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MENSTRUAL BLOOD STEM CELLS RESCUE MYOCARDIOCYTES IN RAT MYOCARDIAL INFARCTION BY REGULATING REDOX AND DECREASING ROS GENERATION THROUGH PARACRINE ACTION

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Objective In the study, we hypothesised that menstrual blood stem cells (MBSCs) protect ischemic myocardium through paracrine effect.

Methods & Result During in vitro experiments, neonatal rat ventricle myocardiocytes (NRVMs) were cocultured with MBSCs and then underwent hypoxia/reoxygenation procedure. The apoptosis ratio of NRVMs in coculture group was lower than the control group (10.26±3.9% vs 17.38±4.4%, $p<0.05$). The medium of normoxia and hypoxia cultured MBSCs was collected to detect the secreted EGF, VEGF, TGFβ (559±21, 0, 635±59 ng/ml in normoxia culture, respectively, 582±19, 198±6, 664±102 mg/ml in hypoxia culture, respectively). The RNA was also extracted and reverse transcriptional PCR showed that MBSCs expressed multiple cytokines.

The MBSCs were injected into five sites around the infarct region after ligation of the left anterior descending (LAD) in rats. 4 weeks later, 18-fluorodeoxyglucose (18-FDG) microPET were performed and the images indicated more viable myocardiocytes in the scar area of transplant group than of saline group (0.357±0.067 vs 0.275±0.053, p<0.01 in transverse section, 0.333±0.046 vs 0.267±0.045, p<0.01 in coronal section). The infarct size of transplant group was less than saline group in Masson trichrome stain (33.6±2.9% vs 41.6±4.9%, p<0.05). Gene chip cluster analysis suggested that the expression level of Akr1cl2, Alox12l, Fmo2 and Aldh5a1, which belong to the REDOX family, were downregulated in saline group, but upregulated in transplant group. Quantitative PCR confirmed partly the results of gene chip analysis. During the in vitro study, the generation of reactive oxygen species (ROS) in NRVMs were reduced by cocultured with MBSCs after H/R treatment.

Conclusion MBSCs paracrined multiple cytokines to protect myocardiocytes from apoptosis by upregulating several oxidoreductase expression and decreasing ROS generation.