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Comparative transcriptomic studies on food intake regulation in mandarin fish and grass carp

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Although several genes were shown to be involved in the determination of food preference, very little is currently known about transcriptome determining the unique food preference such as live prey in mandarin fish and food habit transition in grass carp. Mandarin fish accept only live prey fish refusing dead prey fish or artificial diets. Using transcriptome sequencing, we found 1,986 uni-genes to be differentially expressed between dead prey fish feeders and non feeders. The acquisition of novel food preference (dead prey fish) might be due to genes related to enhance visual ability, resetting of circadian phase, appetite control and deficiency in memory retention as well as more abundant variant alleles. Grass carp (*Ctenopharyngodon idella*) is an ecologically appealing model of vertebrate herbivore. Grass carp goes through a transition from carnivores to herbivores during its life cycle. However, little is currently known about genes determining the food habit transition and how they could achieve higher growth rates on plant materials which have a relatively poor nutritional quality. We showed that grass carp fed with duckweed (modeling fish after food habit transition) had significantly higher relative length of gut than fish before food habit transition or those fed with chironomidae larvae (fish without transition). Using transcriptome sequencing, we identified 10,184 differentially expressed genes between grass carp before and after transition in brain, liver and gut. We suggest that the food habit transition from carnivores to herbivores in grass carp might be due to genes related to enhanced gut growth, increased appetite, resetting of circadian phase and enhanced digestion and metabolism. We also found extensive alternative splicing and novel transcript accompanying food habit transition. Elucidating the genes regulating these unique food preference including the live prey in mandarin fish as carnivorous fish and the food habit transition from carnivores to herbivores in grass carp as herbivorous fish could lead to a better understanding of mechanisms controlling food habit promoting the intake and utilization of feedstuff in fish increasing the replacement of animal protein by plant protein in animal feed and decreasing the cost of cultivation and the pollution of the environment.

Biography

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