Excessive alcohol consumption has a negative effect on bone marrow hematopoiesis leading to decreased numbers of peripheral blood cells and, subsequently, to a development of petechiae, spontaneous bleeding, hypoxia, immunodeficiency and frequent infections in patients suffering from alcoholism. We have previously demonstrated that immune functions of murine splenic lymphocytes, affected by chronic ethanol intoxication, can be improved by an *in vitro* treatment with synthetic GABAA-R ligand meta-chlorobenzohydrylurea (mCBU). It has also been shown that splenic lymphocytes, modulated *in vitro* by m-CBU and administered to long-term alcoholized syngeneic recipients intravenously, have a positive psychoneuroimmunomodulatory effects as reflected by improved behavioral patterns, stimulation of neuroplasticity and reduction of neuroinflammation, stimulation of humoral immune response. In this study, the influence of mCBU-modulated splenic lymphocytes on bone marrow hematopoiesis and production of peripheral blood cells in long-term alcoholized mice was studied. Hematopoietic activity was suppressed in the bone marrow of long-term alcoholized mice as reflected by a significantly decreased number of erythroid precursors and a downward trend for a population of granulocyte-macrophage precursors. In peripheral blood, a decrease in the number of lymphocytes, platelets, erythrocytes and leukocytes was observed with an increase in the population of segmented neutrophils, indicating peripheral inflammation. Splenic lymphocytes, precultured with mCBU at a concentration of 10 μg/ml for 30 minutes and administrated into syngeneic long-term alcoholized recipients intravenously, improved bone marrow hematopoietic activity as reflected by the restoration of the colony-forming activity of bone marrow hematopoietic precursors and shifts in peripheral blood counts including a decrease of segmented neutrophils, recovery of erythrocytes and lymphocytes populations with upward trend for platelets. The results indicate the potential effectiveness of mCBU-modulated lymphocytes in recovering bone marrow hematopoiesis impaired by long-term ethanol intoxication.