Analyzing the Role of Intralipid in the Treatment of Beta-Adrenergic Blocker Overdose in Daphnia magna

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Beta-adrenergic blockers (beta-blockers) are extensively used to treat a variety of cardiovascular disorders from hypertension, arrhythmia, coronary artery disease, and angina. The rapidly growing use of beta-blockers for patients over 50 years of age correspondingly introduces an increasing number of fatal exposures due to overdose. Beta-blocker-induced cardiotoxicity may lead to cardiac arrest, heart failures, and potentially death. Intralipid (lipid emulsion) is a plant-based fat that has been recognized for treatment of toxicity induced by anesthetics and other lipophilic drugs. The purpose of this project aims to evaluate the role of Intralipid in the treatment of beta-blocker overdose in Daphnia magna (D. magna). Three different beta-blockers (metoprolol, nebivolol, and propranolol) were used for this study. Each beta-blocker was first exposed to D. magna at increasing concentrations and was compared to that of untreated D. magna. To analyze the role of Intralipid in reversing the cardiotoxicity, increasing concentrations of Intralipid were administered following the exposure of D. magna to a selected dose of beta-blocker that was determined to lower the heart rate by 50%. Cardiac activity was measured by recording the heartbeats. The results indicate that the heart rate of D. magna significantly decreases with independent exposure to the individual beta-blockers. Intralipid does not affect heart rate independently; however, it effectively reverses the cardiotoxic effects of the beta-blockers by increasing the heart rate of the D. magna to a normal level. In conclusion, the data strongly support that Intralipid effectively countered the effect of beta-blocker-induced cardiotoxicity in D. magna.

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