Stem Cell Care India

A GUIDE FOR PATIENTS

LITERATURE

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❖ Kidney Diseases

➢ Stem cell-based treatment of kidney diseases

Kidney dysfunction, including chronic kidney disease and acute kidney injury, is a globally prevalent health problem. However, treatment regimens are still lacking, especially for conditions involving kidney fibrosis. Stem cells hold great promise in the treatment of chronic kidney disease and acute kidney injury, but success has been hampered by insufficient incorporation of the stem cells in the injured kidney. Thus, new approaches for the restoration of kidney function after acute or chronic injury have been explored. Recently, kidney organoids have emerged as a useful tool in the treatment of kidney diseases. In this review, we discuss the mechanisms and approaches of cell therapy in acute kidney injury and chronic kidney disease, including diabetic kidney disease and lupus nephritis. We also summarize the potential applications of kidney organoids in the treatment of kidney diseases.

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➢ Mesenchymal Stem Cell Therapy for Diabetic Kidney Disease: A Review of the Studies Using Syngeneic, Autologous, Allogeneic, and Xenogeneic Cells

Diabetic kidney disease (DKD) is a microvascular complication of diabetes mellitus (DM) and comprises multifactorial pathophysiologic mechanisms

Despite current treatment, around 30-40% of individuals with type 1 and type 2 DM (DM1 and DM2) have progressive DKD, which is the most common cause of end-stage chronic kidney disease worldwide. Mesenchymal stem cell- (MSC-) based therapy has important biological and therapeutic implications for curtailing DKD progression.

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➢ Stem/Stromal Cells for Treatment of Kidney Injuries With Focus on Preclinical Models

Within the last years, the use of stem cells (embryonic, induced pluripotent stem cells, or hematopoietic stem cells), Progenitor cells (e.g., endothelial progenitor cells), and most intensely mesenchymal stromal cells (MSC) has emerged as a promising cell-based therapy for several diseases including nephropathy. For patients with end-stage renal disease (ESRD), dialysis or finally organ transplantation are the only therapeutic modalities available. Since ESRD is associated with a high healthcare expenditure, MSC therapy represents an innovative approach. In a variety of preclinical and clinical studies, MSC have shown to exert renoprotective properties

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➢ Mesenchymal stem cells and extracellular vesicles in therapy against kidney diseases

Kidney diseases pose a threat to human health due to their rising incidence and fatality rate. In preclinical and clinical studies, it has been acknowledged that mesenchymal stem cells (MSCs) are effective and safe when used to treat kidney diseases. MSCs play their role mainly by secreting trophic factors and delivering extracellular vesicles (EVs). The genetic materials and proteins contained in the MSC-derived EVs (MSC-EVs), as an important means of cellular communication

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➢ Stem cells: A potential treatment option for kidney diseases

The prevalence of kidney diseases is emerging as a public health problem. Stem cells (SCs), currently considered as a promising tool for therapeutic application, have aroused considerable interest and expectations. With self-renewal capabilities and great potential for proliferation and differentiation, stem cell therapy opens new avenues for the development of renal function and structural repair in kidney diseases. Mounting evidence suggests that stem cells exert a therapeutic effect mainly by replacing damaged tissues and paracrine pathways.

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➢ Potential and Therapeutic Efficacy of Cell-based Therapy Using Mesenchymal Stem Cells for Acute/chronic Kidney Disease

Kidney disease can be either acute kidney injury (AKI) or chronic kidney disease (CKD) and it can lead to the development of functional organ failure. Mesenchymal stem cells (MSCs) are derived from a diverse range of human tissues. They are multipotent and have immunomodulatory effects to assist in the recovery from tissue injury and the inhibition of inflammation. Numerous studies have investigated the feasibility, safety, and efficacy of MSC-based therapies for kidney disease

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➢ Safety and tolerability of autologous bone marrow mesenchymal stromal cells in ADPKD patients

Autosomal dominant polycystic kidney disease (ADPKD) is a genetic ciliopathy disease characterized by progressive formation and enlargement of cysts in multiple organs. The kidneys are particularly affected and patients may eventually develop end-stage renal disease (ESRD). We hypothesize that bone marrow mesenchymal stromal cells (BMMSCs) are renotropic and may improve kidney function via anti-apoptotic, anti-fibrotic, and anti-inflammatory effects. In this study, we aim to assess the safety and tolerability of a BMMSC infusion in ADPKD patients..

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➢ Stem/progenitor cell in kidney: characteristics, homing, coordination, and maintenance

Renal failure has a high prevalence and is becoming a public health problem worldwide. However, the renal replacement therapies such as dialysis are not yet satisfactory for its multiple complications. While stem/progenitor cell-mediated tissue repair and regenerative medicine show there is light at the end of tunnel. Hence, a better understanding of the characteristics of stem/progenitor cells in kidney and their homing capacity would greatly promote the development of stem cell research and therapy in the kidney field and open a new route to explore new strategies of kidney protection. In this review, we generally summarize the main stem/progenitor cells derived from kidney in situ or originating from the circulation, especially bone marrow. We also elaborate on the kidney-specific microenvironment that allows stem/progenitor cell growth and chemotaxis, and comment on their interaction. Finally, we highlight potential strategies for improving the therapeutic effects of stem/progenitor cell-based therapy. Our review provides important clues to better understand and control the growth of stem cells in kidneys and develop new therapeutic strategies.

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➢ Mesenchymal stem cell treatment for chronic renal failure

Chronic renal failure is an important clinical problem with significant socioeconomic impact worldwide. Despite advances in renal replacement therapies and organ transplantation,

poor quality of life for dialysis patients and long transplant waiting lists remain major concerns for nephrologists treating this condition.

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➢ Stem cell options for kidney disease

Chronic kidney disease (CKD) is increasing at the rate of 6-8% per annum in the US alone. At present, dialysis and transplantation remain the only treatment options. However, there is hope that stem cells and regenerative medicine may provide additional regenerative options for kidney disease.

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➢ Hepatocyte growth factor modification promotes the amelioration effects of human umbilical cord mesenchymal stem cells on rat acute kidney injury

Human umbilical cord-derived mesenchymal stem cells (hucMSCs) are particularly attractive cells for cellular and gene therapy in acute kidney injury (AKI). Adenovirus-mediated gene therapy has been limited by immune reaction and target genes selection

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