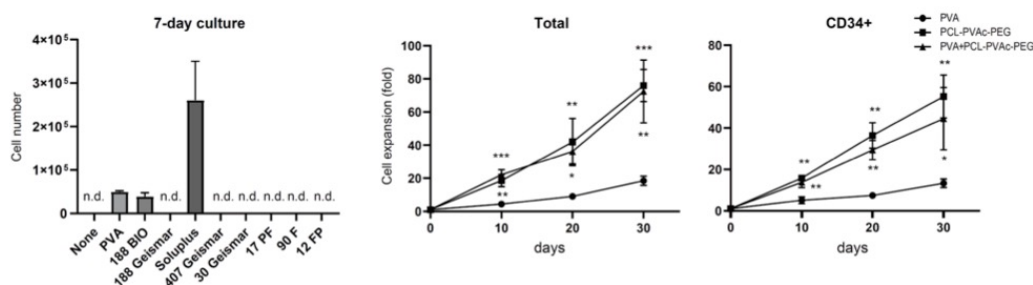


Hematopoietic stem cells (HSCs) are a rare cell type that reconstitute the entire blood and immune systems following transplantation. This represents a curative cell therapy for a variety of hematological diseases. However, the low number of HSCs makes both biological analyses and clinical application difficult, and the limited ability to expand human HSCs *ex vivo* remains a substantial barrier to the wider and safer therapeutic use of HSC transplantation. While various reagents have been tested in attempts to stimulate human HSC expansion, cytokines have long been thought to be essential for supporting HSCs *ex vivo*. Here we report the establishment of a novel culture system that supports the long-term *ex vivo* expansion of human HSCs, achieved through the complete replacement of cytokines and albumin with chemical agonists and a caprolactam-based polymer. We discovered that a phosphoinositide 3-kinase activator in combination with a thrombopoietin receptor agonist and the pyrimidoindole derivative UM171 were sufficient to stimulate expansion of umbilical cord blood (CB) HSCs. The optimized conditions expanded engraftable hematopoietic stem and progenitor cells by ~1500-fold during a 30-day *ex vivo* culture and also supported clonal expansion. We envision that this chemically-defined expansion culture system will help to advance clinical HSC therapies.

“Soluplus” based medium can expansion of human HSCs *ex vivo*



50 fold expansion was possible using Soluplus!