**Improving Survival and Expansion of Hematopoietic Stem Cells:**

**A Method for Improving Survival and Expansion of Hematopoietic Stem Cells**

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| **Project Number:** | 1874 |
| **Principal Investigator:** | Prof. Idit Shachar |
| **Patent Status:** | Pending |

**Overview**

**A method for increasing survival and expansion of hematopoietic stem cells by modulating the activity of two HSC proteins.**

**Background and Unmet Need**

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.

**The Innovation**

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

**The Technical Essence:**

Prof. Shachar and her team discovered that two key proteins, CD74 (a cell surface receptor) and macrophage migration inhibitory factor (MIF, the respective agonist) are integral in regulating the maintenance of the HSCs. Their absence lead to induced survival of these cells and accumulation of quiescent and proliferating cells. Using a variety of *in vitro* and *in vivo* models the team showed that Inhibiting these molecules resulted in improved renewal, survival, and motility of HSC. Additional details with regard to this technology can be obtained based on a non-disclosure agreement (NDA).

**Applications and Advantages:**

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

**Development Status**

Prof. Shachar and her team have shown *in vitro* that mice hematopoietic stem and progenitor cells (HSPC) proliferate and differentiate better when CD74 is suppressed compared to *WT* cells. Accordingly, a similar affect was observed in MIF negative mice. *In vivo*, the team has shown, in mice models, that CD74 negative HSPCs demonstrate enhanced long-term self-renewal capacity compared to *WT* HSPCs.

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