

Effects of Hyper-gravity on Growth and Morphological Development of Otoliths of Larval Zebrafish

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Zebrafish is an important model for vertebrate developmental biology. In this study, the zebrafish were exposed to normal gravity and 5*g at stages of 3dpf and 6dpf respectively to determine the damage of hyper-gravity to fish growth and morphological development of otoliths of larval zebrafish at different stages. Fish growth was calculated by total body length. The otoliths were calculated by semi major axis. The sharps of otoliths were irregular before hatch. After hatch, the sharps turned to round and velvet in the periphery, thus the sizes of otoliths could be calculated by its axis. Samples were analyzed for changes at 6dpf and 10dpf. After that the fish were transferred to normal gravity in the following 8 days to determine the effect of gravity compensation. The results showed that larval zebrafish were sensitive to hyper-gravity. The growth was retarded and the sizes of otoliths were smaller than that on normal gravity. This tendency continued through the gravity compensation period. When fish exposed to hypergravity from 3dpf to 6dpf, the total body length reduced 5% compared to the normal ones, and extended to 12% at 10dpf. After the compensation period, it recovered to 9.5%. While the one exposed to hyper-gravity at 6dpf only reduced 9% at 10dpf, and recovered to 7.2% through compensation effect. The otoliths showed the same tendencies. The left lapillis reduced 7.6% compared to the normal at the first 3 days treatment, and extended to 18.4% at 10dpf, but very slightly recovered after compensation period. While the left lapillis exposed to hypergravity from 6dpf only reduced 7.9% at 10dpf, but extended to 9.7% in the compensation period. In conclusion, hyper-gravity affects the growth of larval zebrafish, the young larvae are more sensitive than the older. It also indicated that fish could recover quicker at body length in gravity compensation period, but the development of otoliths was lagged at certain degree.

Keyword: hyper-gravity, growth and morphological development, otolith, compensation