Accelerate your scientific discoveries

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Accelerate your scientific discoveries

Introduction

Beckman Coulter Life Sciences and Molecular Devices provide customers with a complete end to end automation solution. This ebook details a variety of application based workflows that are automated to increase throughput and save time.

Table of Contents

Automated protein applications

Accurate and sensitive quantitation and purification of proteins is critical to many experiments. Signal expression through protein modification is at the core in understanding developmental pathways within the cell. Purified complexes are often used in downstream analyses such as high-resolution imaging, sequencing, or crystallography for discovery of protein-based therapeutics.

However, purification of protein:ligand complexes remains challenging due to the lack of robust, reproducible separation techniques. Linear (also known as continuous) rate-zonal density gradients are formed in several ways, but the process always starts with layering a discontinuous (also known as step) gradient. Layering techniques are tedious and time-consuming and are often not reproducible among researchers, requiring practice and a whole lot of patience to generate strong interfaces between densities.

Similarly, ELISA assays when done manually can cause errors in detection due to lack of precision with inconsistent washing and incubation times.

The Biomek 4000 Workstation provides consistent and reproducible automated results in layering discontinuous density gradients. The Biomek 4000 Workstation offers ease of use and outstanding precision in liquid handling. One primary difference is that the machine does the work and doesn't require a researcher to be present. During these methods, you can walk away from the machine and perform other tasks, such as data analysis or grant writing.

Automating Bradford assays—reliable results with less effort

In this application note we demonstrate the automated preparation (Figure 1) and analysis of Bradford protein assay samples using a Biomek NX^{P} Workstation with an integrated EMax® Plus Microplate Reader (Figures 2 and 3). Excellent replication consistency and standard curve linearity (Figure 4 and Table 1) were seen with this fully automated solution.

Reliable results, less effort

- ✓ Increase reliability by reducing user-to-user variability and minimizing the opportunity for errors
- ✓ Reduce sample preparation time to just minutes for set-up on the automated system with increased time savings as sample throughput increases

Read the complete application note

Learn more about the components:

- **Biomek NX^{P} Workstation**
- **EMax Plus Microplate Reader**
- **MultiWash™+ Microplate Washer**

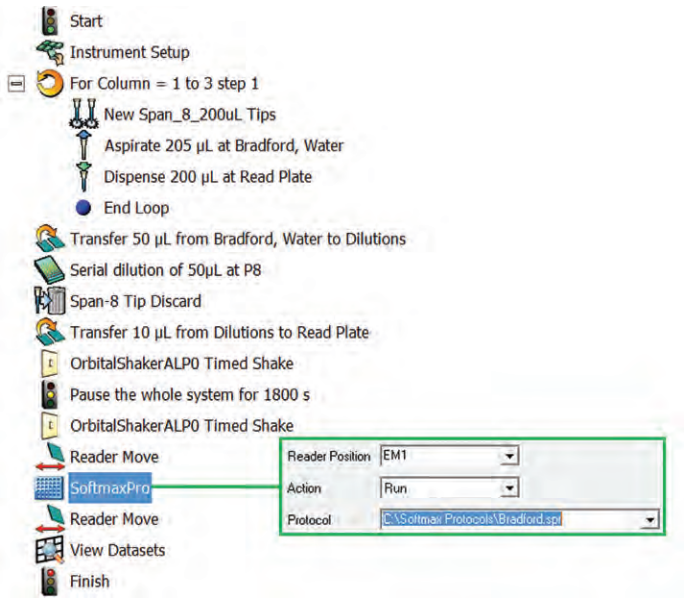

Figure 1. Automated protein quantification assay. Screen capture showing the Biomek method for preparation of a standard curve (Serial Dilution step) and reagent addition. The highlighted SoftmaxPro step allows the user to select a pre-defined SoftMax® Pro software protocol to control the plate analysis on the EMax Plus Microplate Reader.

Figure 2. Image of the deck of the Biomek NX^{P} Workstation with the integrated EMax Plus Microplate Reader (left) and the MultiWash+ Microplate Washer (rear, not used for this assay) from Molecular Devices. The workstation's rotating gripper is used to place plates on the integrated instruments, removing the requirement for user intervention.

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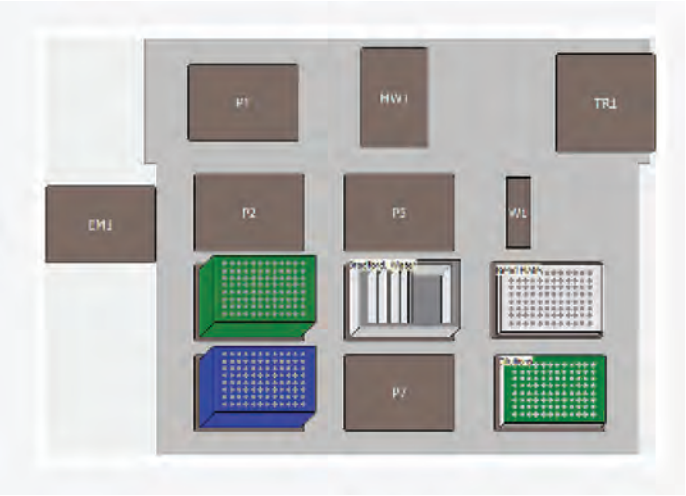


Figure 3. Screen shot of the deck layout for the Bio-Rad Protein Assay. The serial dilution is executed in the "Dilutions" plate and the protein assay is executed in the "Read Plate", which is positioned on an orbital shaker. Following incubation, this plate is transported to the EMax Plus Microplate Reader at position "EM1" for analysis.

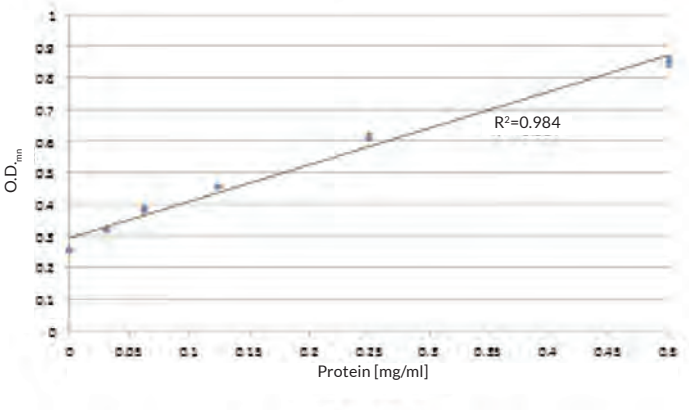


Figure 4. Standard curve generated with the Bio-Rad Protein Assay Kit (Microtiter Plate Protocol). Average absorbance for triplicate values of 0 to 0.5 mg/ml bovine serum albumin. Error bars represent standard deviation of the mean. The 0.984 R^2 value of the trend line indicates excellent linearity of the curve.

