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Toxicity and sub-lethal effects of cyanobacteria on model aquatic organisms

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Cyanobacterial water blooms represent a problem throughout the world due to the eutrophication of the aquatic environment in particular. The production of wide range of secondary metabolites including cyanotoxins belongs to consequential problems connected with the occurrence of cyanobacterial blooms in the surface water. A wide range of aquatic organisms including invertebrates, fish and amphibian, mammalian or avian species may be exposed to cyanobacterial metabolites and other compounds via consumption of or dermal contact with water contaminated by cyanobacteria.

During the last decades, mortalities of wild birds have been associated with the toxic cyanobacterial blooms worldwide; however these data were mostly based on indirect evidence. The intention of our research group was to complement field observations published by other workers with results from laboratory experiments on the model bird Japanese quail (*Coturnix coturnix japonica*). We have performed evidence-based avian toxicity test with different doses of cyanobacterial biomass with controlled levels of cyanotoxins microcystins (MCs) to evaluate the effective concentration of MCs. In consequent experiments we have set up more relevant environmental scheme with multiple exposures to cyanobacterial biomass, heavy metal lead and vaccination to simulate the natural conditions. In both the experiments the sub-lethal parameters of oxidative stress (lipid peroxidation), detoxification and antioxidative markers (glutathione, glutathione-S-transferase, glutathione reductase, glutathione peroxidase, catalase, superoxide dismutase) were measured together with accumulation of MCs, Pb in their tissues. These parameters were reviewed together with haematological and histopathological parameters examined by our colleagues from University of Veterinary and Pharmacy and the complex effects of cyanobacterial biomass on the model birds were summarized.

The aim of the presentation will be the summary of the recently performed experiments and results and the overview of the future experiments.