

Microvesicles of mesenchymal stem cells demonstrate immunosuppressive activity in vivo

S.V. Kurbangaleeva, O.A. Neustroeva, A.M. Aimaletdinov, A.A. Rizvanov, M.O. Gomzikova

Background: Mesenchymal stem cells (MSCs) demonstrate immunosuppressive activity in vitro and in vivo. It has been shown that microvesicles convey biological activity of parental MSCs. However, the low yield of natural EVs prevents their clinical use. To increase the yield of microvesicles we use cytochalasin B. The aim of our research was to determine the immunomodulatory properties of murine MSCs and cytochalasin B induced microvesicles derived from MSCs.

Materials and methods: immunization of mice with sheep red blood cells (SRBC), measurement of phagocytic activity of peritoneal macrophages, determination of cellularity of spleen, thymus and bone marrow were conducted.

Results: The effect of MSCs and CIMVs-MSCs on humoral and cellular immunity of mice was analyzed. We found that CIMVs and MSC reduce the level of anti-SRBC antibody and the severity of immune reaction. The antibody titer in control, saline-treated mice, pretreated with allogeneic MSCs and pretreatment with CIMVs-MSCs was 6.8 ± 1.3 ; 4.5 ± 0.6 ($p=0.032$); 4.0 ± 0.57 ($p=0.019$) respectively. The effect of allogeneic MSCs and CIMV-MSCs on neutrophil activity has been studied. There was no difference between leukocyte activation in mice treated with MSCs or CIMVs-MSCs as compared to control mice, indicating that neither MSCs or CIMVs-MSCs affected neutrophil activity. Next, we determined the effect of MSCs and CIMVs-MSCs on phagocytic macrophage activity by neutral-red dye uptake. We found that the phagocytic index of macrophages from the negative control was 0.52 ± 0.14 , while it was lower in cells from mice pretreated with MSCs (0.39 ± 0.07 ; $p=0.23$) or CIMVs MSC (0.34 ± 0.13 ; $p=0.4$).

Conclusions: According to the received data, CIMVs-MSCs demonstrate the immunosuppressive activity similar to parental MSC.