Novel Buoyancy Based Cell Selection: X-BACS™ Technology

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Introduction

New developments in cell biology and genetic engineering have revolutionized the field of medicine with the greatest impact observed in the field of Immuno-oncology. Efficient isolation of desired cell populations is the cornerstone in the development of manufacturing and quality control processes for emerging cell therapies. We have developed a buoyancy based cell selection method that isolates desired cell populations from a mixture of cell types, such as mononuclear cell (MNC) fraction preparations from whole blood. Using this method, we have efficiently recovered highly pure populations of T-cells (95%) with good yield (85%). The method is simple to execute with standard laboratory equipment.

Materials and Methods

Peripheral Blood (PB) units were purchased from BloodSource, Mather, CA. MNC fractions were prepared using both Ficoll-Hypaque density gradient centrifugation or, as an alternative, the X-LAB™ System.

Both MNC fractions were used to select CD3+ T-Cells using BACS technology. MNC fractions were incubated with CD3 antibody for 30 minutes, followed by microbubble reagent for 20 minutes. Following incubation, the target and non-target fractions were separated using centrifugation.

Results

Whole blood units (n=4) were split among three (3) independent users and each recovered MNCs using both Ficoll-Hypaque gradient centrifugation as well as with the X-LAB System.

CD3+ T-cells were selected from both MNC fractions using the X-BACS System. A mean CD3+ recovery of 83.5%, 96.3% viability and 95.1% purity was obtained from Ficoll MNC fractions while a mean CD3+ recovery of 89.0%, 98.3% viability and 97.3% purity was obtained from X-LAB MNC fractions.

The overall percent (%) CD3+ cell recovery was calculated by multiplying percent (%) MNC recovery with percent (%) CD3+ BACS recovery. In summary, better CD3+ selection was obtained using the X-LAB System followed by BACS compared to Ficoll method followed by BACS.

Conclusions

We have developed a buoyancy based cell selection method that provides an efficient means of isolating a highly pure population of CD3+ T-cells (>95%) with good yield (>85%) and excellent viability (>95%).