

研究报告

急性盐度胁迫对军曹鱼稚鱼渗透压调节的影响

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收稿日期 2006-6-5 修回日期 网络版发布日期 2007-8-16 接受日期 2007-4-5

摘要 研究了环境盐度急性胁迫对军曹鱼 (*Rachycentron canadum*) 稚鱼鳃 Na^+ - K^+ ATPase (NKA) 活性及血清渗透压、 Na^+ 、 K^+ 和 Cl^- 离子调节的影响. 结果表明:将稚鱼从盐度37中直接转移至盐度0、5、15、25、37 (对照)和45的水体中, 12 h后仅盐度0处理出现死亡(死亡率100%). 各处理鳃NKA活性和血清渗透压在最初3 h内出现一定波动, 随后变化平稳. 试验结束时(12 h), NKA活性与盐度梯度呈“U”型分布, 盐度5处理酶活性显著高于其它处理 ($P<0.05$), 盐度15处理活性最低, 而各处理的血清渗透压大小 ($293\sim 399\text{ mOsmol}\cdot\text{kg}^{-1}$) 与盐度呈正相关;在3~12 h内稚鱼血清 Na^+ 和 Cl^- 浓度随盐度升高而升高, 但增幅较小, 血清 K^+ 浓度则与盐度呈负相关;12 h稚鱼的等渗点为 $328.2\text{ mOsm}\cdot\text{kg}^{-1}$, 相当于盐度11.48, 而 Na^+ 、 K^+ 和 Cl^- 等离子点分别为155.2、6.16和137.1 $\text{mmol}\cdot\text{L}^{-1}$, 分别相当于盐度10.68、20.44及8.41. 军曹鱼在生理上具有广盐性鱼类的“低渗环境高NKA活性”特征, 有较强及迅速的渗透压和离子调节与平衡能力.

关键词 [盐度](#) [胁迫](#) [军曹鱼](#) [\$\text{Na}^+\$ - \$\text{K}^+\$ ATP酶](#) [离子和渗透压调节](#)

分类号

Effects of abrupt salinity stress on osmoregulation of juvenile *Rachycentron canadum*.

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Abstract

Rachycentron canadum is a thriving mariculture species for offshore cage in southern Mainland and Taiwan of China, due to its rapid growth rate and high quality flesh. In this paper, the gill Na^+ - K^+ ATPase (NKA) activity and iono- and osmoregulation of juvenile *R. canadum* were investigated in a 12 h stress of ambient salinities (0-45), and the results showed that after an abrupt transfer to the salinities of 0, 5, 15, 25, 37 (control) and 45, the death of juvenile *R. canadum* only occurred in salinity 0, with a mortality of 100% by the end of the experiment. In all treatments, the gill NKA activity and serum osmolality fluctuated in first 3 h, and then changed smoothly. The NKA activity varied with salinity grade in U shape, being significantly ($P<0.05$) higher in salinity 5 and the lowest in salinity 15 in 12 h, while the serum osmolality (ranged $293\sim 399\text{ mOsmol}\cdot\text{kg}^{-1}$) presented a positive correlation with salinity. Serum $[\text{Na}^+]$ and $[\text{Cl}^-]$ concentration slightly increased with salinity within the period of 3-12 h, while serum $[\text{K}^+]$ displayed a reverse pattern. The isosmotic point was estimated as $328.2\text{ mOsm}\cdot\text{kg}^{-1}$ and corresponded to salinity 11.48. The isoionic points for serum $[\text{Na}^+]$, $[\text{K}^+]$ and $[\text{Cl}^-]$ were estimated as 155.2, 6.16, and $137.1\text{ mmol}\cdot\text{L}^{-1}$, which corresponded to the salinities of 10.68, 20.44 and 8.41, respectively. It was concluded that *R. canadum* could be characterized physiologically as a “higher-NKA-in-hyposmotic media” marine euryhaline teleost with the capability of rapid and effective hyper/hypo iono- and osmoregulation.

Key words [salinity](#) [stress](#) [Rachycentron canadum](#) [\$\text{Na}^+\$ - \$\text{K}^+\$ ATPase](#) [iono-and osmoregulation](#)

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