Targeting Novel Regulator for Improved Hematopoietic Stem Cells Generation

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Overview

A potential method of generating hematopoietic stem cells for transplantation by inhibiting CD74.

Summary

Hematopoietic stem cells (HSCs) originate in the bone marrow and are the progenitors of all hematopoietic cells. HSCs have the capacity to both self-renew and to differentiate, and they migrate from the bone marrow to the blood upon demand. Since HSCs can differentiate to a variety of cell types, including immune system cells, they have a huge therapeutic potential. Indeed, bone marrow transplantation is a common practice to treat a variety of diseases, such as cancers and autoimmune disorders.

Two key proteins, CD74, a cell surface protein receptor, and the cytokine macrophage migration inhibitory factor (MIF), its respective agonist, were found to be crucial in the regulation of cell proliferation and survival.

The research team of Prof. Shachar discovered that by manipulating these two proteins they could improve the properties of HSCs. These modified HSCs exhibit increased survival, renewal, and migratory capacities, making the present technology a possible therapeutic tool for patients in need.

Applications and Advantages

- Increase HSC survival and renewal â€“ while reserving their ability to differentiate to different cell lineages.
- Improved therapy â€“ for conditions that require high HSC function, such as bone marrow transplantation.
- Better mobility â€“ improved exit of HSC from bone marrow to the blood.

Development Status

Prof. Shachar and her team discovered that CD74 and MIF is integral in regulating the maintenance of the HSCs. Reducing the expression of the proteins leads to induced survival of HSC cells and accumulation of quiescent and proliferating cells. Using a variety of in vitro and in vivo models the team showed that inhibiting CD74 resulted in improved renewal, survival, and motility of HSC.

Patent Status

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