Toxicity of ivermectin on cladocerans: comparison of toxic effects on Daphnia and Ceriodaphnia species

Interspecies differences in contaminant sensitivity are measured to assess environmental risk based on species sensitivity distribution. The present study was intended to demonstrate the importance of studying the effects of contaminants on the life-history traits of various species. To do this, we compared the effects of ivermectin on the survival, growth, and reproduction of two cladoceran species (Daphnia magna and Ceriodaphnia dubia) and two strains of D. magna (one Japanese and one European). Ivermectin is widely used against endo- and ectoparasites in livestock and pets and is known for its high toxicity. Local aquatic ecosystems can be contaminated due to direct excretion into surface waters, but few data are available about the chronic effects of ivermectin on aquatic organisms. Adult daphnids were exposed to concentrations from 0 to 1 ng/L. Our results show a significant effect on all the life-history traits measured and reveal inter- and intraspecies differences. The no-observed-effect concentration found for growth and reproduction is 0.0003 ng/L for D. magna versus 0.001 ng/L for C. dubia, and the lowest-observed-effect concentration is 0.001 ng/L for D. magna versus 0.01 ng/L for C. dubia. C. dubia is smaller than D. magna and appeared to be less sensitive to ivermectin. The European strain of D. magna exhibited less resistance than the Japanese strain. A bias in the sex ratio was observed for all strains tested.

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