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Menstrual blood-derived stromal stem cells inhibit optimal generation and maturation of human monocyte-derived dendritic cells

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abstract

Introduction: Menstrual blood stromal stem Cells (MenSCs) have shown promising potential for future clinical settings. Nonetheless, data regarding their interaction with immune cells is still scarce. Here, we investigated whether MenSCs could affect the generation and/or maturation of human blood monocyte-derived dendritic cells (DCs).

Materials and methods: MenSCs were isolated from menstrual blood of normal women through culture of adherent mononuclear cells. Magnetically-isolated peripheral blood monocytes were differentiated toward immature DCs (iDC) and mature DCs (mDCs) in the presence or absence of MenSCs. Monocyte-derived cells were assessed for the percentage of monocyte-, iDC-, and mDC-specific markers as well as the expression of costimulatory molecules. IL-6 and IL-10 levels were also determined in supernatants of MenSC-monocytes cocultures.

Results: Optimal phenotypic differentiation of monocytes into iDCs was inhibited upon coculture with MenSCs. Moreover, higher levels of IL-6 and IL-10 were detected in these settings. Even though addition of MenSCs to iDC cultures could not prevent iDC maturation, coculture of MenSCs with monocytes from the beginning of differentiation process could effectively hinder generation of fully mature DCs.

Conclusion: This is the first study to address the inhibitory impact of MenSCs on generation and maturation of DCs. IL-6 and IL-10 could be partly held responsible for this effect. Given the central roles of DCs in regulation of immune responses, these results highlight the importance of further research on the potential modulatory impacts of MenSCs, as rather easily accessible and expandable stem cells, on the immune system-related cells.

1. Introduction

Utilization of stem cells has provided new perspectives on treatment of serious diseases such as autoimmunity, graft versus host disease (GVHD), and cancer. Stem cells are divided into two general categories: embryonic and adult stem cells. Embryonic stem cells possess a high proliferative capacity; nevertheless, their usage poses the risk of malignancies and therefore limits their clinical usage [1]. Adult stem cells, on the other hand, have been widely recovered from sources such as bone marrow [2], umbilical cord blood [3], and adipose tissue [4], and are considered to be of high clinical value. Nonetheless, utilization of these cells has also proved to be troublesome due to several limitations including invasive and difficult isolation methods, and rather limited proliferative and/or differentiating capacity in case of certain stem cell subsets.

Menstrual blood stromal stem cells (MenSCs), originate from the endometrial layer of uterus, and are known as a type of mesenchymal-like stem cell, with considerable potential for clinical applications; in fact, in some publications they are given

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