

**IOtest®
CD34-FITC**

REF IM1870
100 tests; 2 mL
20 µL / test



IOtest
Conjugated Antibody



ENGLISH	Specifications
Specificity	CD34
Clone	581
Hybridoma	NS0 x Balb/c
Immunogen	Human CD34 ⁺ leukaemic cells
Immunoglobulin	IgG1
Species	Mouse
Source	Ascites
Purification	Protein A affinity chromatography
Fluorochrome	Fluorescein isothiocyanate (FITC)
λ excitation	488 nm
Emission peak	525 nm
Buffer	PBS pH 7.2 plus 2 mg / mL BSA and 0.1% NaN ₃

USE

This fluorochrome-conjugated antibody permits the identification and numeration of cell populations expressing the CD34 antigen present in human biological samples using flow cytometry.

PRINCIPLE

This test is based on the ability of specific monoclonal antibodies to bind to the antigenic determinants expressed by leucocytes.

Specific staining of the leucocytes is performed by incubating the sample with the IOtest reagent. The red cells are then removed by lysis and the leucocytes, which are unaffected by this process, are analyzed by flow cytometry.

The flow cytometer measures light diffusion and the fluorescence of cells. It makes possible the delimitation of the population of interest within the electronic window defined on a histogram, which correlates the orthogonal diffusion of light (Side Scatter or SS) and the diffusion of narrow-angle light (Forward Scatter or FS). Other histograms combining two of the different parameters available on the cytometer can be used as supports in the gating stage depending on the application chosen by the user.

The fluorescence of the delimited cells is analyzed in order to distinguish the positively-stained events from the unstained ones. The results are expressed as a percentage of positive events in relation to all the events acquired by the gating.

EXAMPLES OF CLINICAL APPLICATIONS

The CD34 antibody is one of the best markers for haematopoietic stem and progenitor cells. This antibody can be used for the identification and numeration of CD34⁺ cells in peripheral blood, bone marrow, cord blood as well as in leukapheresis products (1, 2).

Expression of the CD34 antigen is not limited to haematopoietic progenitors. It is also found at the vascular endothelial cell level (3, 4).

The demonstration of the CD34 antigen on the surface of leukaemic cells aids in the classification of malignant blood disorders (5 – 8). CD34 is expressed in certain acute lymphoblastic and myeloblastic leukaemias (9, 10). In blast cell crises of CML, an increase in the percentage of cells expressing the CD34 antigen is observed (5 – 8).

STORAGE AND STABILITY

The conjugated liquid forms must be kept at between 2 and 8°C and protected from light, before and after the vial has been opened.

Stability of closed vial: see expiry date on vial.

Stability of open vial: the reagent is stable for 90 days.

PRECAUTIONS

1. Do not use the reagent beyond the expiry date.
2. Do not freeze.
3. Let it come to room temperature (18 – 25°C) before use.
4. Minimize exposure to light.
5. Avoid microbial contamination of the reagents, or false results may occur.
6. Antibody solutions containing sodium azide (NaN₃) should be handled with care. Do not ingest and avoid contact with the skin, mucosa and eyes.
Moreover, in an acid medium, sodium azide can form the potentially dangerous hydrazoic acid. If it needs to be disposed of, it is recommended that the reagent be diluted in a large volume of water before pouring it into the drainage system so as to avoid the accumulation of sodium azide in metal pipes and to prevent the risk of explosion.
7. All blood samples must be considered as potentially infectious and must be handled with care (in particular: the wearing of protective gloves, gowns and goggles).
8. Never pipette by mouth and avoid all contact of the samples with the skin, mucosa and eyes.
9. Blood tubes and disposable material used for handling should be disposed of in ad hoc containers intended for incineration.

SAMPLES

Venous blood or bone marrow samples must be taken using sterile tubes containing an EDTA salt as the anticoagulant. The use of other anticoagulants is not recommended.

