Stem Cell Expansion in Culture

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Hematopoietic stem cells are used for treating blood related-diseases such as leukemias, lymphomas, hereditary anemias and bone marrow failures. They can be retrieved from the bone marrow, cytokine mobilized peripheral blood and umbilical cord blood. It has been found that at times, there are not enough stem cells retrieved from the various sources mentioned above. In order to resolve this problem, the number of stem cells would need to be increased, eg. in culture. The Wnt/b-Catenin signalling pathway has been found responsible for the proliferation of stem cells. This led to the testing of Fzd10, along with Wnt3a and Wnt4 proteins. More specifically, the experiment examined the possibility of the proliferation of the stem cells in an in vitro setting. Bone marrow cells were transfected with the Fzd10 gene and placed in culture with the addition of Wnt proteins. Flow cytometry protocol was used to analyze the amount of cells in stem and progenitor cell populations. The results show that the number of control stem cells, cells not containing Fzd10 gene, with the addition of Wnt3a and Wnt4 doubled after 48 hours in culture. This was compared to the Fzd10 stem cells which only slightly increased or remained stable after 48 hours of stimulation with Wnts. This research may be a step toward improving bone marrow transplants and increasing the number of stem cells to enter the recipient's body. This in turn would lead to a greater production of blood cells in the damaged bone marrow and a faster rehabilitation process from therapeutic treatments.

Awards Won: