OCCURRENCE AND DEVELOPMENT OF LAMELLAR MITOCHONDRIA-RICH CELLS IN GILLS OF FRESHWATER-ADAPTED MILKFISH (*CHANOS CHANOS*)

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Introduction

Milkfish culture in Taiwan has a history of over 300 years. Every year about 30,000 mt of milkfish were produced. Milkfish are cultured in fresh, brackish, and oceanic waters because they are good regulators and are euryhaline throughout their non-diadromous life cycle (Chen, 1990). Previous studies focused on diadromous (i.e. eel and salmon) and non-diadromous freshwater- and estuarine-resident teleosts, i.e. tilapia and killifish, revealed similar positive correlation between environmental salinity and the biochemical activity of gill Na^+,K^+-ATPase (McCormik, 2001). The milkfish, being a marine inhabitant, is a well-suited subject for experiments of salinity adaptation. To avoid the effects of sexual and seasonal differences in gonadal growth, juvenile milkfish were used in the present study. Since our recent physiological studies found different patterns of sodium pump expression upon salinity challenge in milkfish, it is intriguing to realize the occurrence and development of lamellar mitochondria-rich (MR) cells in gills of freshwater-adapted milkfish (*Chanos chanos*).

Experimental designs and results

Distribution of MR cells in freshwater-adapted juvenile milkfish was examined with the light microscope. By using Na pump monoclonal antibody, MR cells were labeled (Dang et al., 2000) and discriminated between lamellae and interlamellar regions of filaments. The number of labeled MR cells on lamellae or interlamellar regions were counted and compared between the seawater and freshwater groups. Our results showed

that the number of lamellar MR cells (LMRCs) increased during long-term freshwater-acclimated milkfish (Fig. 1). The total numbers of MR cells thus were significantly higher in seawater group. We also labeled MR cells of time-course sampled fish with Na pump monoclonal antibody after acclimation to fresh water (0, 6, 12, 24, 48, and 96hrs). LMRCs were first found in 24hrs-group and raised in number in 48hrs-group. Our results revealed that the LMRCs occurred during 24hrs in freshwater-acclimated fish. In order to realize the development LMRCs, the freshwater-acclimated milkfish were injected with Brd-U tracer and sampled at 6, 12, 24, 48, and 96hrs. Double labeling of Na pump and Brd-U will give evidence to the generation of LMRCs. Our preliminary data demonstrated significant increase of LMRCs in freshwater-adapted juvenile milkfish and the milkfish LMRCs occurred in 24hrs after transfer to fresh water. The Brd-U labeled MR cells will also be observed to understand the development of milkfish LMRCs.

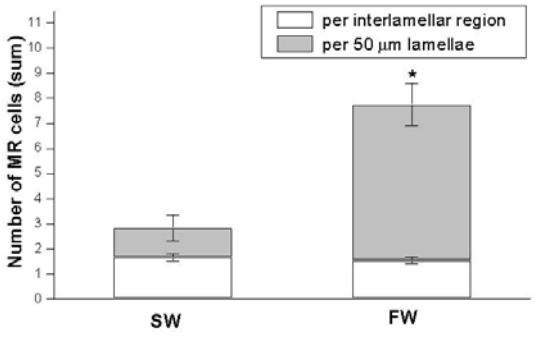

Figure 1. Number of MR cells on gills of seawater and freshwater-adapted milkfish (N=5, Means±SE). Bars in different colors indicated various regions of the gill. *Significant different, $p<0.05$, Student's *t*-test.

References

Chen, L. C. 1990. Aquaculture in Taiwan. pp. 119-137. Fishing News Books, London, UK.

Dang, Z., R. A., C. Lock., G. Flik and S. E. Wendelaar Bonga 2000. Na,K-ATPase immunoreactivity in branchial chloride cells of *Oreochromismossambicus* exposed to copper. J. Exp. Biol. 203:379-387.

McCormick, S. D. 2001 Endocrine control of osmoregulation in teleost fish. Am. Zool. 41:781-794.