

Automation of Cell Staining

Using the Biomek 4000 Laboratory Automation Workstation

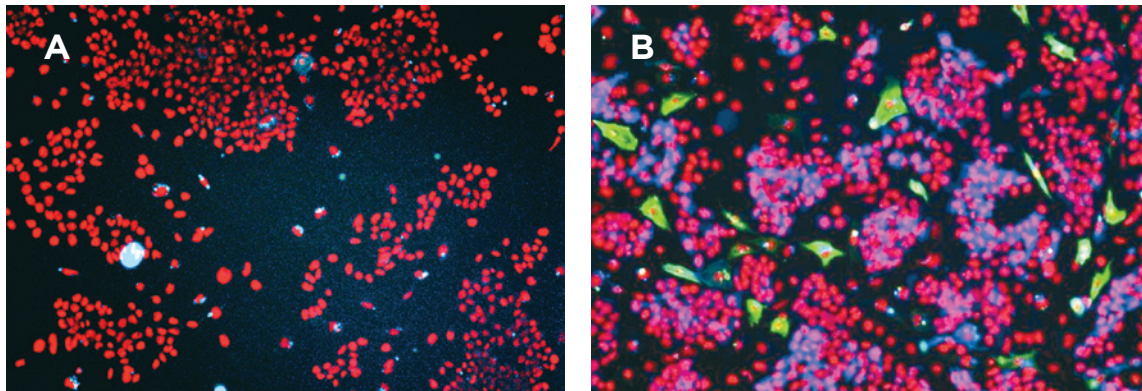
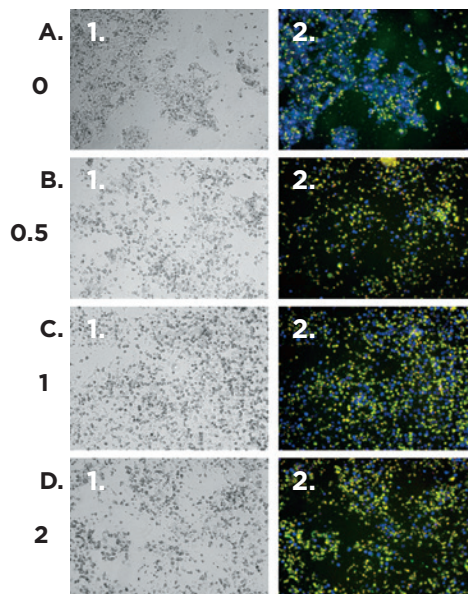


Figure 1. Intracellular staining of stem cell markers using PerFix-nc reagents.

Manual cell staining of cardiomyocytes, either to characterize antigen expression or to assess cell health, is labor-intensive and time-consuming. Here we demonstrate automation strategies using the Biomek 4000 Laboratory Automation Workstation that provide: 1) well-resolved and reproducible

detection of intracellular markers in murine embryonic stem cells and differentiated cardiomyocytes using PerFix-nc fixation and permeabilization reagents with a no-wash protocol and 2) walk-away apoptosis analysis by automating staining with annexin V-fluorescein and 7- AAD.

All liquid handling steps were performed on a Biomek 4000 Laboratory Automation Workstation. Sixteen wells required less than an hour to prepare for imaging. Cells were stained with either isotype controls (A) or with myosin heavy chain (green, B) and Nanog (blue, B). DAPI (red) was used to mark the locations of nuclei.



- Rapid Cell Preparation Time – The Biomek 4000 Workstation provides walk-away automation of the cell staining process of 16 wells in approximately 1 hour.
- Flexible Automation – Applicable to a number of different cell staining procedures.

Figure 2. Annexin V-FITC/7-AAD staining on staurosporine treated mouse ES cells. A) Examples of images from control and staurosporine-treated mouse ES cells. Staurosporine (0, 0.5, 1 & 2 μ M) treated mouse ES cells images: (A1-D1) transmitted light images; (A2-D2) composited images with Annexin V-FITC (green), 7-AAD (red) and Hoechst33342 (blue).

