# Photoperiodic encoding by the neuronal network of the suprachiasmatic nucleus

Leest, H.T. van der

# GLOSSARY

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|---|---|
| **ACSF** | Artificial cerebrospinal fluid |
| **AVP** | Arginine vasopressin |
| ***Bmal1*** | Bmal1 gene |
| **BMAL** | Bmal1 protein |
| **CHX** | Cycloheximide, a protein synthesis blocker |
| **Circadian rhythm** | Rhythm of about a day, *circa* = approximately; *dies* = day |
| ***Clock*** | Clock gene |
| **CLOCK** | Clock protein |
| **CRY** | Crytochrome protein |
| ***Cry1*** | Cryptochrome 1 gene |
| ***Cry2*** | Cryptochrome 2 gene |
| **CSNK1D** | Casein kinase 1 δ |
| **CSNK1E** | Casein kinase 1 ε |
| **CT** | Circadian time, the endogenous state of the pacemaker, or phase φ |
| **DD** | Constant darkness |
| **Entrainment** | Adjustment to the external time |
| ***ex vivo*** | Tissue taken from living organism |
| **fDR** | Fast-delayed rectifier K+-channel |
| **GABA** | γ-amino butyric acid |
| **GFP** | Green fluorescent protein |
| **GHT** | Geniculohypothalamic tract |
| **IGL** | Intergeniculate leaflet |
| ***in situ*** | Fixed tissue directly taken from a living organism |
| ***in vitro*** | Living tissue in a controlled environment outside an organism |

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|---|---|
| ***in vivo*** | In the living organism |
| **LD** | Light-dark |
| **LL** | Constant light |
| **MUA** | Multi-unit activity, activity of multiple cells |
| **NMDA** | N-methyl-D-aspartate |
| ***nPas2*** | Paralogue neuronal PAS domain-containing protein 2 gene |
| **NPY** | Neuropeptide Y |
| **Optic chiasm** | Crossing of the optic nerves |
| **Organotypic** | Culture of a specific part of tissue |
| **PACAP** | Pituitary adenylyl cyclase activating peptide, a neuropeptide |
| **PER** | Period protein |
| **Per1** | Period 1 gene |
| **Per2** | Period 2 gene |
| **PHI** | Peptide histidine isoleucine |
| **Photoperiod** | Length of daylight |
| **PRC** | Phase response curve |
| ***Rev-erbα*** | Rev-Erbα gene |
| **REV-ERBα** | Rev-Erbα protein |
| **RGC** | Retinal ganglion cells |
| **RHT** | Retino-hypothalamic tract |
| **RNA** | Ribonucleic acid |
| **SCN** | Suprachiasmatic nucleus, location of the biological clock in mammals |
| **SUA** | Single unit activity, activity of a single cell |
| **Subpopulation** | A small number of neurons taken from a larger population |
| **Tau** | Internal speed of the clock τ, which is used to describe the free-running period of an animal |
| **TEA** | Tetraethylammonium |
| ***Tim*** | Timeless gene of *Drosophila* clock |
| **TIM** | Timeless protein of *Drosophila* clock |
| **TTX** | Tetrodotoxin, a pharmacological blocker of fast Na+ channels |
| **VIP** | Vasoactive intestinal polypeptide |
| **vLGN** | Ventral lateral geniculate nucleus |
| **Vm** | Membrane potential |
| **VPAC2** | Vasoactive intestinal peptide receptor 2 |
| **Zeitgeber** | External time cues, litterally time-giver |
| **ZT** | Zeitgeber time |

# List of Publications

Schaap,J., Albus,H., VanderLeest,H.T., Eilers,P.H., Detari,L., and Meijer,J.H. (2003). Heterogeneity of rhythmic suprachiasmatic nucleus neurons: Implications for circadian waveform and photoperiodic encoding. **Proc. Natl. Acad. Sci. U. S. A.** *100*, 15994-15999.

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VanderLeest,H.T., Houben,T., Michel,S., Deboer,T., Albus,H., Vansteensel,M.J., Block,G.D., and Meijer,J.H. (2007). Seasonal encoding by the circadian pacemaker of the SCN. **Curr. Biol.** *17*, 468-473.

VanderLeest,H.T., Rohling,J.H., Michel,S., and Meijer,J.H. (2009). Phase shifting capacity of the circadian pacemaker determined by the SCN neuronal network organization. **PLoS One**. *4*, e4976.

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van Kempen,G.Th.H., vanderLeest,H.T., van den Berg,R.J., Eilers,P. and Westerink,R.H.S. (2010). Three distinct modes of exocytosis revealed by amperometry in neuroendocrine cells *Submitted*

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Henk Tjebbe

# CURRICULUM VITAE

Henk Tjebbe van der Leest werd geboren op 28 juli 1979 in Rotterdam. In 1998 behaalde hij zijn VWO diploma aan de Gereformeerde Scholengemeenschap Randstad te Rotterdam. Hij startte in 1998 de studie Biologie aan de Universiteit Leiden waar hij in 1999 zijn propedeuse behaalde. Als onderdeel van de opleiding volgde hij een stage bij de afdeling diermorfologie van de Universiteit Leiden. Tijdens zijn studie raakte hij geïnteresseerd in de werking van de hersenen en de mogelijkheden die computers bieden hierin inzicht te geven. In 2002 startte hij zijn hoofdstage en legde hij een hoofdvaktentamen af bij Prof. Dr. J.H. Meijer in de groep neurofysiologie van het Leids Universitair Medisch Centrum. Daarin vond hij de uitdagende combinatie van hersenonderzoek en programmeren van analysemethoden. In 2004 heeft hij zijn doctoraalexamen Biologie behaald.

Het werk in het laboratorium, met elektrofysiologische apparatuur en het ontwikkelen van analysemethoden op de computer beviel zo goed, dat op dezelfde afdeling waar hij zijn hoofdstage had gevolgd de start werd gemaakt met het promotieonderzoek waarvan de resultaten beschreven staan in dit proefschrift.

Sinds 2009 heeft hij een aanstelling als postdoctoraal onderzoeker bij het laboratorium voor neurofysiologie, afdeling Moleculaire Celbiologie van het Leids Universitair Medisch Centrum.