Scaling of Some Metabolic Enzymes in Liver of a Freshwater Teleost: An Adaptive Mechanism

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The activities of mitochondrial malate dehydrogenase (mMDH) and the total mitochondrial proteins increase as a function of body mass in the freshwater catfish, *Clarias batrachus*. It clearly indicates an increase in energy production in larger- sized individuals for various purposes including prey-predator interactions. The higher activity of lactate dehydrogenase (LDH) in larger fish may indicate more production of lactate for gluconeogenesis in the liver to meet emergency requirements of increased energy demand. However, the activity of cytoplasmic malate dehydrogenase (cMDH) decreases with the increasing body mass of the fish which reflects reduction in NADPH production and, in turn, reduced lipogenesis in liver of larger individuals. Thus, the present observations suggest an adaptive mechanism dealing with the higher energy budget, and reduced synthetic activities (lipogenesis) in the liver of larger-sized freshwater catfish. This type of biochemical scaling might be also supporting other metabolic pathways in order to adjust some physiological functions for survival in the aquatic environment.