The samples should be kept at room temperature (18 – 25°C) and not shaken. The samples should be homogenized by gentle agitation prior to taking the test sample.

The samples must be analyzed within 24 hours of venipuncture.

METHODOLOGY

NECESSARY MATERIAL NOT SUPPLIED

- Sampling tubes and material necessary for sampling.
- Automatic pipettes with disposable tips for 20, 100 and 500 µL.
- Plastic haemolysis tubes.
- Calibration beads. For example: Flow-Set™ Fluorospheres (Ref. 6607007).
- Red cell lysis reagent with washing stage after lysis. For example: VersaLyse™ (Ref. A09777).
- Leucocyte fixation reagent. For example: IOtest 3 Fixative Solution (Ref. A07800).
- Isotypic control: IOtest reagent. IgG1-FITC (Ref. A07795).

- Buffer (PBS: 0.01 M sodium phosphate; 0.145 M sodium chloride; pH 7.2).
- Centrifuge.
- Automatic agitator (Vortex type).
- Flow cytometer.

PROCEDURE

NOTE: The procedure below is valid for standard applications. Sample and/or VersaLyse volumes for certain Beckman Coulter applications may be different. If such is the case, follow the instructions on the application's technical leaflet. For each sample analyzed, in addition to the test tube, one control tube is required in which the cells are mixed in the presence of the isotypic control (Ref. A07795).

1. Add 20 µL of specific IOtest conjugated antibody to each test tube, and 20 µL of the isotypic control to each control tube.
2. Add 100 µL of the test sample to both tubes. Vortex the tubes gently.
3. Incubate for 15 to 20 minutes at room temperature (18 – 25°C), protected from light.
4. Then perform lysis of the red cells, if necessary, by following the recommendations of the lysis reagent used.
As an example, if you wish to use VersaLyse (Ref. A09777), refer to the leaflet and follow preferably the procedure called "with concomitant fixation", which consists of adding 1 mL of the "Fix-and-Lyse" mixture prepared extemporaneously. Vortex immediately for one second and incubate for 10 minutes at room temperature, protected from light.
If the sample does not contain red cells, add 2 mL of PBS.
5. Centrifuge for 5 minutes at 150 x g at room temperature.
6. Remove the supernatant by aspiration.
7. Resuspend the cell pellet using 3 mL of PBS.
8. Repeat step 5.
9. Remove the supernatant by aspiration and resuspend the cell pellet using:
 - 0.5 mL or 1 mL of PBS plus 0.1% of formaldehyde if the preparations are to be kept for more than 2 hours and less than 24 hours. (A 0.1% formaldehyde PBS can be obtained by diluting 12.5 µL of the IOtest 3 Fixative Solution (Ref. A07800) at its 10X concentration in 1 mL of PBS).
 - 0.5 mL or 1 mL of PBS without formaldehyde, if the preparations are to be analyzed within 2 hours.

NOTE: In all cases, keep the preparations between 2 and 8°C and protected from light.

PERFORMANCE

SPECIFICITY

Three classes of CD34 epitopes exist, defined by differential sensitivity to various enzymatic cleavages: the action of neuraminidase, of chymopapain and of Pasteurella haemolytica glycoprotease (11). The monoclonal antibody (mAb) 581 specifically recognizes a class III epitope resistant to these three enzymes. MAb 581 was assigned to CD34 during the 5th HLDA Workshop on Human Leucocyte Differentiation Antigens, held in Boston, USA, in 1993 (WS Code: MA027, Section M) (11).

LINEARITY

To test the linearity of staining of this reagent, a positive cell line (KG-1a) and a negative cell line (RPMI8866) were mixed in different proportions and with a constant final number of cells, so that the positive / negative cell line ratio of the mixture ranged from 0 to 100%. Aliquots were stained using the procedure described above and linear regression between the expected values and the observed values was calculated.

