SHORT NOTE

Hiroaki Suetake[1], Shingo Kajimura, Yasutoshi Yoshiura[2] and Katsumi Aida

Department of Aquatic Bioscience, Graduate School of Agricultural and Life Sciences, The University of Tokyo, Bunkyo, Tokyo 113-8657, Japan

[1]Fisheries Laboratory, Graduate School of Agricultural and Life Sciences, The University of Tokyo, Maisaka, Hamana, Shizuoka 431-0211, Japan

[2]Inland Station, National Research Institute of Aquaculture, Tamaki, Mie 519-0423, Japan

(Accepted 31August 2001)

Gonadotropin Gene Expression in Japanese Eel and Conger Eel: A Review

The Japanese eel *Anguilla japonica* does not mature spontaneously in culture conditions, having only previtellogenic oocytes in the ovary[(1)]. Repeated gonadotropin (GTH) treatment can induce ovarian development in Japanese eel[(2-3)], but this method is not always sufficient to obtain eggs of good quality. In this process, participation of endogenous remains to be known. We therefore investigated the profiles of pituitary GTH gene expression in the Japanese eel, to understand the control mechanisms of the gonadal development during artificial maturation. Further, we examined the profiles of pituitary GTH gene expression in the common Japanese conger *Conger myriaster* and compared the profiles with those in the Japanese eel during artificial maturation to obtain basic information on the process of gonadal development in the anguilliformes under natural conditions.

There are two distinct GTHs, i. e., GTH-I and GTH-II, in teleosts[(4)]. Both are composed of a common α subunit and a distinct β subunit. We recently isolated and characterized the cDNAs of GTH-Iβ and GTH-IIβ subunits in the Japanese eel[(4)] and the common Japanese conger[(5)]. Stimulation of GTH-II synthesis can be induced during artificial maturation by treatment with salmon pituitary homogenate[(6,7)] and salmon GTH (sGTH)[(4)] in the Japanese eel. Our preliminary investigation has revealed that the GTH-Iβ gene is mainly expressed in immature Japanese eel[(4)]. However, little information is available concerning a detailed profile of GTH-I synthesis during induced ovarian maturation in the Japanese eel.

We analyzed mRNA profiles of the pituitary GTH-Iβ and GTH-IIβ subunits in the Japanese eel during artificial maturation. We induced ovarian maturation in the cultured female Japanese eel with repeated injection of sGTH. In the Japanese eel, the mRNA levels of pituitary GTH-Iβ were high when females were immature, i.e. before the injection of sGTH. The levels, however, decreased with the ovarian development, reached minimum level at the late vitellogenic stage, and thereafter were kept very low. On the other hand, GTH-IIβ mRNA levels were very low at the previtellogenic stage, and increased markedly in accordance with the progress of ovarian development.

In contrast to the Japanese eel, we can obtain the common Japanese conger, which matured as far as

Suetake, H., S. Kajimura, Y. Yoshiura and K. Aida (2001) Gonadotropin Gene expression in japanese eel and conger eel: a review. J. Taiwan Fish. Res., **9**(1&2): 275-276.

mid-vitellogenic stage in captive conditions[5]. In the conger, the mRNA levels of GTH-Iβ were low at the perinucleolus stage, showed an increase at the oil droplet stage, and peaked at the primary yolk globule stage. Subsequently, the levels decreased significantly at the secondary yolk globule stage. On the other hand, GTH-IIβ mRNA was firstly detected at the oil droplet stage, and showed a drastic increase with the progress of ovarian development.

These results suggest that mRNA level of GTH-Iβ is high during early vitellogenic stage in the anguilliformes and that the level in the Japanese eel is abnormally low during the artificial maturation. Our results also demonstrated that GTH-I is involved in the early stages of ovarian development, and GTH-II in the latter stages. The difference in the GTH-Iβ and GTH-IIβ mRNA profiles suggest the existence of differential feedback of sex steroids to each gene. The results obtained in the present study will lead to the establishment of a technique for a seed production of eel.

References

1. Yamamoto, K., M. Omori and K. Yamauchi (1974) Oogenesis of the Japanese eel. Bull. Japan. Soc. Sci. Fish., **40:** 9-15.
2. Yamamoto, K. and K. Yamauchi (1974) Sexual maturation of Japanese eel and production of eel larvae in the aquarium. Nature, **251:** 220-222.
3. Sato, N., Kawazoe, I., Y. Suzuki and K. Aida (1996) Use of an emulsion prepared with lipophilized gelatin for the induction of ovarian maturation in the Japanese eel *Anguilla japonica*. Fish. Sci., **62:** 806-814.
4. Yoshiura, Y., H. Suetake and K. Aida (1999) Duality of gonadotropin in a primitive teleost, Japanese eel (*Anguilla japonica*). Gen. Comp. Endocrinol., **114:** 121-131.
5. Kajimura, S., Y. Yoshiura., M, Suzuki., T, Utoh., N, Horie., H. Oka and K. Aida. Changes in mRNA levels of gonadotropin Iβ and IIβ subunits during vitellogenesis in the common Japanese conger. Fish. Sci., (in press).
6. Nagae, M., T. Todo., K. Gen., Y. Kato., G. Young., S. Adachi and K. Yamauchi (1996) Molecular cloning of the cDNAs encoding pituitary glycoprotein hormone α- and gonadotrophin IIβ subunits of the Japanese eel, *Anguilla japonica*, and increase of their mRNAs during ovarian development induced by injection of chum salmon pituitary homogenate. J. Mol. Endocrinol, **16:** 171-181.
7. Nagae, M., S. Adachi and K. Yamauchi (1997) Changes in transcription of pituitary glycoprotein hormone α and gonadotropin IIβ subunits during ovarian development induced by repeated injections of salmon pituitary homogenate in the Japanese eel, *Anguilla japonica*. Fish Physiol. Biochem., **17:** 179-186.