Protein Concentration (mg/mL)	Average O.D. 595	CV (%)
0.5	0.850	1.7%
0.25	0.613	2.2%
0.125	0.456	0.2%
0.063	0.384	2.4%
0.031	0.321	2.0%
0	0.253	0.2%

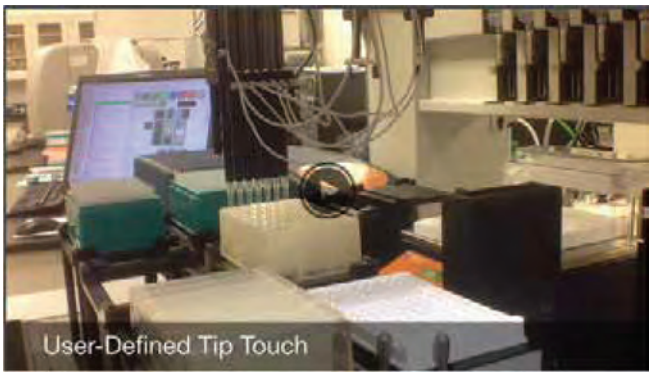
Table 1. Average absorbance (O.D. 595) and variabilty (CV) values for an automated standard curve of bovine serum albumin (BSA).

Automated ELISAs—save time and increase throughput

While enzyme-linked immunosorbent assays (ELISAs) provide valuable high-sensitivity detection, the numerous preparation steps separated by incubations and often coupled with high sample throughput, result in significant resources being monopolized. We demonstrate how the integration of the MultiWash+ Microplate Washer and EMax Plus Microplate Reader to a Biomek NX^{P} Workstation (Figure 5) facilitates the automated processing (Figure 6) and analysis of ELISAs. This automated solution can free up resources while providing more reliable ELISA results (Figure 7).

Read the complete application note

View the video
A simplified approach to automating ELISA



Learn more about the components:

- **Biomek NX^{P} Workstation**
- **EMax Plus Microplate Reader**
- **MultiWash+ Microplate Washer**

Save time and increase throughput

- ✓ Increase reliability of the data generated and reduce user-to-user variability and human error by automating the entire process – from sample processing to analysis
- ✓ Increase utility of the system by leveraging configuration flexibility, including configurable deck layouts and the capability to integrate with compatible devices
- ✓ Increase data integrity and accuracy through less user intervention and a complete hardware and software component integration

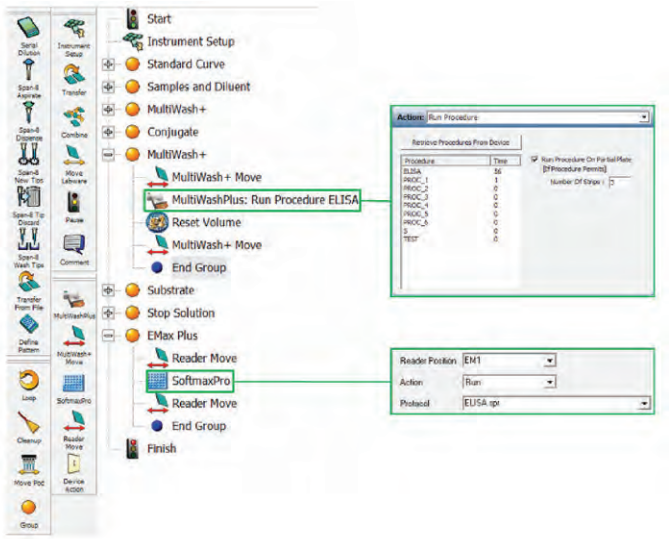


Figure 5. Screen capture of the Biomek NX^P ELISA method (left) and the steps that control the integrated washer and reader (right). The MultiWash Plus step runs the procedure that has been selected from the list of available MultiWash+ Microplate Washer procedures on the entered number of strips (i.e. plate columns). Similarly, the SoftmaxPro step automatically runs the selected SoftMax Pro analysis protocol on the EMax Plus Microplate Reader.

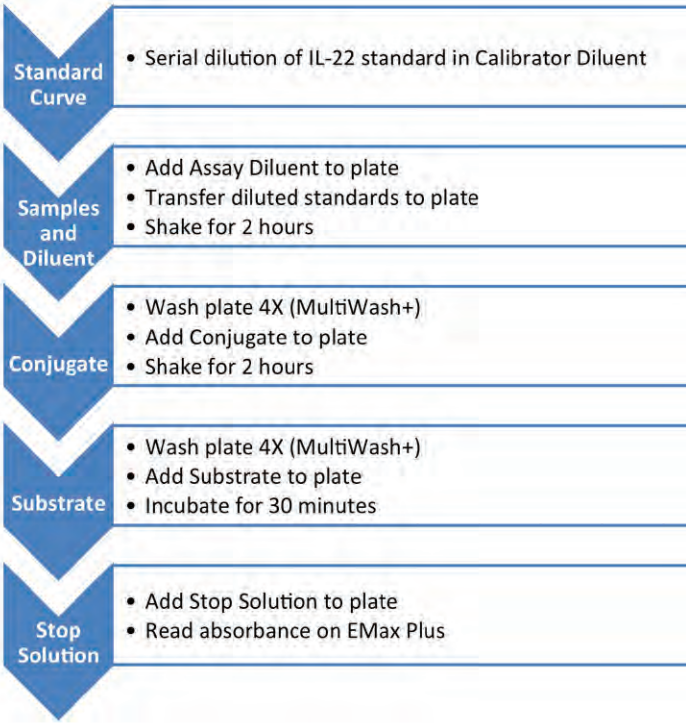


Figure 6. Automated workflow for the Quantikine Mouse/ Rat IL-22 ELISA.

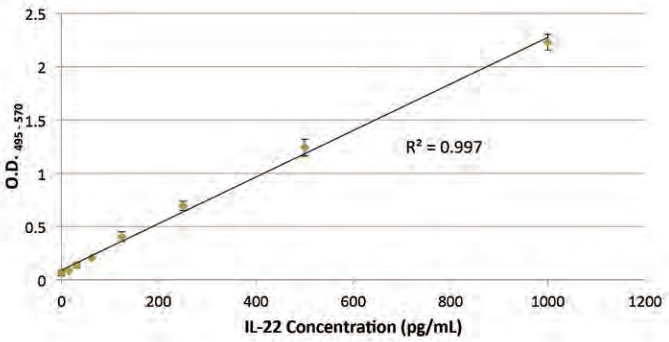


Figure 7. Standard curve generated with the Quantikine Mouse/Rat IL-22 ELISA. Average absorbance for triplicate values of 0 to 1000 pg/mL Mouse/Rat IL-22 Standard. Absorbance at 495 nm was normalized by subtracting absorbance at 570 nm. Error bars represent standard deviation of the mean. The 0.997 R^2 value of the trend line indicates excellent linearity of the curve.