Specificity	Linear regression	Linearity (R ²)
CD34	$Y = 1.0053 X + 0.2077$	0.9997

EXPECTED VALUES

Each laboratory must compile a list of reference values based upon a group of healthy donors from the local population. This must be done by taking age, sex and ethnic group into account, as well as any other potential regional differences.

In our laboratories, the whole blood samples of 10 healthy adults were used. The results obtained for the count of the positive events of interest are given in the table below:

Lymphocytes	Number	Mean (%)	SD	CV (%)
CD34 ⁺	10	0.12	0.07	59.2

INTRA-LABORATORY REPRODUCIBILITY

On the same day and using the same cytometer, 12 measurements of the positivity of a sample containing positive cells (mixture of a positive cell line KG-1a and a negative cell line RPMI8866) were carried out. The results obtained are summarized in the following table:

Positive Cells	Number	Mean (%)	SD	CV (%)
CD34 ⁺	12	53.10	0.59	1.10

INTER-LABORATORY REPRODUCIBILITY

On the same day and on the same sample containing positive cells (mixture of a positive cell line KG-1a and a negative cell line RPMI8866), 12 measurements of the positivity were carried out by two technicians and the preparations analyzed using two different cytometers. The results obtained are summarized in the following tables:

Cytometer n° 1:

Positive Cells	Number	Mean (%)	SD	CV (%)
CD34 ⁺	12	53.10	0.59	1.10

Cytometer n° 2:

Positive Cells	Number	Mean (%)	SD	CV (%)
CD34 ⁺	12	53.16	0.60	1.16

LIMITATIONS OF THE TECHNIQUE

1. Flow cytometry may produce false results if the cytometer has not been aligned perfectly, if fluorescence spillover have not been correctly compensated for and if the regions have not been carefully positioned.
2. It is preferable to use a RBC lysis technique with a washing step as this reagent has not been optimized for "no wash" lysis techniques.
3. Accurate and reproducible results will be obtained as long as the procedures used are in accordance with the technical insert leaflet and compatible with good laboratory practices.
4. The conjugated antibody of this reagent is calibrated so as to offer the best specific signal/non-specific signal ratio. Therefore, it is important to adhere to the reagent volume/sample volume ratio in every test.
5. In the case of a hyperleucocytosis, dilute the specimen in PBS so as to obtain a value of approximately 5×10^9 leucocytes/L.
6. In certain disease states, such as severe renal failure or haemoglobinopathies, lysis of red cells may be slow, incomplete or even impossible. In this case, it is recommended to isolate mononucleated cells using a density gradient (Ficoll, for example) prior to staining.

MISCELLANEOUS

See the Appendix for examples and references.

TRADEMARKS

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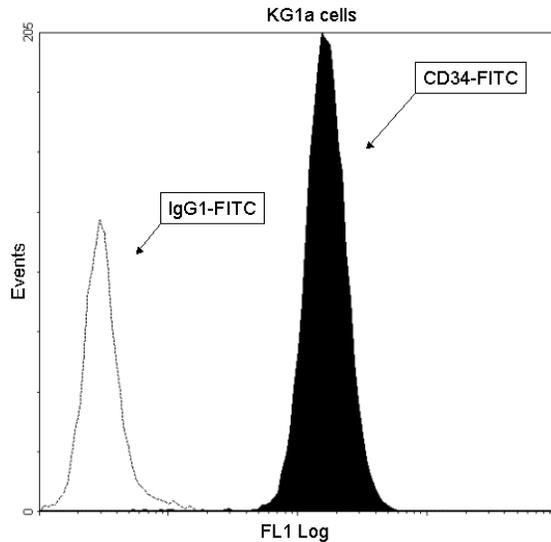


APPENDIX TO REF IM1870

EXAMPLE

The graph below is a monoparametric representation (Count versus Fluorescence Intensity) of KG-1a cell line. Staining is with IOTest CD34-FITC Conjugated Antibody (Ref. IM1870). Gate is on KG-1a cells. A mouse IgG1-FITC isotypic control (Ref. A07795) is shown in light.

