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**Comprehensive mRNA and microRNA Analysis Revealed the Effect and Response Strategy of Freshwater fish, Grass Carp *Ctenopharyngodon idella* Under Geosmin Exposure**

Jun-ming Zhang\*, Huan Han, Yi-chao Li, Bing Fu, Gen Kaneko, Kang Li, Xi-chen Jin, Shuang Ji, Er-meng Yu, and Li-ping Liu

China-ASEAN "The Belt and Road" Joint Laboratory of Marine Culture Technology  
Shanghai Ocean University  
Shanghai 201306, China  
Junming-zhang@foxmail.com

Geosmin is an environmental pollutant that causes off-flavor in water and aquatic products. The high occurrence of geosmin contamination in aquatic systems and aquaculture raises public awareness, however, few studies have investigated the response pathways of geosmin stress on freshwater fish. In this research, grass carp were exposed to 50 $\mu$ g/L geosmin for 96h, liver tissue was sequenced and validated using real-time qPCR. In total of 528 up-regulated genes and 488 down-regulated genes were observed, includes cytochrome P450 and uridine diphosphate (UDP)-glucuronosyltransferase related genes.

KEGG analysis showed that chemical carcinogenesis-DNA adducts, metabolism of xenobiotics by cytochrome P450, drug metabolism-cytochrome P450 pathway was enriched. Common genes from the target genes of microRNAs and differential expression genes are enriched in metabolism of xenobiotics cytochrome P450 pathway. Two miRNAs (dre-miR-146a and miR-212-3p) down regulated their target genes (*LOC127510138* and *adh5*, respectively) which are enriched cytochrome P450 related pathway. The results present that geosmin is genotoxic to grass carp and indicate that cytochrome P450 system and UDP-glucuronosyltransferase play essential roles in biotransformation of geosmin. MicroRNAs regulate the biotransformation of geosmin by targeting specific genes, which contributes to the development of strategies to manage its negative impacts in both natural and artificial environments.