Automating a linear density gradient for purification of a protein:ligand complex

Automating linear density gradients offers significant advantages over manual preparations (Figure 8). We applied the method to purify protein:ligand complexes by rate zonal centrifugation. The method of automating a linear density gradient is amenable to most proteins, after optimization of spin time, speed, and gradient conditions, offering significant advantages over manual preparations (Figure 9).

Consistent results, less manual work

- ✓ Get a distinct interface and a consistent fraction every time
- ✓ Reduce the jostling of tubes which may occur when moving gradients to the cold room or refrigerator with our automated chilled peltier step
- ✓ Eliminate tedious manual work, layering and fractionating of density gradients

Read the complete application note

Learn more about the components:

- **Biomek 4000 Workstation**
- **SpectraMax® i3x Multi-Mode Microplate Reader**

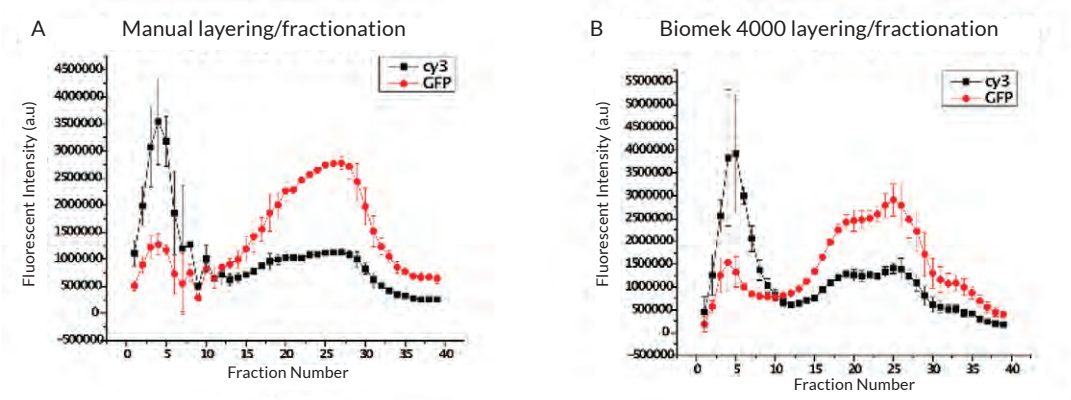


Figure 8. (A) Manual versus (B) Biomek 4000 workstation preparation of a 5-20% linear sucrose gradient.

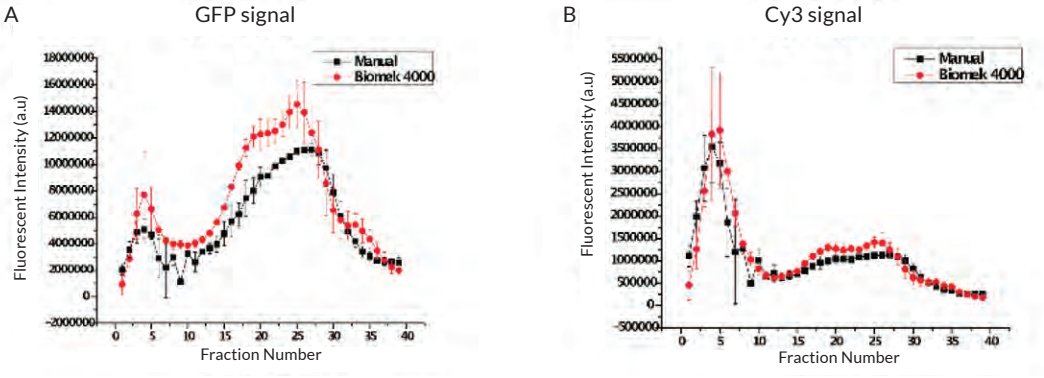


Figure 9. Overlaid images of different preparation techniques for (A) eGFP-gp16 and (B) cy3-dsDNA.

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Automated cell biology applications

Scientists are always seeking ways to accelerate the rate of discoveries, and find technologies and methods that can hasten experimental design.

Optimization experiments can be of great value, but can be highly challenging and time consuming to execute manually, so much so that many researchers might bypass this level of optimization entirely. By automating factorial studies, optimized conditions can be identified that may have been missed through sequential testing of single variables.

To optimize cell transfection, one must find the ideal concentration of nucleic acids, transfection reagents, and cell numbers that result in high percentages of transfected cells and low toxicity. This creates an unwieldy and highly challenging factorial experiment to perform manually. In addition, the cost of these reagents can be significant, particularly when used in large sample numbers.

Transient transfections can be used for screening the effects of overexpression (plasmid) or knockdown (siRNA) of genes as well as non-coding nucleic acids (miRNA mimics or inhibitors). By selecting for expression clones that have incorporated the construct of interest and a selection marker, stable lines can be generated for long-term studies or as reporter lines for screens.

Automated workflows can also be easily adapted to optimize plasmid transfections. The SpectraMax MiniMax™ 300 Imaging Cytometer from Molecular Devices can measure transient transfection of a GFP expression plasmid, and optimal conditions could be utilized to initiate a stable transfection line. The identification and expansion of strongly expressing clones can then be automated by integrating the SpectraMax MiniMax Cytometer on a cellular system.

The flexible deck configuration of the Biomek FX^{P} allows for custom integration of additional devices such as incubators or cell viability analyzers to enable complete automation of cellular workflows. Cost and throughput demands can be mitigated by using higher density plate formats with smaller well volumes, which makes optimization experiments in 384-well plates a convenient remedy.

The likely result is weeks saved during optimization and/or improved transfection efficiency over non-optimized conditions.

Automated XTT assay for cell viability analysis

Cellular viability assays are valuable for numerous workflows—from establishing proliferation rates to drug toxicity screens. XTT assays are a simple way of determining the number of viable cells; however, a reliable assay requires a standard curve of cell dilutions and optimized incubation times. Automation of the cell dilution and plating, reagent addition, and analysis can enhance the consistency of these steps while also minimizing the resources required for higher throughput screens.

