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Possible directions of human cord blood mononuclear cells differentiation in the regenerating rat liver

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Abstract

It is known that human cord blood hematopoietic stem cells (HSC) are able to differentiate into hepatocytes. This ability can be widely used in treatment of various liver diseases. However, there are some genetic diseases of liver, when the application of autologous stem cells is not possible. So it could be very helpful to develop methods of genetic modification of stem/progenitor cells. However, it should be proved that genetic modification does not change the properties of HSC. We performed partial hepatectomy for the white mongrel male rats and injected human umbilical cord blood mononuclear cells transfected by gene of green fluorescent protein (GFP) into the spleen. Paraffin sections of the liver were stained with antibodies to stem cell factor receptor, human leukocyte antigen, α-smooth muscle actin, enhanced GFP, cytokeratin 19, hepatocyte specific antigen, human α-fetoprotein. Also we used a double-immunohistochemical staining to detect expression of stem cell factor receptor and desmin, enhanced GFP and cytokeratin 19. Our study showed that human cord blood mononuclear cells transfected by gfp transplanted into the spleen of rats after partial hepatectomy migrated to the liver and acquired the phenotype of hepatocytes, cholangiocytes and sinusoidal cells. At the same time the differentiation of such transplanted cells into myofibroblasts, as it was previously shown, does not occur. Hepatoblasts and hepatocytes found in the liver of rats after transplantation of genetically modified and native cells express human hepatocyte specific antigen and α-fetoprotein that means they are functionally active.

Keywords

Hematopoietic stem cells, Liver, Transfection, Umbilical cord blood