

Concentration-Dependent Uptake of the Microcystin-RR Toxin in Human Placental Cell Lines

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The incidence of harmful algae blooms (HAB) is increasing and as a result, populations are being exposed to cyanotoxins produced by the blue-green algae cyanobacteria. Two of the most prominent cyanotoxins in freshwater are microcystin-LR (MC-LR), and microcystin-RR (MC-RR). Microcystins enter cells through organic anion-transporting peptides (OATP) and inhibit protein phosphatases leading to cellular damage to the liver and brain. The placenta also expresses OATP transporters that could facilitate the uptake of microcystins leading to potential toxicity. We hypothesize that microcystin-RR will enter placenta cells. To test this, two human cytotrophoblast cell lines (JAR, BeWo) and one human extravillous trophoblast cell line (HTR8/SVneo) were incubated with microcystin-RR at concentrations of 0, 0.1, 1, and 10 μ m. The uptake of microcystin-RR was assessed by western blotting of cell lysates using an antibody that recognizes proteins bound by microcystin-RR. Significant uptake of MC-RR in all 3 cell lines was observed at a concentration of 10 μ m. Furthermore, only JAR cells exhibited significant uptake of MC-RR at a concentration of 1 μ m as well. Recognizing that MC-RR can actively enter placenta cells, we suspect that cyanotoxins can cause toxicity to the placenta. Moving forward, we will examine the ability of MC-RR to injure trophoblast cells as well as identify the specific OATP transporters responsible for entry into the placenta. Funded by Rutgers University Foundation and NIH R25ES020721.