Improve consistency and efficiency

- ✓ Overcome challenges arising from the need for higher throughput, including multiple time points and/or consistent timing across multiple plates

Read the complete application note

Learn more about the components:

- **Biomek NX^P Span-8 Workstation**
- **EMax Plus Microplate Reader**
- **SoftMax Pro Software**

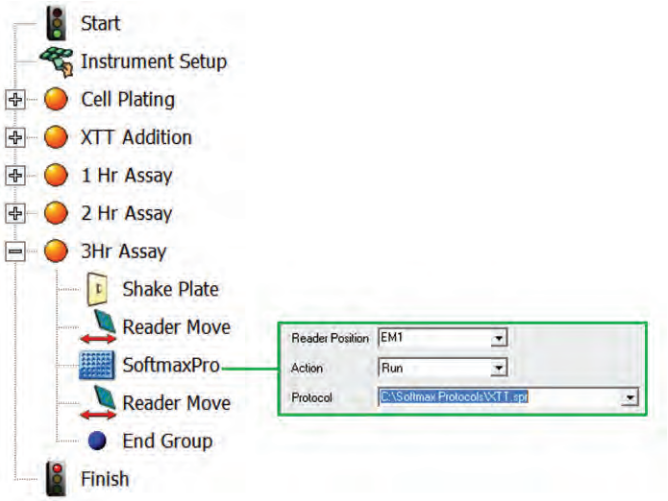


Figure 10. Automated XTT cell viability assay. Screen capture showing a Biomek method that serially dilutes and plates cells, adds activated XTT reagent, and analyzes absorbance at three time points using an integrated EMax Plus Microplate Reader. The SoftmaxPro step allows the user to select a predefined SoftMax Pro software protocol to control the plate analysis. The entire workflow can be automated without intervention through the integration of a humidified 5% CO_2 incubator.

Figure 11. Images of HCT 116 cells following automated dilution and plating. A starting solution of 200,000 cells/mL was added to the Biomek NX^P and serially diluted. 100 µL of cells were plated in triplicate and assayed by XTT addition after 24 hours.

Automated optimization of cell transfection

Cell transfection is an essential technique for interrogating cellular pathways. Determining the optimal conditions for introducing nucleic acids into cells can be a time consuming endeavor at the initiation of a cell biology experiment or screen. The Biomek FX^P Workstation (Figure 12a) can be used to identify the optimal conditions for siRNA transfection in a single experiment. Factorial combinations of transfection reagents and concentrations, cell number, and fluorescent oligonucleotide concentrations were plated in 384-well plates using the enhanced multichannel selective tip pipetting (Figures 12b and 13). This higher density plate format conserved reagents while also facilitating the replicate wells necessary to determine variability within a given condition. 24 hours after transfection, cells were stained with Draq7 and transfection efficiency and cell toxicity was measured on the SpectraMax i3 Multi-Mode Detection Platform with MiniMax 300 Imaging Cytometer (Figures 12c and 14).

Improve transfection efficiency

- ✓ Optimize conditions that may have been missed through sequential testing of single variables
- ✓ Miniaturize and execute complex optimization experiments to reduce costs and accelerate timelines

Read the complete application note

Learn more about the components:

- **Biomek FX^P Workstation**
- **SpectraMax i3 Microplate Reader with MiniMax Imaging Cytometer**
- **EMax Plus Microplate Reader**
- **SoftMax Pro Software**

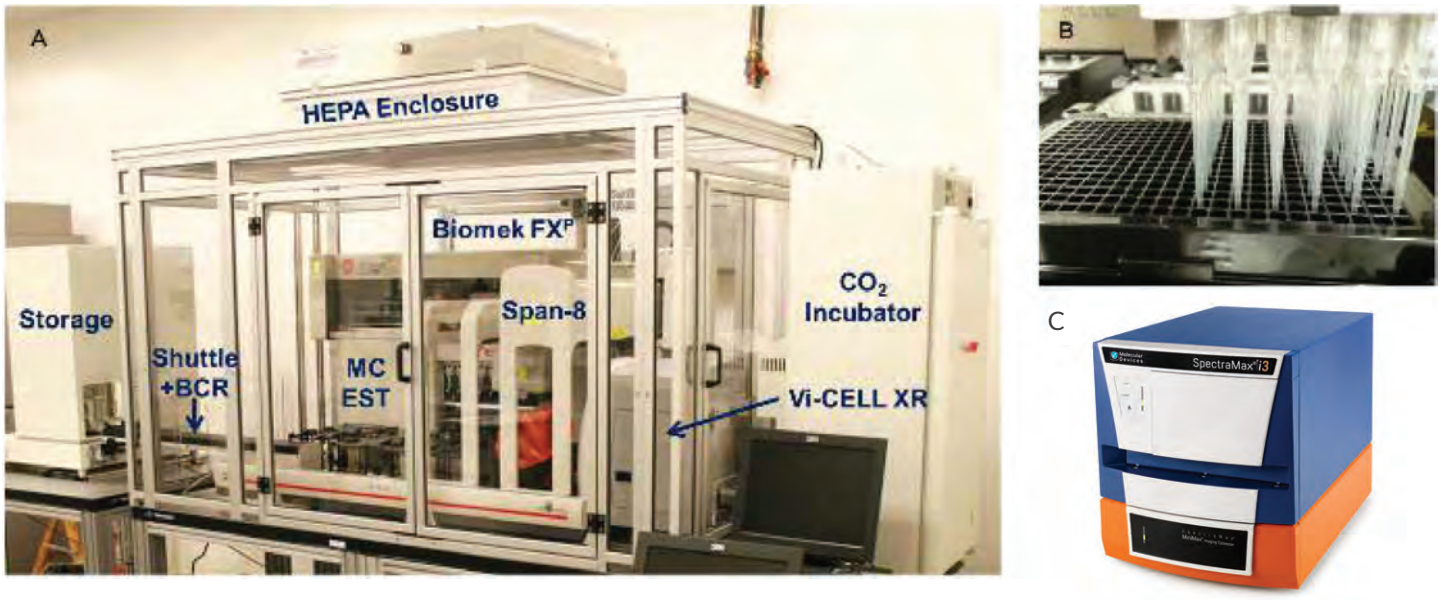


Figure 12. Automated cell culture and analysis. (A) A Biomek FX^P with a 96-channel head and Span-8 pipettors inside a HEPA-filtered enclosure was used to automate sterile cell transfection and reagent additions. **(B)** The enhanced selective tip pipetting feature of the 96-channel head was utilized to create reagent and cell dilutions across rows and columns. **(C)** The SpectraMax i3 MiniMax Imaging Cytometer was used for analysis of cellular transfection and cytotoxicity.

