A novel self-inactivating alpharetroviral vector-based gene therapy strategy for IL7RA deficient severe combined immunodeficiency

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The ARISE project (short for "AlphaRetroviral for IL7RA-SCID Eradication ") aims to develop a safe and effective gene therapy for individuals suffering from a rare but very severe immunodeficiency known as IL7RA-deficient severe combined immunodeficiency (SCID). In this condition, the IL7 receptor does not function properly, leading to severe impairment of the immune system. Affected children have almost no functional T-cells, which are essential for fighting infections, and without treatment, they often do not survive beyond their first year of life.

The current standard treatment is a bone marrow transplant (BMT). However, even if a suitable donor is found, the procedure carries significant risks. The mortality rate is 26%, and many survivors face long-term health issues, such as rejection of the donor marrow, graft-versus-host disease, or a weakened immune response.

Gene therapy could be a life-saving alternative to BMT. Unfortunately, no gene therapy currently exists for IL7RA-SCID, as the disease is extremely rare, resulting in limited industrial investment. Additionally, the role of IL7RA in immune signaling is complex, making the development of gene therapy particularly challenging.

The goal of ARISE is to develop an innovative gene therapy using a specialized alpharetroviral vector to repair the defective IL7RA gene in the patient's stem cells. This would enable affected children to develop a fully functional immune system, providing lifelong protection against infections. This gene therapy could offer a safe and permanent solution without the risks and complications associated with bone marrow transplantation.