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Approaching Chronic Inflammation through the Therapeutic Use of Mesenchymal Stem Cells

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Commentary

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Commentary to editorial

One of the greatest discoveries in the clinical area is the fact that most of the ailments have an inflammatory unbalance foundation, usually caused by a non-treated chronic inflammation. Besides the clear example of autoimmune diseases, metabolic conditions such as diabetes, degenerative conditions including arthritis and even the development of cancerous cells, have been linked to a dysfunction of the immune system [1,2]. Conventional treatments of these conditions have mainly focused on the effects given a false sense of cure, and most of the patients keep experiencing the ailment since treatments fail to treat the root cause or effectively promote tissue regeneration. Recently, the use of biologic drug therapies aiming to halt the production of proinflammatory cytokines have been used with moderate results. Replacement proteins, cytokines, hormones and monoclonal antibodies drugs are among the most researched and commercially used. However, the complexity of molecular interactions within the patient's microenvironment poses a serious challenge for distinct illnesses [3].

In the last few decades, the scientific community has made great research in the pursuit of new approaches to treat several conditions, especially those with underlying chronic inflammation causes. The use of mesenchymal stem cells (MSC) might be the answer to immunomodulate the overreaction of the patient's immune system, as well as to promote regeneration of damaged tissue. After the studies presented by Friedenstein group during the 70's, research on these type of cells gained weight in the scientific field. As new investigations and findings have been made, the concept of "mesenchymal stem cells" proposed by Caplan *et al*. [4] has been transformed nowadays to cover a more complex and diverse group of cells. MSC are often debated along with the terms "multipotent", "stromal", and depending on the school of ideas one name is preferred to the other. However, for clinical purposes, the term MSC has been used indistinct, since the therapeutic observations are reliable. Although several therapeutic properties have been described, the immunomodulation effect of MSC both *in vitro* and *in vivo* appears to be the most researched and the potential answer to distinct conditions. Naji et al. [6] have reported a great overview of the medical conditions treated with mesenchymal stem cells, including clinical trials and worldwide prevalence [4-6].

MSC display a remarkable capability to promote a suppressive response within the patient's immune system via the activation of biochemical cascades, including NF-kB and PI3K/AKT while promoting the polarization of the anti-inflammatory macrophage type 2. MSC could influence macrophages to polarize into M2 type, leading to the expression of antiinflammatory cytokines and eventually the regulation of the inflammatory process [7]. Besides macrophages, several studies have reported the ability of MSC to modulate T cell, B cells and DC cells, among other cells from the immune system. Of special interest is that this cellular communication could be through cell-to-cell contact or the expression of soluble factors during intravenous infusion [8].

Finally, distinct clinical trials have been addressing the potential therapeutic use of MSC for a plethora of conditions (www.clinicaltrials.gov). MSC are usually extracted form healthy young donors of bone marrow, adipose tissue and umbilical cord where allogeneic therapy is regulated. Although differences in their differentiation capacity, as well as their marker expression and cytokine profile have been reported, these types of MSC are the most researched and clinical promoted as immunomodulatory agents in distinct conditions. Furthermore, the low immunogenicity MSC displayed *in vivo*, makes MSC therapy safe for the patient, as there is no rejection symptoms.

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Conflicts of Interests

Author declares that there is no conflicts of interest.

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