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Short Commentary

Stem Cells Administration in Cystic Kidney Animal Models: New Potential Therapeutic Approach

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Cystic Kidney Disease (CKD) represents a heterogeneous group of chronic disorders and the fourth leading cause of end stage renal disease. CKD incidence has been increasing every year for several decades [1,2]. Dialysis and kidney transplantation are often the only efficient treatments available for patients. This is the reason why, nowadays, CKD has a huge human and economic impact on society and healthcare [1,3].

In the last years, Mesenchymal Stromal Cell (MSC) has been widely used in preclinical studies as a promising treatment in numerous acute and chronic kidney disease [4]. In fact, the immunomodulatory capability and their anti-inflammatory and anti-apoptotic properties make the MSC a valid therapeutic approach [5-8]. Furthermore, MSC therapy may lead to lower public health costs. Lately, the focus has been set on the factors released by the cells in the media, such as chemokines, cytokines, angiogenic and growth factors and their role as new potential therapeutic factors.

To date, only two preclinical studies testing the therapeutic effect of allogenic MSC in CKD rat models have been published [9,10]. Both showed a beneficial amelioration of the renal function in PKC rats following MSC treatment.

In our recent study, we investigated and demonstrated for the first time the potential therapeutic effects of human MSC and their derived conditional media administration in the CKD animal model [11]. Human MSC can escape the host's immune system due to the immunomodulatory capability. For this reason and in the light of potential clinical application, we tested the therapeutic effect of two different types of human MSC and their derived conditioned media. Our results highlighted an amelioration of kidney function together with outstanding changes in the gene expression profile [11]. MSC's secreted factors, such a cytokines, could have led the reprogramming of metabolism related pathways together with the calcium signaling pathways and the resulting cyst size reduction. Major changes have been observed also in the immune related pathways, indicating a restoration of the maincellular physiological responses.

Despite the recent promising results provide the ground for new therapeutic approaches; further studies have to be performed to better understand the MSC and their derived conditioned media mode of action.

Moreover, even today, one of the major difficulties in planning such an experimental design is the lack of knowledge concerning the suitable administration route. The intravenous (i.v.) injection is so far the most common administration route yet by using this route cells might be trapped in the lungs with the risk of causing emboli [12-15]. To overcome this problem, in our study, we administrated the cell either by i.v. or intraperitoneal (i.p.) injection. We demonstrated that i.p. is safety and efficient alternative route for cell administration.

In order to achieve the most desired outcome, further studies have to be performed to assess the proper cell dose as well.

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