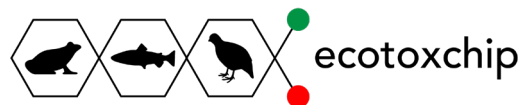


Mechanism of action (MOA): chlorpyrifos in quail



BACKGROUND INFORMATION

Chlorpyrifos is an organophosphate pesticide widely used globally. In a range of animal studies, exposures to chlorpyrifos have been linked with adverse outcomes including neurotoxicity, metabolic activation, disturbed lipid metabolism, oxidative stress, and immunotoxicity.

OBJECTIVE

To characterize the molecular mechanisms of action of chlorpyrifos in exposed Japanese quail (JQ) embryos using the Version 1 (V1) JQ EcoToxChip and EcoToxExplorer.

METHODS & RESULTS

Fertilized JQ eggs were injected on embryonic day 0 with 41 ug/g CPF (in DMSO). At embryonic day 9, the liver was excised and immediately flash frozen. RNA was extracted, cDNA run on the V1 JQ EcoToxChip. The data were analyzed with [EcoToxExplorer.ca](https://ecotoxexplorer.ca) with key findings noted below.

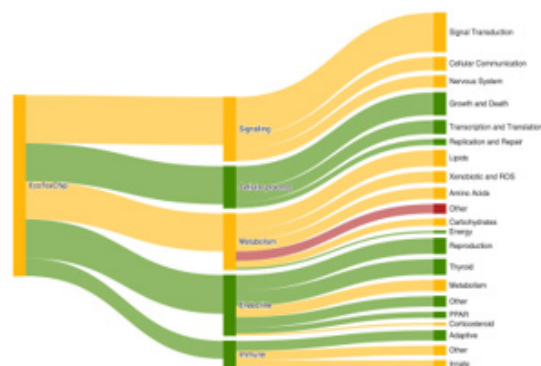
1. Top differentially expressed genes¹

	Fold Change
CYP2H1	4,002
CYP2H2	2,051
CYP3A9	91
CYP2C9	24
ALAS1	21

2. OECD adverse outcome pathways (AOPs) flagged¹

- CAR Activation (AOP 107)
- AhR Activation (AOP131)
- PPAR Antagonism (AOP6)
- Estrogen Receptor Antagonism (AOP30)

3. EcoTox processes and EcoTox modules flagged²



TAKEAWAYS

Using the EcoToxChip, we flag these samples as "YELLOW". We conclude that the main biological pathways affected by this exposure were those related to metabolism and cellular signaling. Notable genes are expressed, and AOPs are flagged. In general, these are responses that would be expected by CPF. The notable exception was a lack of AChE response, likely due to the rapid clearance of the chemical.

Notes

Farhat, A., Crump, D., Bidinosti, L., Boulanger, E., Basu, N., Hecker, M., Head, J.A. 2019. An Early-life Stage Alternative Testing Strategy for Assessing the Impacts of Environmental Chemicals in Birds. Environ Toxicol Chem. doi: 10.1002/etc.4582.

¹ p<0.05; ² EcoToxExplorer V1 settings were 1.2 for yellow and 1.5 for red