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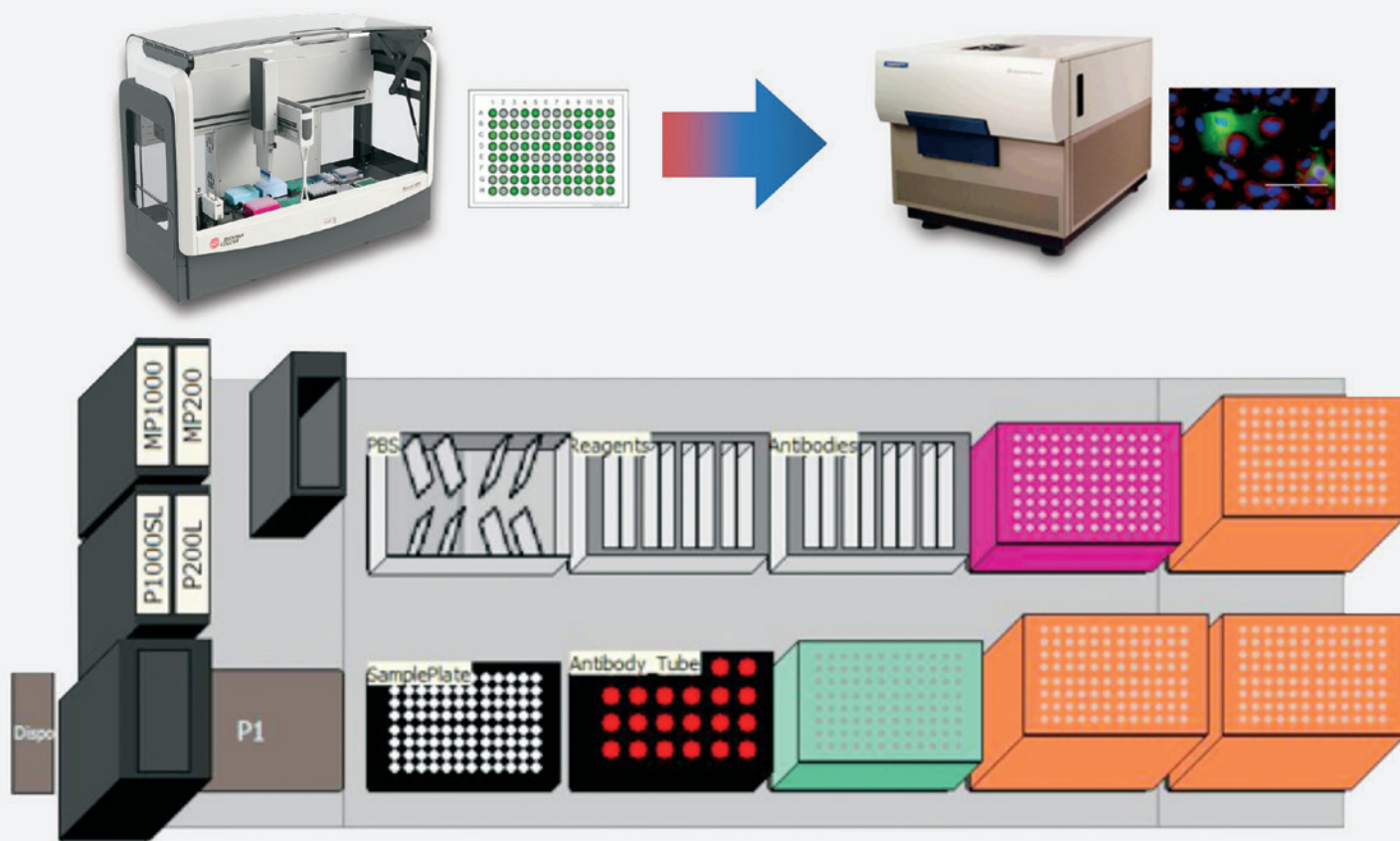


Figure 3. Shown above is the Biomek 4000 Laboratory Automation Workstation and Molecular Devices ImagerXpress system for Cell Staining. Workflow and deck layout for automated cell staining using the Biomek 4000 Laboratory Automation Workstation.

SUMMARY

This work demonstrates that cell staining sample preparation workflows can be automated with relatively standard components and process steps on our new Biomek 4000 Laboratory Automation Workstation. Automation can achieve preparation timesavings with large numbers of samples while maintaining at least equivalent results and precision compared with manual processing. As a result, it is possible to perform large cell staining studies in an expandable manner with walk-away capability.