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Stem Cell

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Stem Cell patents Research Literatures (1)

Mark Herbert, PhD

39-06 Main Street, Flushing, Queens, New York 11354, USA, ma8080@gmail.com

Abstract: Stem cells are derived from embryonic and non-embryonic tissues. Most stem cell studies are for animal stem cells and plants have also stem cell. Stem cells were discovered in 1981 from early mouse embryos. Stem cells have the potential to develop into all different cell types in the living body. Stem cell is a body repair system. When a stem cell divides it can be still a stem cell or become adult cell, such as a brain cell. Stem cells are unspecialized cells and can renew themselves by cell division, and stem cells can also differentiate to adult cells with special functions. Stem cells replace the old cells and repair the damaged tissues. Embryonic stem cells can become all cell types of the body because they are pluripotent. Adult stem cells are thought to be limited to differentiating into different cell types of their tissue of origin. This article introduces recent research reports as references in the related studies.
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Key words: stem cell; life; research; literature

Introduction

The stem cell is the origin of an organism's life that has the potential to develop into many different types of cells in life bodies. In many tissues stem cells serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a red blood cell or a brain cell. This article introduces recent research reports as references in the related studies.

The following introduces recent reports as references in the related studies.

Borakati, A., et al. (2018). "A Systematic Review And Meta-Analysis of Clinical Trials of Mesenchymal Stem Cell Therapy for Cartilage Repair." Curr Stem Cell Res Ther **13**(3): 215-225.

BACKGROUND: Osteoarthritis (OA) is a major global burden creating significant morbidity worldwide. Current curative therapies are expensive, challenging to access and have significant risks, making them infeasible and difficult in many cases. Mesenchymal stem cells (MSCs) can be applied to joints and may regenerate the cartilage damaged in OA, this therapy may be advantageous to existing treatments. OBJECTIVE: We systematically reviewed clinical trials of MSCs for cartilage repair and provide an overview of the literature in this area here. MEDLINE, Embase, CENTRAL, clinicaltrials.gov and Open- Grey were searched for controlled trials and case series with >5 patents involving MSC therapy for cartilage repair. The controlled trials were meta-analysed and the primary outcome measure was improvement in pain over the control group. A narrative synthesis was composed for the case series. RESULTS: A significant reduction in pain was found with the use of MSCs over controls: Standardised mean difference=-1.27 (95% Confidence intervals -1.95 to -0.58). However, the data was extremely heterogeneous with I2=95%, this may be attributed to differing therapies, clinical indication for treatment and joints treated amongst others. Case series showed improvements in treated patients with a variety of differing treatments and by many outcomes. There were no severe adverse outcomes found across all studies that could be attributed to MSCs, implying their safety. CONCLUSION: We conclude that MSCs have significant potential for the treatment of OA, however, larger, more consistent trials are needed for conclusive analysis.

Ilas, D. C., et al. (2017). "Targeting subchondral bone mesenchymal stem cell activities for intrinsic joint repair in osteoarthritis." Future Sci OA **3**(4): FSO228.

Osteoarthritis (OA) is a common age-related disease with complex pathophysiology. It is characterized by wide-ranging tissue damage and ultimate biomechanical failure of the

whole joint. However, signs of tissue adaptation and attempted repair responses are evident in OA-affected osteochondral tissues. Highlighted in this review article is the role of bone-resident mesenchymal stem cells (MSCs) in these bone remodeling responses, and a proposal that targeting MSC activities in OA subchondral bone could represent a novel approach for intrinsic joint regeneration in OA. The development of these therapies will require better understanding of MSC proliferation, migration and differentiation patterns in relation to OA tissue damage and further clarification of the molecular signaling events in these MSCs during disease progression.

Kim, G., et al. (2018). "Tonsil-derived mesenchymal stem cell-embedded in situ crosslinkable gelatin hydrogel therapy recovers postmenopausal osteoporosis through bone regeneration." PLoS One **13**(7): e0200111.

We investigated therapeutic potential of human tonsil-derived mesenchymal stem cells (TMSC) subcutaneously delivered to ovariectomized (OVX) mice for developing more safe and effective therapy for osteoporosis. TMSC were isolated from tonsil tissues of children undergoing tonsillectomy, and TMSC-embedded in situ crosslinkable gelatin-hydroxyphenyl propionic acid hydrogel (TMSC-GHH) or TMSC alone were delivered subcutaneously to the dorsa of OVX mice. After 3 months, three-dimensionally reconstructed micro-computed tomographic images revealed better recovery of the femoral heads in OVX mice treated with TMSC-GHH. Serum osteocalcin and alkaline phosphatase were also recovered, indicating bone formation only in TMSC-GHH-treated mice, and absence in hypercalcemia or other severe macroscopic deformities showed biocompatibility of TMSC-GHH. Additionally, visceral fat reduction effects by TMSC-GHH further supported their therapeutic potential. TMSC provided therapeutic benefits toward osteoporosis only when embedded in GHH, and showed potential as a supplement or alternative to current therapies.

Liang, J., et al. (2017). "Effects of allogeneic mesenchymal stem cell transplantation in the treatment of liver cirrhosis caused by autoimmune diseases." Int J Rheum Dis **20**(9): 1219-1226.

