Evaluation of the RoboSep Cell Separation System

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Introduction

Magnetic bead separation of T and B lymphocytes has been used in tissue typing laboratories for many years. We evaluated a new method of cell extraction using EasySep beads and the automated robotic instrument (Figure 1, StemCell Technologies). The RoboSep system can process 4 samples simultaneously requiring minimal manual set-up. This was compared to our current manual Dynabead method (Dynal).

Figure 1. Inside view of RoboSep

Methods

EasySep dextran-coated magnetic nanoparticles bind to target cells using bispecific Tetrameric Antibody Complexes (TAC). These complexes recognize both dextran and the cell surface antigen expressed on the target cell (Figure 2). The smaller size of the magnetic dextran iron particles allows for efficient binding to the TAC-labelled cells. Magnetically labelled cells are then separated from unlabelled cells using the EasySep magnet within the RoboSep instrument.

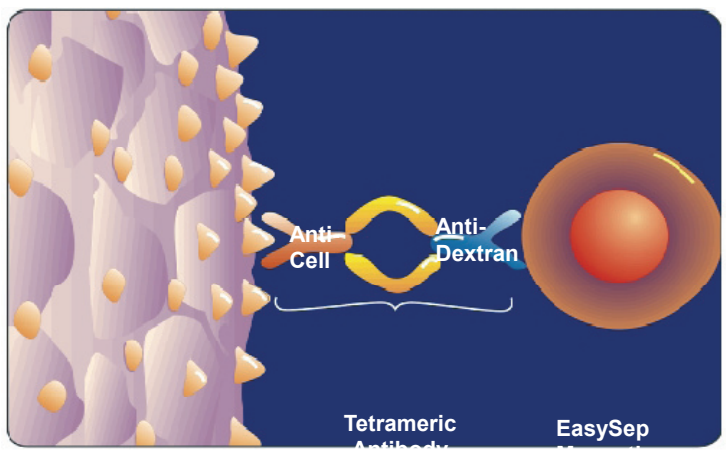

Figure 2. Schematic Drawing of EasySep® TAC Magnetic Labelling of Human Cells.

T and B cells were separated from the same routine samples for CDC crossmatch or serological typing using the manual Dynabead and the RoboSep automated EasySep methods. A total of seven samples included blood from patients with low white cell counts and samples which were up to 9 days old at the time of extraction.

Results

Approximately double the yield of T and B lymphocytes was achieved for every extraction from the same volume of blood for a variety of normal and poor quality samples using the RoboSep method compared to Dynabeads. For three samples the cell yield by RoboSep was sufficient for crossmatching whilst the yield using Dynabeads was insufficient. Comparison of crossmatch results of cells using each separation method showed no differences in sensitivity or specificity (Figure 3). Furthermore, the cells separated by the RoboSep method appeared to be stained brighter and were easier to read under the fluorescent microscope (Figure 4).

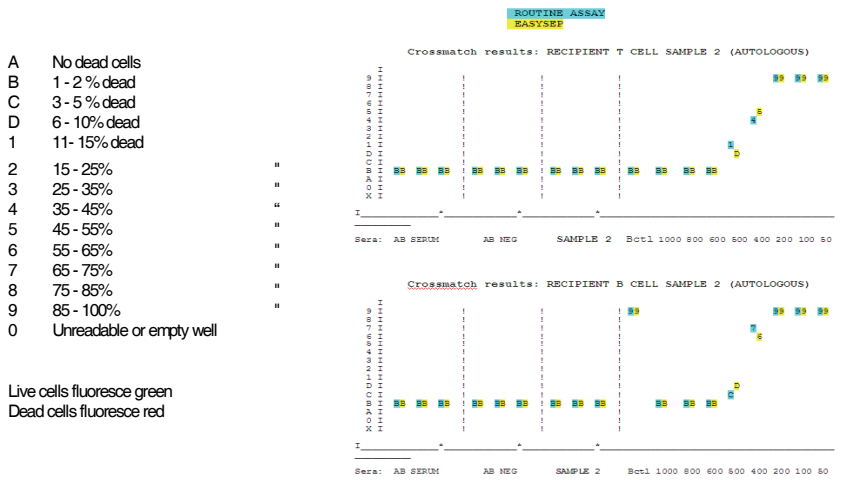

Figure 3. Comparison of crossmatch results - Dynabead and RoboSep methods

Dynabeads- Fewer cells and dull appearance

RoboSep- Double yield and brighter cells

Figure 4. Comparison of cell fluorescence intensity - Dynabead and RoboSep methods

Conclusions

Automation of T and B cell separation using RoboSep results in double the yield of lymphocytes from the same starting blood volume when compared to the manual Dynabead separation. Manual handling time required for cell separations is significantly reduced. Automation reduces the possibility of sample processing errors and contamination can be avoided due to the disposable tip system. In addition, frequent reagent validation can be minimized by ordering multiple kits of the same lot having a long shelf-life.