

# **Cloning and nutritional regulation of polyunsaturated fatty acid desaturase and elongase of a marine teleost, the nibe croaker *Nibea mitsukurii***

Yoji Yamamoto<sup>1,4</sup>, Naoki Kabeya<sup>1</sup>, Yutaka Takeuchi<sup>2</sup>, Alimuddin<sup>3</sup>, Yutaka Haga<sup>1</sup>,  
Shuichi Satoh<sup>1</sup>, Toshio Takeuchi<sup>1</sup> and Goro Yoshizaki<sup>1</sup>

(1) Department of Marine Biosciences, Tokyo University of Marine Science and Technology, Minato, Tokyo 108-8477, Japan

(2) Research Center for Advanced Science and Technology, Tokyo University of Marine Science and Technology, 670 Banda, Tateyama Chiba, 294-0308, Japan

(3) Department of Aquaculture, Faculty of Fisheries and Marine Sciences, Bogor Agriculture University, Bogor, 16680, Indonesia

(4) Present address: School of Aquatic and Fishery Science, University of Washington, 1122 Boat St., Box 355020, Seattle, WA 98105, USA

Received: 25 November 2009

Accepted: 25 January 2010

Published online: 11 March 2010

## **Abstract**

We identified fatty acid desaturase (fads)-like and elongase (elovl)-like genes from nibe croaker to better understand the molecular basis of n-3 highly unsaturated fatty acid metabolism in marine fish. Phylogenetic analysis revealed that the fads-like and elovl-like genes were classified into the fads6 and elovl5 groups, respectively. We investigated the effects of various levels of docosahexaenoic acid (DHA)-enriched live feed, *Artemia nauplii*, on larval growth, survival, and fads-like and elovl-like gene expression. After a 15-day feed trial, total length, body weight, and survival were all significantly improved by the supplementation of *Artemia*

with DHA. This result indicates that nibe croaker cannot endogenously produce enough DHA. Furthermore, the fads-like gene transcripts in larvae fed on oleic acid-enriched Artemia were significantly higher than those in larvae on 100% DHA-enriched Artemia. In contrast, no significant differences were observed in the transcript levels of the elovl-like gene. These data indicate that the fads6-like gene was controlled by negative feedback from the quantity of DHA stored in the larval body. These results have implications for the functionality of the fads-like gene in nibe croaker.

**Keywords** Artemia - Docosahexaenoic acid - n-3 Highly unsaturated fatty acid - Fatty acid desaturase - Fatty acid elongase - Nibe mitsukurii