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Human peripheral blood monocytes in stem cell technology

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Human peripheral blood monocytes are a type of white blood cells that are derived from bone marrow and circulated in blood and spleen. They comprise about 4 to 8% of total leukocytes. Monocytes play an important role in the immune system as they can recognise danger signals. In addition, they perform phagocytic activity in response to the antigen. Monocytes produce macrophages and dendritic cells at the site of infection. As they are derived from bone marrow, they have the capability of differentiation. In other words, they can be used as adult stem cells or somatic stem cells. They have certain practical advantages over adult stem/progenitor cells, which make them applicable for clinical use on a wide level. Monocytes can differentiate into a whole organ and this is termed pluripotency. They are easily accessible by using a low-invasive procedure and can be readily maintained in culture. Monocytes can be applied to patients in both autologous and allogeneic settings, which fulfils the need for immunosuppression. Further, monocytes have limited proliferative capacity and they lack telomerase reverse transcriptase. This leads to a low risk of tumorigenicity. However, there are a few disadvantages of using monocytes, namely limited number in blood circulation, low proliferation potential in vitro, and varying differentiation potential into specialised cell types. These challenges offer an opportunity for further research in the enhancement of cell proliferation potential and the maintenance of their differentiation potential towards desired cell types. This research could lead to the use of human peripheral blood monocytes in regenerative medicine and tissue engineering.

Keywords: Human peripheral blood monocytes, Stem cell technology, Pluripotency, Regenerative medicine, Tissue engineering

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