AIM: There has been great interest in recent years to take advantage of mesenchymal stem cells (MSCs) to treat end-stage liver disease. This study is aimed to evaluate clinical therapeutic effects of allogeneic MSC transplantation in liver cirrhosis caused by autoimmune diseases. METHODS: The enrolled patients with liver cirrhosis were assigned to receive allogeneic MSC infusions through a peripheral vein. The primary objective of this study was to assess the safety and effectiveness of MSCT in patients with autoimmune diseases-induced cirrhosis. Secondary endpoints were to assess changes in the Models of End Stage Liver Disease (MELD) scores and liver functions after the transplantation. RESULTS: A total of 26 patients were enrolled. Of these, 23 patients received umbilical cord MSCT, two received cord blood MSCT and one received bone marrow MSCT. Three patents died of the complications caused by cirrhosis and two patients received liver transplantation after MSCT. Four patients were lost to follow-up. The mean of alanine transaminase values decreased 6 months, 1 and 2 years after the transplantation, but there were no statistical significance. The mean value of total bilirubin decreased at 6 months and 1 year follow-up. Average serum albumin levels improved at 6 months, 1 and 2 years follow-up. The mean value at 2 years increased significantly compared with the baseline value. A lowering of prothrombin time was seen at 6 months after MSCT. MELD score improved at 6 months, 1 and 2 years of follow-up. No serious adverse events were observed during or 24 h after infusions of MSCs in any of the 26 patients with liver cirrhosis. CONCLUSION: Based on this clinical trial, allogeneic MSCT through the peripheral vein probably is safe and seemingly has beneficial effect in patients with liver cirrhosis. Therefore, allogeneic MSCT is a potential option for treatment of liver cirrhosis caused by autoimmune diseases. Further studies with higher numbers of patients are warranted to better clarify the impact and mechanisms of MSCT in liver cirrhosis.

Monsel, A., et al. (2016). "Mesenchymal stem cell derived secretome and extracellular vesicles for acute lung injury and other inflammatory lung diseases." Expert Opin Biol Ther **16**(7): 859-871.

INTRODUCTION: Acute respiratory distress syndrome is a major cause of respiratory failure in critically ill patients. Despite extensive research into its pathophysiology,

mortality remains high. No effective pharmacotherapy exists. Based largely on numerous preclinical studies, administration of mesenchymal stem or stromal cell (MSC) as a therapeutic for acute lung injury holds great promise, and clinical trials are currently underway. However, concern for the use of stem cells, specifically the risk of iatrogenic tumor formation, remains unresolved. Accumulating evidence now suggest that novel cell-free therapies including MSC-derived conditioned medium and extracellular vesicles released from MSCs might constitute compelling alternatives. AREAS COVERED: The current review summarizes the preclinical studies testing MSC conditioned medium and/or MSC extracellular vesicles as treatment for acute lung injury and other inflammatory lung diseases. EXPERT OPINION: While certain logistical obstacles limit the clinical applications of MSC conditioned medium such as the volume required for treatment, the therapeutic application of MSC extracellular vesicles remains promising, primarily due to ability of extracellular vesicles to maintain the functional phenotype of the parent cell. However, utilization of MSC extracellular vesicles will require large-scale production and standardization concerning identification, characterization and quantification.

Nair, M. and P. Saxena (2013). "Recent patents on mesenchymal stem cell mediated therapy in inflammatory diseases." Recent Pat Inflamm Allergy Drug Discov **7**(2): 105-113.

Inflammation is the propitious response of vascular tissue to pathogens, damaged cells or irritants. Recent discoveries on the molecular and cellular basis of inflammation and allergy have markedly altered the understanding of these disorders. Although the conventional therapy used for the treatment of autoimmune and inflammatory diseases has improved the condition of patients but it has also placed them at the stake of enormous side effects. In recent times, the usage of Mesenchymal Stem Cell (MSC) therapy in the field of medical science has provided better alternative, concomitant treatment for these diseases as suggested by preclinical studies. Thus, in this review we have summarized the recent findings on MSCs as a therapeutic agent in treating inflammatory disorders using novel methods. This review also outlines the current state of knowledge on the biology of MSCs and their use as a suitable candidate for cell-based therapeutics. In addition, we focus on various patents, in which administration of MSC attenuates inflammation and injury thereby suggesting its integral role in host immune response, immunomodulation and anti-inflammation, which may in turn lead to novel patents in this field in the future.

Pongkitwitoon, S., et al. (2016). "Cytoskeletal Configuration Modulates Mechanically Induced Changes in Mesenchymal Stem Cell Osteogenesis, Morphology, and Stiffness." Sci Rep **6**: 34791.

Mesenchymal stem cells (MSC) responding to mechanical cues generated by physical activity is critical for skeletal development and remodeling. Here, we utilized low intensity vibrations (LIV) as a physiologically relevant mechanical signal and hypothesized that the confined cytoskeletal configuration imposed by 2D culture will enable human bone marrow MSCs (hBMSC) to respond more robustly when LIV is applied in-plane (horizontal-LIV) rather than out-of-plane (vertical-LIV). All LIV signals enhanced hBMSC proliferation, osteogenic differentiation, and upregulated genes associated with cytoskeletal structure. The cellular response was more pronounced at higher frequencies (100 Hz vs 30 Hz) and when applied in the horizontal plane. Horizontal but not vertical LIV realigned the cell cytoskeleton, culminating in increased cell stiffness. Our results show that applying very small oscillatory motions within the primary cell attachment plane, rather than perpendicular to it, amplifies the cell's response to LIV, ostensibly facilitating a more effective transfer of intracellular forces. Transcriptional and structural changes in particular with horizontal LIV, together with the strong frequency dependency of the signal, emphasize the importance of intracellular cytoskeletal configuration in sensing and responding to high-frequency mechanical signals at low intensities.

The above contents are the collected information from Internet and public resources to offer to the people for the convenient reading and information disseminating and sharing.

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