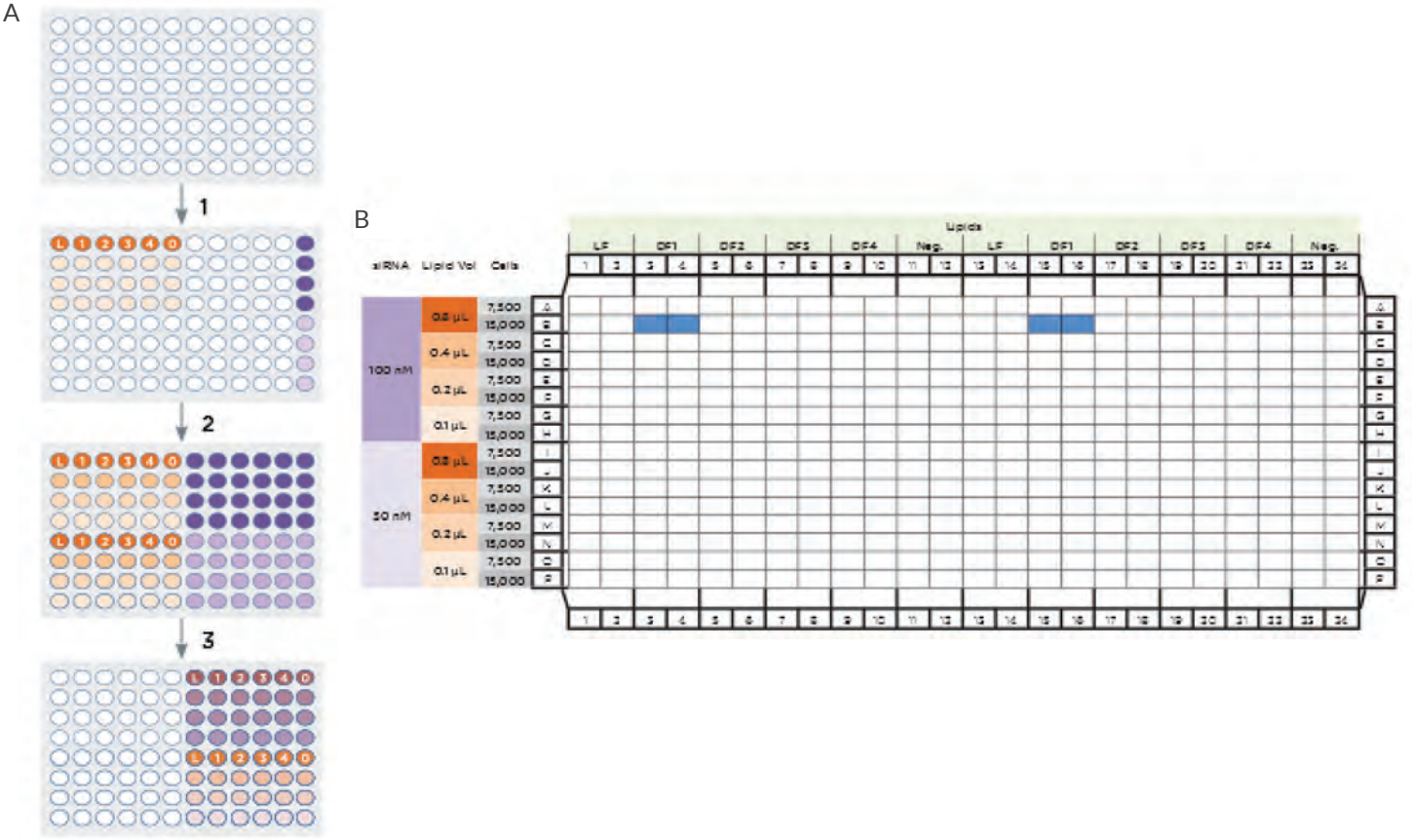


Figure 13. Workflow for automated transfection optimization. (A) Liquid handling steps to generate factorial combinations of transfection reagents and siGLO oligonucleotides. Step 1—Transfection reagents (dark orange), Opti-MEM (light orange), and siGLO concentrations (purple) were added to a 96-well plate. Step 2—Transfection reagents were serially diluted across 4 rows and replicate stamped. siGLO was replicate stamped across 5 additional columns. Step 3—The 48 lipid dilution wells were then combined with the 48 siGLO wells. **(B)** The 48 conditions were replicate stamped into a 384-well plate and cells were added at two concentrations (7,500 or 15,000 cells/well). The representative plate map illustrates the quadruplicate values of 15,000 cells transfected with 100 nM siGLO in the presence of 0.8 µL DharmaFECT 1 incubator.

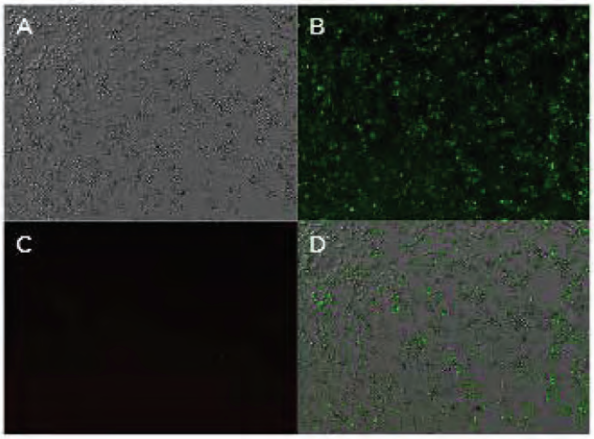
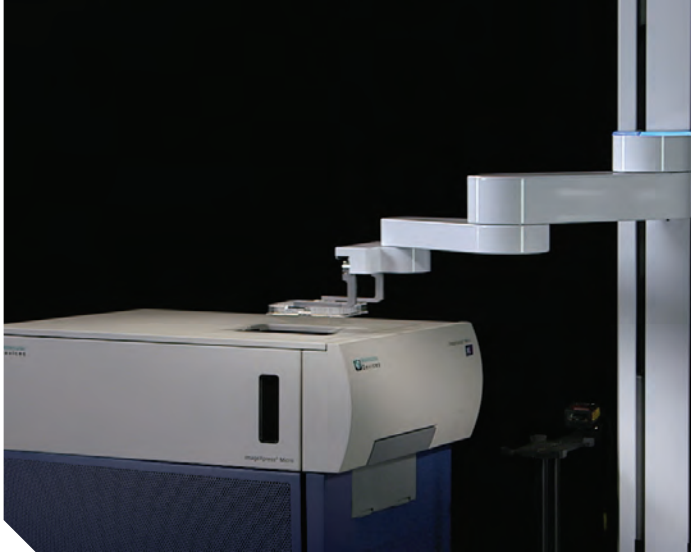


Figure 14. Measuring transfection efficiency and cytotoxicity. PANC-1 cells were transfected with FAM-labeled siRNA oligonucleotides (siGLO) for 24 hours, stained with Draq7 to identify cytotoxic cells, and imaged with the SpectraMax MiniMax Cytometer. **(A)** Brightfield image utilized for total cell counts. **(B)** 541 nm image utilized for transfected cell counts. **(C)** 713 nm image utilized for dead cell count. **(D)** Overlay of all three images.

Automated 3D imaging



Why prepare cell cultures in 3D?

