

Molecular basis of neuroendocrine control of spawning migration in grass puffer

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Grass puffer, *Takifugu niphobles*, exhibits unique spawning behavior: it spawns at certain seashore locations only during spring tide in early summer. Observations of spawning behavior in spawning grounds and in aquarium revealed that the spawning rhythm is tightly connected to the tidal changes and is also endogenously maintained possibly under the control of circalunar clock. Tagging experiments suggested that grass puffer shows compact homing migration, in which the fish return to natal spawning beds every two weeks during the spawning period. Therefore, grass puffer provides an excellent model for the study of regulatory mechanism of spawning migration.

To establish molecular basis of neuroendocrine control of the cyclic spawning, we assessed changes in magnitudes of gene expression for various hormones and their receptors by quantitative real-time PCR. In the hypothalamus, the expressions of gonadotropin-releasing hormone, kisspeptin and LPXRFamide genes significantly increased during the spawning period and showed diurnal and circadian variations in association with changes in expression of melatonin receptor (Mel) gene. In the pineal gland, Mel gene showed unique rhythmic expressions with 14 hours cyclicity and monthly variations with a peak at lunar age 6. These coincident molecular events may be important for control of the lunar-synchronized spawning migration.