

## Treatment of acute pancreatitis in rats using MSCs of the human umbilical cord

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**Background.** Acute pancreatitis (AP) is serious disorder requiring emergency hospitalization. After pancreatic tissue necrosis and multiple organ failure in AP, a mortality rate is up to 30–47 %. There are currently no effective therapies for AP. MSCs can be a potential candidate for the treatment of this disease due to their immunomodulatory properties. **The aim** of this study was to compare the therapeutic effect of the transplantation of free MSCs and MSCs preconditioned with H<sub>2</sub>O<sub>2</sub> in the rat model of AP. **Methods.** Wistar rats were randomized into four groups: a negative control group received normal saline; a positive control group obtained the intraperitoneal injection of L-arginine at a dose of 200 mg/100 g of body weight within 1 h interval in-between; and two of experimental groups were injected intraperitoneally with free MSCs of human umbilical cord and preconditioned MSCs with 30 μmol H<sub>2</sub>O<sub>2</sub> second passage at a dose (6–7x10<sup>6</sup> cells/kg of rat weight) 24 h after AP induction. Rats were sacrificed after 7 days, the pancreatic tissues and blood were collected. Biochemical and histological methods were used to determine the amylase level and pathological changes in the rat pancreas. **Results.** One day after the AP induction, the amylase level increased by 7 times, and histological analysis indicated acute organ damage. The size of fibrotic area was 5 times larger than the negative control. The similarly important morphometric parameter was the presence of a large number of non-nuclear acinar cells and infiltration of inflammatory cells. 7 days after transplantation of free MSCs and MSCs preconditioned with H<sub>2</sub>O<sub>2</sub> into the rats with induced AP, the amylase level in the blood of rats decreased 2 times after MSC transplantation, and decreased 3 times after injection of preconditioned MSCs. The size of fibrotic area in the pancreatic parenchyma was decreased by 3.5 times after MSC transplantation and almost returned to norm after the injection of MSCs preconditioned with H<sub>2</sub>O<sub>2</sub>. Other morphometric parameters of pancreas almost return to a normal level. **Conclusions.** The results of this study show that the transplantation of free MSCs to the rats with modeling acute pancreatitis led to the recovery of structural and functional parameters, but the injection of preconditioned MSCs with 30 μmol H<sub>2</sub>O<sub>2</sub> significantly improved the therapeutic efficacy of MSC therapy.