BD Biosciences Nucleic Acid Dyes

Features

- Applicable for DNA content analysis, viability analysis, and as nuclear counterstains
- Multitude of colors allows for easier panel design for multicolor flow cytometry and multiparameter immunofluorescence imaging

Available for multiple laser lines

BD Biosciences offers a rainbow of nucleic acid dyes for DNA content analysis, viability analysis, and immunofluorescence imaging for use with multiple laser lines (Table 1).

- BD Pharmingen™ DAPI Solution and BD Pharmingen™ Hoechst 33342 Solution are available for the UV or violet lasers.
- BD Via-Probe™ Green is available for the blue laser.
- BD Pharmingen™ Propidium Iodide Staining Solution (PI) and BD Pharmingen™ 7-Amino-Actinomycin D (7-AAD) are available for the yellow-green or blue lasers. BD Pharmingen™ DRAQ5™ and DRAQ7™ are excited by both the yellow-green and red lasers, and BD Via-Probe™ Red is available for the red laser. Together, these dyes provide maximum flexibility for multicolor flow cytometry and immunofluorescence imaging.

Tools to monitor cell cycle and DNA content

In fixed and permeabilized samples, BD Biosciences nucleic acid dyes bind stoichiometrically to DNA, allowing a quantitative assessment of DNA content and correlation with the cell cycle phase. Combined with the power of single cell analysis provided by flow cytometry, a heterogeneous population of cells can be assessed for the cell cycle status of individual cells (Figure 1). Membrane-permeable nucleic acid dyes, such as Hoechst 33342 and DRAQ5, can also be used to assess DNA content in unfixed cells.

Increased flexibility in viability analysis

BD Biosciences membrane-impermeable nucleic acid dyes include DAPI, BD Via-Probe Green, PI, 7-AAD, DRAQ7, and BD Via-Probe Red. Because these dyes cannot cross intact cell membranes, they are excluded from live cells and stain dead cells brightly. This allows the dyes to be used for viability analysis conveniently and easily, in a no-wash flow cytometry assay amenable to multiple laser lines. The dyes also can be used for multiplexing with surface marker antibodies and other apoptosis and viability probes (Figure 2).

Compatible with high parameter immunofluorescence imaging

The breadth of nucleic acid dyes offered, combined with our BD Horizon Brilliant™ Violet dyes, enables easy immunofluorescence imaging of up to five colors simultaneously (Figure 3). BD Biosciences nucleic acid dyes also are compatible with common imaging fluorochromes such as the Alexa Fluor® dyes. This enables robust high parameter immunofluorescence imaging.

Figure 1. DNA Content Analysis in Jurkat Cells

Jurkat cells (ATCC, TIB-152) were fixed and permeabilized with ice-cold, 70% ethanol and then stained with BD Pharmingen™ DAPI Solution (Cat. No. 564907), BD Pharmingen™ Propidium Iodide Staining Solution (Cat. No. 556463), BD Pharmingen™ DRAQ7™ (Cat. No. 564904), or BD Via-Probe™ Red (Cat. No. 565804) in PBS with 0.25 mg/mL of RNase, and then analyzed using the violet (BV421 filter set), blue (FITC filter set), yellow-green (PE-Cy®7 filter set), or red (APC filter set) lasers, respectively. All samples were acquired using a BD LSRFortessa™ cell analyzer, and histograms were derived from gated events based on light scattering characteristics of cells. Cells with 2N DNA content (first peak) are in the G0 or G1 phases, cells with 4N DNA content (second peak) are in the G2 or M phases, and cells with DNA content between 2N and 4N are in the S phase. All four dyes provide resolution of cell cycle status, enabling analysis across multiple laser lines. For multiplexing with specificities or fluorochromes that might be denatured by ethanol treatment, equivalent DNA content histograms can also be generated using the BD Pharmingen™ Transcription Factor Buffer Set (Cat. Nos. 562725, 562574) (data not shown).
BD Biosciences Nucleic Acid Dyes

BD flow cytometers are Class 1 Laser Products.

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Table 1. Nucleic Acid Stains Offered by BD Biosciences

<table>
<thead>
<tr>
<th>Description</th>
<th>DNA Content</th>
<th>Excitation Laser</th>
<th>Fluorescence Channel</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD Pharmingen Hoechst 33342 Solution</td>
<td>✓</td>
<td>UV/Violet</td>
<td>DAPI (UV/V421) (V)</td>
<td>561908</td>
</tr>
<tr>
<td>BD Pharmingen DRAQ5™</td>
<td>✓</td>
<td>UV/Violet</td>
<td>DAPI (UV/V421) (V)</td>
<td>564902, 564903</td>
</tr>
<tr>
<td>BD Pharmingen DAPI Solution</td>
<td>✓</td>
<td>UV/Violet</td>
<td>DAPI (UV/V421) (V)</td>
<td>564907</td>
</tr>
<tr>
<td>BD Via-Probe Green Nucleic Acid Stain</td>
<td>✓</td>
<td>UV/Violet</td>
<td>Blue</td>
<td>565799, 565802</td>
</tr>
<tr>
<td>BD Pharmingen Propidium Iodide Staining Solution</td>
<td>✓</td>
<td>YG/Blue</td>
<td>PE</td>
<td>556463, 550825</td>
</tr>
<tr>
<td>BD Pharmingen 7-AAD</td>
<td>✓</td>
<td>YG/Blue</td>
<td>PerCP-Cy™5,5</td>
<td>559925, 555815, 555806</td>
</tr>
<tr>
<td>BD Via-Probe Red Nucleic Acid Stain</td>
<td>✓</td>
<td>Red</td>
<td>APC</td>
<td>565803, 565804</td>
</tr>
<tr>
<td>BD Pharmingen DRAQ7™</td>
<td>✓</td>
<td>Red/7G</td>
<td>Alex Fluor®700/PE-Cy7</td>
<td>564904</td>
</tr>
</tbody>
</table>

*For viability in fixed cells, please see our BD Horizon™ Fixable Viability Stains.
†DRAQ5 and DRAQ7 are also suboptimally excited by the blue laser.
‡When bound to dsDNA.

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