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Temperature effects on acetaminophen toxicity using medaka

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Acetaminophen (n-acetyl-p-aminophenol, AAP) is one of the most widely used over-the-counter drugs for relief of fever and headaches due to its analgesic and antipyretic properties, and a major ingredient in cold/flu remedies. AAP is generally considered safe for human; however, effects of AAP on aquatic organisms is unknown. Release waste including AAP into aquatic environment can pose an ecological risk. Fish is major organisms in aquatic ecosystems and their habitats are classified by temperature. Their physiological activity should be affected by temperature. Hence, toxic effects of AAP on fish will be temperature-dependent. We employed medaka (Oryzias latipes) as a model to see temperature effects on APP toxicity because they have a wide range of temperature-tolerance (4^0C to 35^0C). Medaka larvae were exposed to 50 mg/L of AAP under 15^0C, 25^0C (optimum temperature) or 30^0C for 4 days. Another group of medaka larvae was exposed to 0 mg/L of AAP under same condition as a control. On day 4, full body length of larvae, heart rate (beats/15 s), and relative ATP value were measured. Full body length of larvae and relative ATP value at 30^0C were significantly decreased by AAP exposure, and heart rate at 15^0C was significantly decreased by AAP exposure compared with each temperature control. Then, another group of medaka was exposed to an increased concentration of AAP (150 mg/L) under the same condition. On day 4, the exposed medaka was subjected to hematological analysis and histological analysis. Hematological analysis revealed AAP exposure increased ratio of a deformed red blood cell with increasing temperature. In addition, red blood cells distributed in gills were notably decreased by AAP at 30^0C. Histological analysis of liver showed AAP exposure increased ratio of vacuole with increasing temperature. These data suggested increased temperature caused enhancement of AAP toxicities in medaka larvae.

Biography

Chisato Kataoka is a PhD candidate of Toyo University and received award of Research Fellow of Japan Society for the Promotion of Science. Her research includes Nanotoxicology, Ecotoxicology, Immunotoxicology and intestinal bacteria using medaka fish (Oryzias latipes). She has been working on fish toxicology of nanomaterials including silver nano-colloid and carbon nanotubes since 2013. She has published four papers and one review paper. Through her intensive studies, recently she has received best student presentation awards in international meetings (Aquatic Animals Models of Human Diseases Conference, and Pollutant Responses in Marine Organisms). Her affiliated academic societies are Society of Environmental Toxicology and Chemistry(SETAC), and The Japanese Society of Environmental Toxicology (JSET).

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