

Understanding human obesity through studying a bottom-feeding fish

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The family line of channel catfish that are genetically selected for increased growth develop behavioral and phenotypic characteristics that are similar to obese humans. The exact mechanism(s) associated with development of obese-like phenotypes in channel catfish is unclear. My laboratory has been investigating genetic and biochemical markers associated with development of obese-like phenotypes in channel catfish, with the possibility of using channel catfish as a model to study obesity development in humans. Because insulin and AMP-protein kinase (AMPK) are critical for in tissue nutrient-sensing and metabolism, we have examined the expression of the mRNA encoding insulin receptors (IRs) and AMPK in various tissues, as well as changes in their expression in response to nutritional status. Expression of IRs and AMPK mRNA were detectable at variable level among tissues examined. Expression of these mRNA species were influenced heavily by the nutritional status in the liver but not in the brain or muscle. Expression of these mRNA in relation to the development of obese-like phenotype needs to be investigated further. In humans, development of obesity often coincides with incidents of dyslipidemia. To examine whether the development of obese-like phenotype is associated with a unique blood lipid profile, a plasma profile of polar lipids and cholesterol esters were characterized using tandem mass spectroscopy. The analysis revealed several lipid signatures that were unique to obese-like channel catfish and age-dependent changes in the lipid signature profiles. The exact mechanism(s) associated with unique plasma lipid signatures in obese-like channel catfish is unclear and requires further investigation.