Stability of closed vial: see expiry date on vial.

Before and after the vial has been opened, store the reagent between 2 and 8°C and protected from light.

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 unstrained ones. The results are expressed as a percentage of positive events in relation to all the events acquired by the gating.

**USE**

This fluorochrome-conjugated antibody permits the identification and enumeration of cell populations expressing the CD45 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 unstrained 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 CD45 molecule and its various isoforms have a variable degree of expression on lymphoid (1-3) or myeloid cells (4). This expression correlates with the stage of differentiation of the cells studied. Thus, characterization of the density of expression of CD45 is useful for discriminating between normal and malignant leucocytic cells (2, 4-7).

The density of expression of CD45 is weak in normal and malignant leucocytic cells (2, 4-7). CD45 is useful for discriminating between different differentiation stages of the cells studied. Thus, the expression correlates with the stage of differentiation of the cells.

**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.
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.

**APPLICATIONS**

**EXAMPLES OF CLINICAL APPLICATIONS**

The CD45 molecule and its various isoforms have a variable degree of expression on lymphoid (1-3) or myeloid cells (4). This expression correlates with the stage of differentiation of the cells studied. Thus, characterization of the density of expression of CD45 is useful for discriminating between normal and malignant leucocytic cells (2, 4-7).

The density of expression of CD45 is weak in normal and malignant leucocytic cells (2, 4-7). CD45 is useful for discriminating between different differentiation stages of the cells studied. Thus, the expression correlates with the stage of differentiation of the cells.

**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.

**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.

1. Add 10 µL of specific IOTest® conjugated antibody to each test tube, and 10 µL of the appropriate 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 “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.
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 IOTest3 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

MAb J33 stains all the isoforms of the CD45 molecule (180–220 kDa) and is therefore referenced as a pan-leucocyte marker. MAb J33 was assigned to CD45 during the 3rd HLDA Workshop on Human Leucocyte Differentiation Antigens, held in Oxford, England, in 1986 (Code WS: 818, Section NL) (11).

LINEARITY

To test the linearity of staining of this reagent, a positive cell line (NAMALWA) and a negative cell line (FRN3.4.14) were mixed in different proportions 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.

<table>
<thead>
<tr>
<th>Specificity</th>
<th>Linear regression</th>
<th>Linearity (R²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD45</td>
<td>Y = 0.9604 X + 0.561</td>
<td>0.9996</td>
</tr>
</tbody>
</table>

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 50 healthy adults were used. The results obtained for the count of the positive events of interest are given in the tables below:

<table>
<thead>
<tr>
<th>Lymphocytes</th>
<th>Number</th>
<th>Mean (%)</th>
<th>SD</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD45</td>
<td>50</td>
<td>93.69</td>
<td>4.44</td>
<td>4.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lymphocytes</th>
<th>Number</th>
<th>Mean (%)</th>
<th>SD</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD45⁺</td>
<td>12</td>
<td>99.02</td>
<td>0.21</td>
<td>0.21</td>
</tr>
</tbody>
</table>

INTRA-LABORATORY REPRODUCIBILITY

On the same day and using the same cytometer, 12 measurements of the positivity of a sample containing positive cells (peripheral blood from the same donor) were carried out. The results obtained are summarized in the following table:

<table>
<thead>
<tr>
<th>Lymphocytes</th>
<th>Number</th>
<th>Mean (%)</th>
<th>SD</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD45⁺</td>
<td>12</td>
<td>99.02</td>
<td>0.21</td>
<td>0.21</td>
</tr>
</tbody>
</table>

INTER-LABORATORY REPRODUCIBILITY

On the same day and on the same sample containing positive cells (peripheral blood from the same donor), 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:

<table>
<thead>
<tr>
<th>Lymphocytes</th>
<th>Number</th>
<th>Mean (%)</th>
<th>SD</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD45⁺</td>
<td>12</td>
<td>99.89</td>
<td>0.07</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Cytometer n° 2:

<table>
<thead>
<tr>
<th>Lymphocytes</th>
<th>Number</th>
<th>Mean (%)</th>
<th>SD</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD45⁺</td>
<td>12</td>
<td>98.62</td>
<td>0.52</td>
<td>0.53</td>
</tr>
</tbody>
</table>

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 x 10⁹ 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.
7. CD45-negative or very weakly-positive acute lymphoblastic leukaemia have been described. For these, the lymphocytic origin of the blast cells should be confirmed using other markers.

MISCELLANEOUS

See the APPENDIX for EXAMPLES and references.

TRADEMARKS

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APPENDIX TO REF IM2473

EXAMPLES

The graph below is a biparametric representation (Side Scatter versus Fluorescence Intensity) of lysed normal whole blood sample. Staining is with IOTest CD45-APC Conjugated Antibody (Ref. IM2473). All leukocytes are represented.

Acquisition and analysis are performed with a CYTOMICS FC 500 flow cytometer equipped with CXP Software.

REFERENCES