Three-dimensional (3D) cell cultures offer a more robust, physiologically relevant look at cells compared to traditional two-dimensional (2D) collection models. 3D cultures maintain a co-culture that mimics a true microenvironment and avoid some pitfalls that may occur in 2D models.

Challenges in developing robust 3D assays include:

- Leaving the spheroid environment undisturbed during cell plating, compound treatment, and sample preparation
- Locating and focusing on the spheroid in every well so it can be imaged in a single field of view
- Rapidly analyzing images to yield meaningful results from which conclusions can be drawn

Resolve challenges using automation and high-content imaging

Automating the 3D assay workflow increases accuracy and precision, eliminates user-to-user variability, and significantly reduces error, allowing higher throughput with greater control. Biomek workstations automate 3D cell culture processes, to ensure the spheroid environment remains undisturbed.

Further maximize throughput by using high-content imaging with the automated ImageXpress® Micro Confocal High-Content Imaging System. Benefits of the system include the ability to capture an entire spheroid in one field of view and the ability to acquire 3D images so that key data is not missed. Spheroids can be rapidly imaged by acquiring images in multiple z planes through the spheroid and then collapsing the stack of images into a single best-focus image for analysis, all with a standard instrument configuration.

Automation simplified

Many lab managers and technicians still use manual methods to collect 2D cultures, and may avoid automation altogether. There is a widely held perception that automating 3D cell culture collection is expensive and difficult. However, Biomek workstations can facilitate complete walkaway workflow from cell seeding, feeding, compound treatment, and sample prep without a steep learning curve or prohibitively complicated procedures. When combined with the power of high-content imaging, an automated workflow enables rapid screening of 3D assays to find hits faster.

Advantages of Biomek workstations include:

- More comprehensive screening for faster hit identification
- More consistent hits with higher reproducibility
- Integrated storage and incubators to maintain throughput, flexibility, and system availability tracking
- Enhanced multichannel selective tip pipetting allows for partial plate usage during optimization stages, and/or smaller reservoir use to reduce dead volume
- Automatic data tracking across all steps from sample input to end result, reducing the opportunity for errors

Automated 3D cell culture and screening by imaging and flow cytometry

Three-dimensional (3D) cell cultures offer greater physiological relevance than monolayer cultures for cellular interaction studies and compound screens. However, manual manipulations of these cultures can be laborious and challenges are amplified as sample throughput increases. We used the Biomek FX^P Workstation (Figure 14) to automate the culture and drug sensitivity screening of cancer spheroids in Perfecta3D® Hanging Drop Plates (Sigma-Aldrich). Automated steps include the plating of cells and addition of compounds to the hanging drops to induce apoptosis (Figure 15). Staining reagents were also added to analyze the spheroids by high-content imaging (Figure 16). Finally, the transfer and dissociation of the spheroids into single cell suspensions was automated to enable flow cytometry analysis (Figure 17). Automated hanging drop cancer spheroids showed excellent consistency (Figure 18) across wells and analyzing these spheroids by two complementary methods generated a more complete picture of drug responses in 3D cultures.

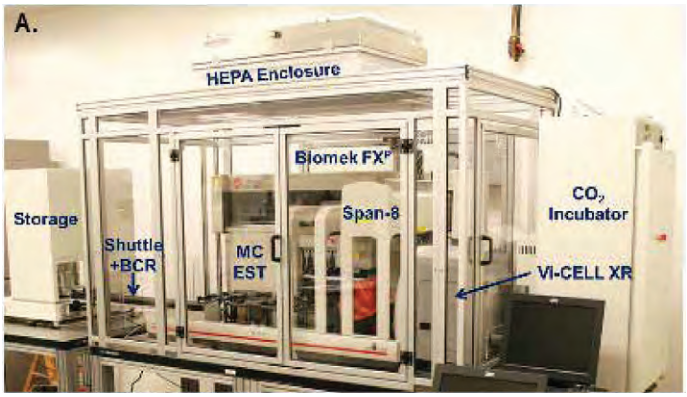
Get a more complete picture

- ✓ Generate two different analyses yielding complementary data and allowing a more complete picture of spheroid responses
- ✓ Grow consistent spheroids that are required for screening while automating the sample processing for both imaging and analysis
- ✓ Reduce barrier to gathering the complementary data required to gain a complete understanding of spheroid drug responses

Read the complete application note

Learn more about the components:

- **Biomek FX^P Workstation**
- **ImageXpress Micro Confocal High-Content Imaging System**



B

Figure 14. Cell culture system. **(A)** A Biomek FX^P Workstation with a 96-channel head and Span-8 pipettors inside a HEPA-filtered enclosure for automating sterile cell manipulations. 3D cultures were grown in HDPs in an integrated incubator for complete workflow automation. **(B)** The 96-channel head utilized enhanced selective tip pipetting which provides additional flexibility by enabling any pattern of tips to be used.

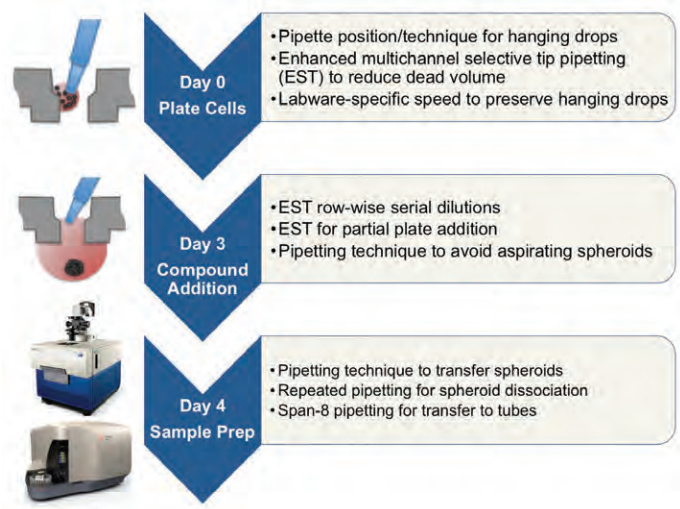


Figure 15. 3D culture workflow. The formation, treatment, and analysis of cancer spheroids required three steps over a four day process. Each of these steps presented unique challenges that were overcome through automation.

