ENHANCING THE STRESS AND NON-SPECIFIC IMMUNE RESPONSES OF LARVAL STRIPED BASS *MORONE SAXATILIS* BY DIETARY MODULATION OF N-3 AND N-6 SERIES FATTY ACIDS

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Introduction

The common practice of transferring fish larvae from the relatively controlled hatchery environment to less controlled grow-out system generally occurs at or close to the sensitive stage of metamorphosis. At that time, the larvae become stressed and the immune response is weak and as a result, heavy losses may occur. Enhanced stress and defense mechanisms may provide the larvae with better resistance to hostile environment. In this study, we examined the effect of diets containing varying proportions of docosahexaenoic (DHA) and arachidonic (AA) acids fed to larval *Morone saxatilis* during metamorphosis on their resistance to salinity stress and to bacterial infection.

Materials and Methods

Morone saxatilis larvae were raised in recirculating water (2-6 psu). Larvae were fed newly hatched *Artemia* nauplii until day 24, then fed twice daily for the bext 22 days with previously enriched *Artemia* naupplii with nine different emulsions, having varying ratios of DHA and AA rich oils (Martek Biosciences Corporation, Columbia, MD). Feeding experiments were terminated on day 46 at which time larvae were injected intraperitoneally either with saline solution or formalin fixed *Staphylococcus aureus*. Blood from each larvae was collected separately on a slide, at times 6, 18, 44, 93 and 141h post injection, and stained with Wright's stain. Larval non-specific immunse response to the pathogen infection was measured by differential count of lymphocytes, monocytes and neutrophils in the blood. Survival and cortisol level, as indicators of stress, were measured at times 0, 15, 30min after larvae exposure to a 25 psu salinity bath.

Results and Conclusions

Total lymphocytes, which accounted for the largest portion of the white blood cells (over 70%), increased dramatically in all infected larvae over the first 6 hours post injection then decreased back to initial levels after 44 hours. Conversely, monocytes and neutrophils rose from 14% and 2% up to 28% and 6% of total leukocytes, respectively. The greatest increase in monocytes and neutrophils counts occured in larvae fed the highest levels of both DHA and AA. High dietary AA was associated with elevated levels of cortisol in larvae bodies, while increasing dietary DHA had no effect on cortisol response. Moreover, DHA fed larvae survived better in high salinity stress, but dietary inclusion of 12.7% AA with 11-21.6% DHA of total fatty acids resulted in maximum survival. In conclusion, both dietary DHA and AA if provided in balanced ratios and levels, could enhance larval resistance to stress and pathogen infections.