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Concise Review: Therapeutic Potential of Mesenchymal Stem Cells for the Treatment of Acute Liver Failure and Cirrhosis

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Key words. mesenchymal stem cell • therapy • acute liver failure • cirrhosis

ABSTRACT

Currently, the most effective therapy for acute liver failure and advanced cirrhosis is liver transplantation. However, this procedure has several limitations, including lack of donors, surgical complications, immunological suppression and high medical costs. The alternative approaches that circumvent the use of a whole liver, such as stem cell transplantation, have been suggested as an effective alternate therapy for hepatic diseases.

Mesenchymal stem cells (MSCs), also known as multipotent mesenchymal stromal cells, are self-renewing cells that can be found in almost all postnatal organs and tissues, including liver. During the past decade, great progress has been made in the field of MSC-dependent liver regeneration and immunomodulation. Because of their potential for differentiation into hepatocytes as well as their immunomodulatory characteristics, MSCs are considered as promising therapeutic agents for the therapy of acute liver failure and cirrhosis.

In this concise review, we have summarized therapeutic potential of MSCs in the treatment of acute liver failure and cirrhosis, emphasizing their regenerative and immunomodulatory characteristics after engraftment in the liver. We have also presented several outstanding problems including conflicting data regarding MSCs engraftment in the liver and unwanted mesenchymal lineage differentiation *in vivo* which limits MSC therapy as a mainstream treatment approach for liver regeneration.

It can be concluded that efficient and safe MSC-based therapy for acute and chronic liver failure remains a challenging issue that requires more investigation and continuous cooperation between clinicians, researchers, and patients. STEM CELLS 2014; 00:000–000

INTRODUCTION

Acute liver failure, which develops secondary to infection, toxin, or immune-mediated attack, is a potentially fatal clinical syndrome characterized by rapid development of hepatocellular dysfunction with diffuse intrahepatic infiltration of inflammatory cells and massive multilobular necrosis. Liver cirrhosis is a chronic disease of the liver, characterized by the loss of functional liver cells and their replacement with fibrous tissue resulted from alcohol abuse, nutritional deprivation, or infection especially by the hepatitis virus B and C (HBV and HCV).

Currently, the most effective therapy for acute liver failure and advanced cirrhosis is liver transplantation, but its use is limited because of organ donor shortage, financial considerations, and the requirement for life-long immunosuppression. An alternative approach such as stem cell transplantation has been suggested as an effective alternate therapy for hepatic diseases [1].

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