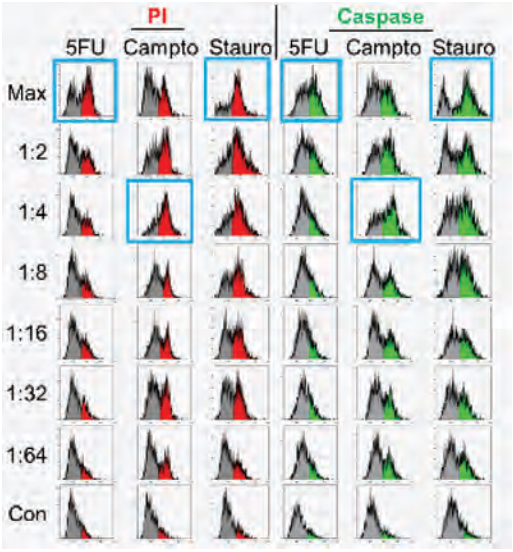


Figure 17. Apoptosis analysis – flow cytometry. Spheroids treated identically as in Figure 16 were dissociated and stained for apoptosis markers and analyzed by flow cytometry. Maximal responses (blue boxes) correlate with imaging results for staurosporine and camptothecin but 5-fluorouracil treatment shows significant positive staining (>50% at maximal concentration).

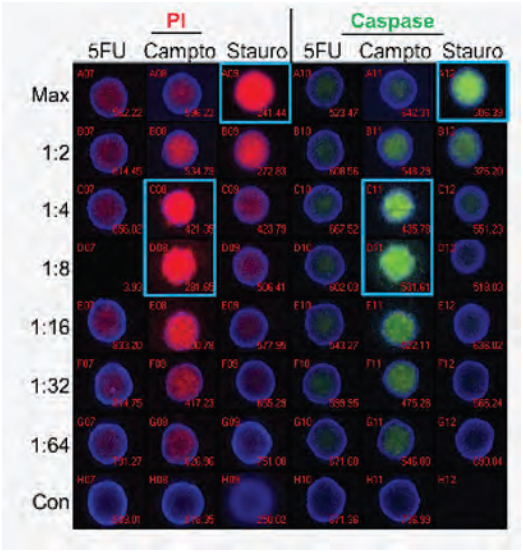


Figure 16. Apoptosis analysis – imaging. Spheroids were treated with 5-fluorouracil (5FU), camptothecin (Campto), and staurosporine (Stauro) at the indicated dilutions for 24 hours and stained for apoptosis markers for analysis by imaging. Control spheroids (Con) were treated with DMSO alone. Wells with maximal staining by propidium iodide (PI) or activated caspase substrate are identified by blue boxes. Staurosporine shows a traditional dose response while the highest level of staining was seen at the 1:4-1:8 dilutions of camptothecin. 5-fluorouracil treatment resulted in no significant staining of spheroids.

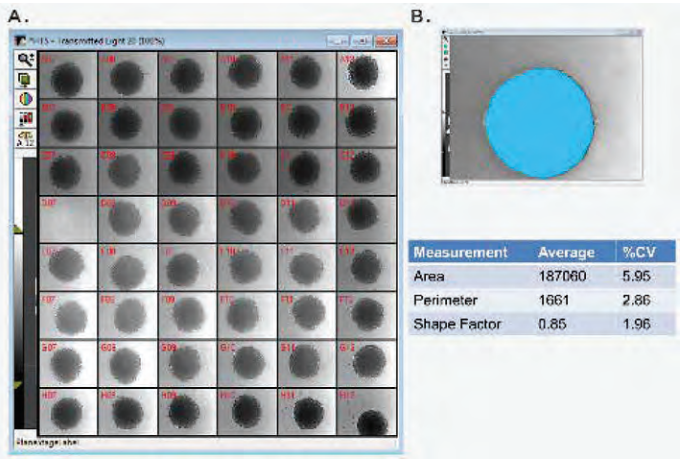


Figure 18. Spheroid consistency. (A) 48 wells of spheroids from the third day were imaged at 10X magnification with transmitted light. **(B)** Spheroids were analyzed for size (area and perimeter) and circularity (shape factor). Across 47 images, the consistency of spheres is illustrated by coefficients of variation (CVs) below 6%. An average shape factor of 0.85 indicates the spheroids show excellent circularity as a perfect circle has a shape factor of 1.0.

Customer story

A seamless Beckman Coulter Life Sciences liquid handling automation solution for RNAi screening provides increased efficiency and flexibility at the biotechnology park, Cancer Campus Grand Paris

Inaugurated in September 2013, the PACRI HTS cell biology platform is one of the cornerstones of the future biotechnology park, Cancer Campus Grand Paris. It offers entirely automated cell biology workflows necessary for phenotypic screening of medium to large scale compound and siRNA libraries. The unique architecture of this automation platform offers unparalleled flexibility by integrating multiple complementary detection technologies: automatic phase- and epifluorescence microscopy flow cytometry and fluorescence, absorbance, or chemiluminescence detection. The platform is comprised of a sterile liquid handling area, which offers automated cell culture processes as well as the preparation of test compounds. The management of liquid transfers is performed by a Biomek FX^P workstation that allows for the simultaneous use of 96 and 384 formats. A distributor, a plate washer, and a barcode labeler complement this central automation.

The detection area consists of an automated CyAn flow cytometer from Beckman Coulter Life Sciences, three automated ImageXpress Micro XL microscopes and a SpectraMax i3 Microplate Reader from Molecular Devices.

Compound management is performed by several 1D and 2D barcode readers that ensure traceability of the entire analytical process from the tube to the creation linear rail and allow access to different devices and different areas to manage the transfer of liquid samples detection and tracking cells. Two research engineers and a scientific coordinator are assigned to this automated platform and are responsible for developing methods and statistical data mining. To identify the major compounds (hits), the validation of primary results from compound or RNAi screen, can be seamlessly performed on the same platform. In the near future, one of the goals is to generate algorithms that enable a step, which entails an automated hit for the production of biological replicates and the use of additional indicators to exclude off-target effects and false positives.

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Download the customer story

Learn more about the component:

- **Biomek FX^P Workstation**
- **ImageXpress Micro Confocal High-Content Imaging System**
- **SpectraMax i3x Microplate Reader**

