

# Cardiac disorders and mode of action of the Egyptian scorpion venom *Androctonus bicolor* on isolated toad's heart

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## Abstract

Scorpion venom is a complex mixture of components with various pharmacological and toxicological effects. It is characterized by the presence of a large number of toxins that specifically interact with ion channels of excitable cells. The Egyptian scorpion *Androctonus bicolor* belongs to the family of Buthidae and until now no information is available about the effect of its venom on cardiac muscles. Using an in vitro approach, cardiotoxicity and mode of action of *A. bicolor* venom on isolated toad's heart were investigated. Direct application of scorpion venom (0.5 g/ml) into isolated toad's heart induced a remarkable bradycardia concomitant with a protraction in the conduction time (P-R interval). In the meantime, a significant increase in the R-wave amplitude (ventricular contraction) was noticed after 5 min of venom perfusion. Various cases of cardiac disorders were recorded such as sinus arrhythmias, ectopic beats and different degrees of heart block. Through using different autonomic and ion channel blockers, the possible mechanism of action of *A. bicolor* venom on isolated toad's heart was revealed. The application of both atropine (4 g/ml) and verapamil (5 g/ml) could not alleviate the pronounced negative chronotropic and positive inotropic effects. Meanwhile, a significant decrease in the R-wave amplitude was observed after propranolol (5 g/ml) application. In conclusion, our findings indicate that the venom of *A. bicolor* directly influenced the cardiac electrical activity of toads through  $\beta$ -adrenergic receptors. The direct effect of this venom on cardiac tissues may significantly contribute in the development of several cardiotoxic effects following scorpion sting.

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