

MASTER 2 Neurosciences Fondamentales et Cliniques
UCB Lyon 1, Lyon, France

Internship proposal 2020-2021
(internship from January to end of May 2021)

Host laboratory:

Stem Cell and Brain Research Institute, INSERM U1208,
18 avenue du Doyen Lépine, 69675 Bron

Host team :

Chronobiology and Affective Disorders
website: <http://www.sbri.fr/>

Internship supervisors :

DKHISSI-BENYAHYA Ouria (HDR)
ouria.benyahya@inserm.fr

Project title :

Ontogeny of the light response of the mammalian retinal clock

Project summary :

The mammalian retina contains an endogenous circadian clock that regulates retinal physiology and tunes the temporal phase of the central clock of the suprachiasmatic nucleus (SCN) to environmental time. This entrainment process involves rods, cones and melanopsin containing retinal ganglion cells (ipRGCs). In contrast with the SCN, the role of these photoreceptors in the light response of the retinal clock is controversial. While studies suggest that none of them is involved in local entrainment of the retinal clock (Buhr et al., 2014, 2015), we recently demonstrated an important role of rods in retinal light response (Calligaro et al., 2019). However, the retina is sensitive to light in the early stages of development, before the maturation of rods. At these developmental stages, only ipRGCs are functional. Thus, the objective of the research project is to determine the role of rods and melanopsin- in the light-entrainment of the retinal clock during development

We will use wildtype and photoreceptor-deficient mice carrying luciferase reporter under the control of the *Per2* clock gene and complementary *ex vivo*, *in vivo* and *in vitro* approaches (immunohistochemistry, culture of retinal explant, bioluminescence imaging of gene expression, molecular and cellular biology, behavior).

3-5 recent publications :

Calligaro H*, Kinane C*, Bennis M, Coutanson C, **Dkhissi-Benyahya O**. A standardized method to assess the endogenous activity and the light-response of the retinal clock in mammals. . *Mol Vision*. 2020 Mar 4;26:106-116.

Calligaro H, Coutanson C, Najjar RP, Mazzaro N, Cooper HM, Haddjeri N, Felder-Schmittbuhl MP, **Dkhissi-Benyahya O**. Rods contribute to the light-induced phase shift of the retinal clock in mammals. *PLoS Biol*. 2019;17(3):e2006211. IF: 9.16.

Mure LS, Le HD, Benegiamo G, Chang MW, Rios L, Jillani N, Ngotho M, Kariuki T, **Dkhissi-Benyahya O**,

Please send your proposal to emiliano.macaluso@univ-lyon1.fr and marion.richard@univ-lyon1.fr for publication on the website.

Cooper HM*, Panda S*. Diurnal transcriptome atlas of a primate across major neural and peripheral tissues. **Science** 2018, 359(6381). IF: 41.05, Top 0.01%

Lahouaoui H, Coutanson C, Cooper HM, Bennis M, **Dkhissi-Benyahya O**. Clock genes and behavioral responses to light are altered in a mouse model of diabetic retinopathy. **PLoS One**. 2014 Jul 9;9(7):e101584.

Dkhissi-Benyahya O., Coutanson C., Knoblauch K., Lahouaoui H., Leviel V., Rey C., Bennis M., Cooper H.M.. Melanopsin is required for retinal clock function and dopamine regulation by light **Cell and Mol Life Science** (2013) Sep;70(18):3435-47.