Per* genes is only correlated to propofol injection. Other studies have already found that general anesthesia (sevoflurane or propofol) influences *Per2* expression in the whole brain of rodents³ and that *Per1* expression is suppressed in the medial prefrontal cortex of rats under propofol infusion.⁴ These molecular alterations especially in the SCN can phase shift the clock and disturb circadian rhythm.

Conclusion: We show here for the first time that short-term propofol anesthesia leads to a transient down-regulation of *Per1* and *Per2* expression in the master SCN clock.

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- Yoshida Y, et al. *Brain Res Bull* 2009;79:441-4.
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- Wang Y, et al. *Anesth Analg* 2016;123:594.