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Purification of rabbit serum PON1 and its protective effect on myocardial injury induced by organophosphate poisoning in rats

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Objective: To explore whether purified rabbit serum paraoxonase 1 (PON1) for the treatment of dichlorvos poisoning myocardial injury in rats is superior to conventional therapy through establishing the model dichlorvos poisoning myocardial injury in rats.

Methods: SD male rats were randomly divided into the normal control group (A group), giving the intraperitoneal injection and the same volume of normal saline of exposure-based DDVP. Exposure group (B group) was given an intraperitoneal injection of 15 mg/kg DDVP. Pretreatment group (C1 group) was given 9600 U/kg of caudal vertebra intravenous injection of PON-1 and then intraperitoneal injection of 15 mg/kg DDVP after 30 minutes. PON1 treatment group (C2 group) was given an intraperitoneal injection of 15 mg/kg DDVP and 9600 U/kg of instant caudal vertebra intravenous injection of PON-1 after exposure. Treatment group (D group) was given an intraperitoneal injection of 15 mg/kg DDVP. After exposure, 45 mg/kg pralidoxime iodide and 10 mg/kg atropine of instant caudal vertebra intravenous injection were given. Combination treatment group (E group) was given 9600 U/kg of instant caudal vertebra intravenous injection of PON-1. 30 minutes later, the group was intraperitoneally injected with 15 mg/kg DDVP. Then, 45 mg/kg pralidoxime iodide and 10 mg/kg atropine of instant caudal vertebra intravenous injection were given. Rabbit serum paraoxonase 1 was purified. 0.3 ml of blood of rats in various groups was respectively collected 6 hours after the modeling. The dichlorvos concentration in rat serum was measured through gas chromatographic method. The general state, salivation, pupil and muscle fibrillation score were observed. The contents of CK, MDA and SOD in cardiac muscle tissues were examined; the contents of serum CK - MB and Tn-T were measured; cardiac muscle tissues were detected by the electron microscope.

Results: Exposure group (B group) had urinary incontinence, salivation and polypnea, together with muscle weakness and dysphoria. The Bleeckler score was 3 points. In comparison with the control group (A group), the contents of CK and SOD, serum CK-MB and Tn-T contents in cardiac muscle tissues significant increased; the content of MDA in cardiac muscle tissues decreased significantly ($p<0.01$). Myofibril lost characteristic streaky structures with the breakage of endomysium and swelling of mitochondria. Toxic symptoms did not appear in C1 group and E group, without differences from the control group in terms of various indexes. Under the electron microscope, the myofibrils of myocardial cells were arranged neatly with clear striats; the structure of mitochondria was basically normal. Salivation and polypnea occurred in C2 group, and the Bleeckler score was 2 points. In comparison with the control group (A group) in terms of other indexes, there were injury manifestations ($p<0.01$). D group only showed slight fasciculation, and the Bleeckler score was 1 point. In comparison with the control group (A group) in terms of other indexes, it had certain protection effects, which was not good as C1 group and E group.

Conclusion: PON1 plays a protective role on the dichlorvos poisoning myocardial injury in rats and the protection ability is better than the conventional therapy.