

【Grant-in-Aid for Scientific Research (S)】

Biological Sciences (Biology)



Title of Project : Coordinated Regulation of Reproduction and Sexual Behavior by Peptidergic Neurons

Yoshitaka Oka

(The University of Tokyo, Graduate School of Science, Professor)

Research Project Number : 26221104 Researcher Number : 70143360

Research Area : Biology: Animal Physiology and Behavior

Keyword : Neurobiology, Neurophysiology, Peptidergic neurons, GnRH, Kisspeptin

【Purpose and Background of the Research】

Animal reproduction is regulated by coordination of nervous and endocrine systems. Environmental factors such as temperature and day length are received and transmitted to the nervous and endocrine systems, and reproductive success will be achieved by this coordinated regulatory mechanism.

Here, we aim to elucidate the mechanisms of coordinated regulation of the both systems by taking advantage of the unique small fish brain model systems, which we have developed and have been utilizing to analyze the physiological functions of two kinds of peptidergic neurons, gonadotropin-releasing hormone (GnRH) and kisspeptin neurons. We will also elucidate the origin of diversity of neural functions of paralogous peptidergic systems from the view point of the evolutionary biology.

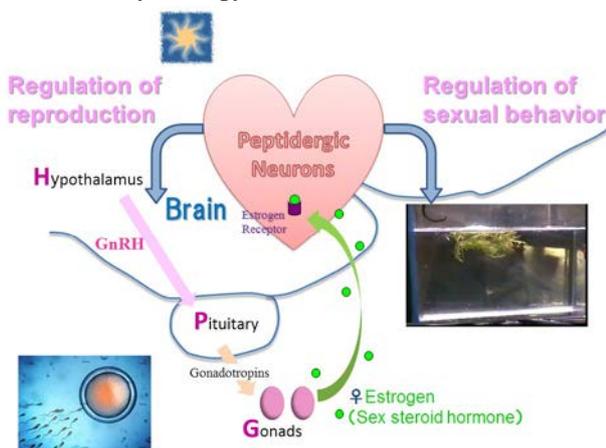


Figure 1. Coordinated regulation of reproduction and sexual behavior by peptidergic neurons

【Research Methods】

We will use various state-of-the-art multidisciplinary techniques in neurobiology such as transgenic technology, molecular biological, electrophysiological, neuroanatomical, and behavioral techniques, to name a few. We will focus on the following two topics.

1) Neural and hormonal mechanisms of hypothalamo-pituitary-gonadal axis regulation,

which underlies the regulation of reproduction

2) Mechanisms underlying the coordinated regulation of reproduction and sexual behavior, which may involve RFRPs, kisspeptins (kiss1&2), and GnRH1&3 neurons.

【Expected Research Achievements and Scientific Significance】

In addition to understanding the neural and hormonal mechanisms of coordinated regulation of reproduction and sexual behavior by the above mentioned peptidergic neurons, the present research project may lead to the finding of novel types of neurons and mechanisms by analyzing the sex steroid hormone receptor-expressing GFP transgenic medaka.

【Publications Relevant to the Project】

- Karigo, T., Kanda, S., Abe, H., Okubo, K., and Oka, Y. (2012) Time-of-day dependent changes in GnRH1 neuronal activities and gonadotropin mRNA expression in a daily spawning fish, medaka. *Endocrinology* 153: 3394-3404.
- Kanda, S., and Oka, Y. (2012) Evolutionary insights into the steroid sensitive kiss1 and kiss2 neurons in the vertebrate brain. *Frontiers in Genomic Endocrinology*, 3:28. doi: 10.3389/fendo.2012.00028.
- Karigo, T., and Oka, Y. (2013) Neurobiological study of fish brains gives insights into the nature of gonadotropin-releasing hormone 1-3 neurons. *Frontiers in Endocrinology*, 4:177. doi: 10.3389/fendo.2013.00177.

【Term of Project】 FY2014-2018

【Budget Allocation】 77,700 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.biol.s.u-tokyo.ac.jp/users/naibunpi/okay@bs.s.u-tokyo.ac.jp>