Unravelling effects of benzo[k]fluoranthene and temperature on the expression of detoxification genes in the rainbow trout liver RTL-W1 cell line

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Fish are being acute to chronically exposed to numerous aquatic contaminants, including polycyclic aromatic hydrocarbons (PAHs), and increased water temperatures due to global warming. Both stressors may impact many fish's biochemical and physiological processes, including hepatic metabolism. Combined effects of temperature and xenobiotics can exist, and little is known about these interactions. Fish liver-derived models, including well-established cell lines, can be employed to understand these connections better. The rainbow trout (*Oncorhynchus mykiss*) liver RTL-W1 cell line has been used to study PAHs' effects. To test if this cell line, cultured in monolayer (2D), can be utilised as a model to study mixed effects of PAHs and temperature, we exposed RTL-W1 cells (72 h) at 18 °C and 21 °C (simulating warming) to benzo[k]fluoranthene (B[k]F), at 10 nM and 100 nM. After PAHs' exposures, cell density and viability were assessed (through trypan blue exclusion and LDH assays). Gene expression of detoxification targets (cytochrome P450 (CYP)1A, CYP3A27, glutathione S-transferase omega 1 (GST), uridine diphosphate (UDP)-glucuronosyltransferase (UGT), catalase (CAT), and multidrug resistance-associated protein 2 (MRP2)), was analysed by RT-qPCR. B[k]F at 10 and 100 nM reduced cell density but did not affect cell viability. Temperature did not seem to influence cell density and viability. LDH leakage was higher at 21 °C than at 18 °C. CYP1A, CYP3A27, and UGT expression were increased, compared with the control, by both concentrations of B[k]F. GST and MRP2 gene expression was increased by B[k]F100. CAT mRNA levels were higher at 21 °C than at 18 °C. There were no statistically significant interactions between PAHs and temperature over the assessed targets. Overall, the RTL-W1 in 2D culture can potentially unravel the liver effects of toxicants in a global warming scenario.

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