Analysis is performed with CYTOMICS FC 500 equipped with CXP Software.



REFERENCES

1. Sutherland, D.R., Anderson, L., Keeney, M., Nayar, R., Chin-Yee, I., "The ISHAGE guidelines for CD34+ cell determination by flow cytometry", 1996, *J. Hematotherapy*, 5, 213-226.
2. Chin-Yee, I., Keeney, M., Anderson, L., Nayar, R., Sutherland, D.R., "Current status of CD34+ cell analysis by flow cytometry: the ISHAGE guidelines", 1997, *Clin. Immunol. Newsletter*, 2-3, 17, 22-29.
3. Fina, L., Molgaard, H.V., Robertson, d., Bradley, N.J., Monaghan, P., Delia, D., Sutherland, D.R., Baker, M.A., Greaves, M.F., "Expression of the CD34 gene in vascular endothelial cells", 1990, *Blood*, 12, 75, 2417-2426.
4. Delia, D., Lampugnani, M.G., Resnati, M., Dejana, E., Ajello, A., Fontanella, E., Soligo, D., Pierotti, M.A., Greaves, M.F., "CD34 expression is regulated reciprocally with adhesion molecules in vascular endothelial cells in vitro", 1993, *Blood*, 4, 81, 1001-1008.
5. Sutherland, Keating, A., "The CD34 antigen: structure, biology and potential clinical applications", 1992, *J. of Hematotherapy*, 1, 115-129.
6. Krause, D.S., Fackler, M.J., Civin, C.I., Stratford, M., "CD34: structure, biology and clinical utility", 1996, *Blood*, 1, 87, 1-13.
7. To, L.B., Haylock, D.N., Simmons, P.J., Juttner, C.A., "The biology and clinical uses of blood stem cells", 1997, *Blood*, 7, 89, 2233-2258.
8. Pui, C.H., Hancock, M.L., Head, D.R., Rivera, G.K., Look, A.T., Sandlund, J.T., Behm, F.G., "Clinical significance of CD34 expression in childhood acute lymphoblastic leukemia", 1993, *Blood*, 3, 82, 889-894.
9. Rothe, G., Schmitz, G., Adorf, D., Barlage, S., Gramatzki, M., Höffkes, H.G., Janossy, G., Knüchel, R., Ludwig, W.D., Nebe, T., Nerl, C., Orfao, A., Serke, S., Sonnen, R., Tichelli, A., Wörmann, B., "Consensus protocol for the flow cytometric immunophenotyping of hematopoietic malignancies", 1996, *Leukemia*, 10, 877-895.
10. Stewart, C.C., Behm, F.G., Carey, J.L., Cornbleet, J., Duque, R.E., Hudnall, S.D., Hurtubise, P.E., Loken, M., Tubbs, R.R., Wormsley, S., "U.S. Canadian consensus recommendations on the immunophenotypic analysis of hematologic neoplasia by flow cytometry: selection of antibody combinations", 1997, *Cytometry*, 30, 231-235.
11. Greaves, M.F., Tittley, I., Colman, S.M., Bühring, H.-J., Campos, L., Castoldi, G.L., Garrido, F., Gaudernack, G., Girard, J.-P., Inglès-Esteve, J., Invernizzi, R., Knapp, W., Lansdorp, P.M., Lanza, F., Merle-Béral, H., Parravicini, C., Razak, K., Merle-Béral, H., Parravicini, C., Razak, K., Ruiz-Cabello, F., Springer, T.A., van der Schoot, C.E., Sutherland, D.R., "CD34 cluster workshop report", 1995, *Leucocyte Typing V, White Cell Differentiation Antigens*. Schlossman, S.F., et al., Eds., Oxford University Press, p. 840-846.