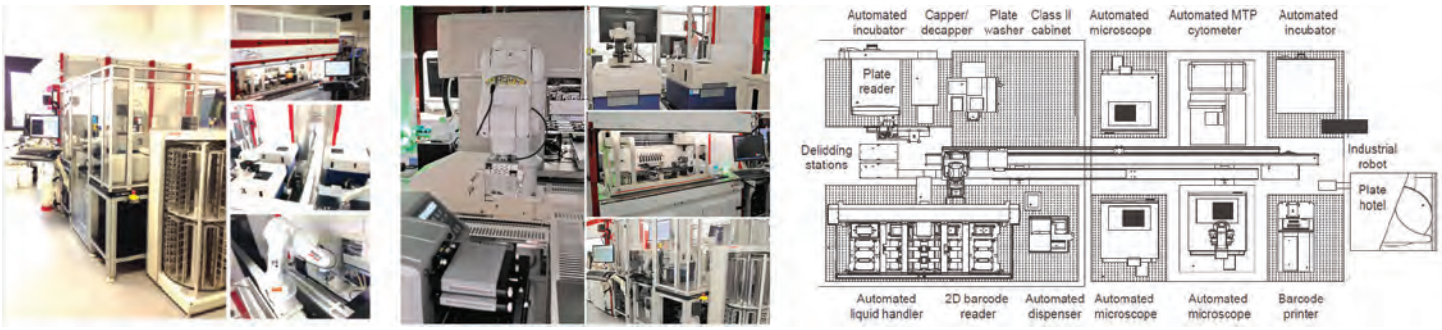
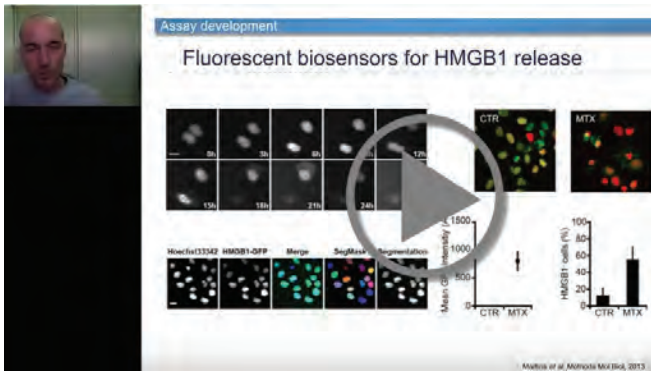


Figure 1. PACRI Installation.

View the webinar

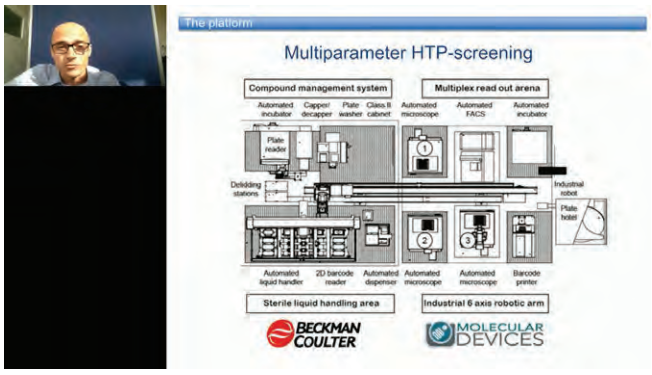
Hallmarks of Cancer: Detect and quantify cell death signatures with high content imaging



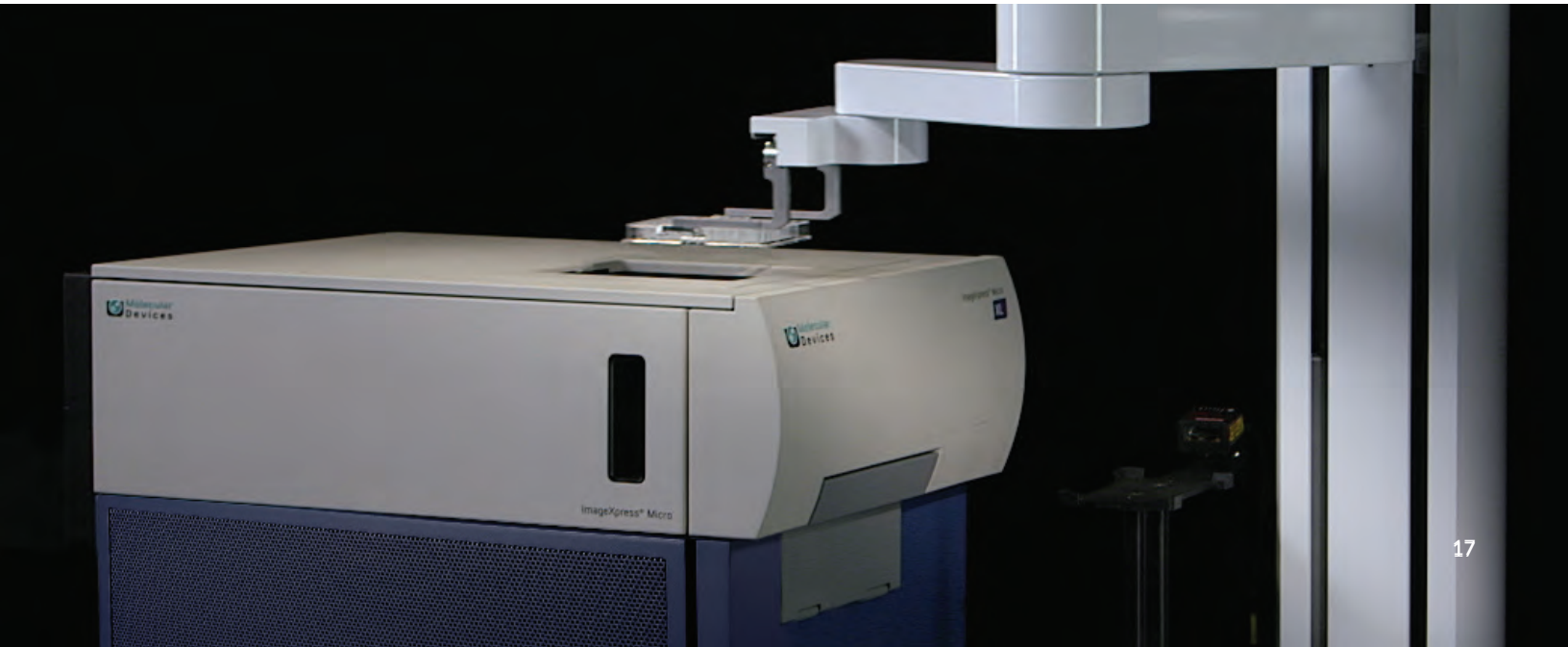
Presenters: Oliver Kepp, Ph.D., Institut Gustave Roussy and Jayne Hesley, Ph.D. Application Scientist, Molecular Devices

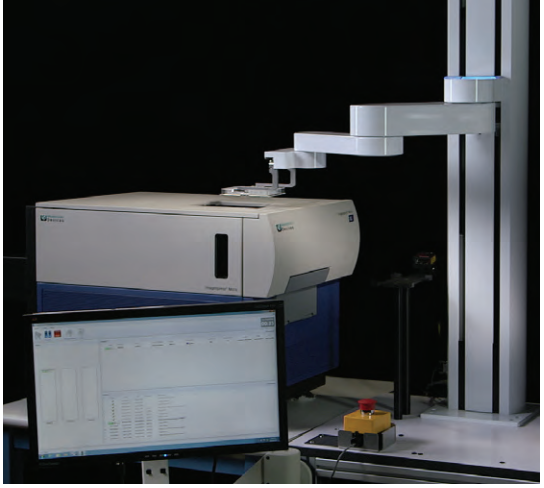
View the webinar

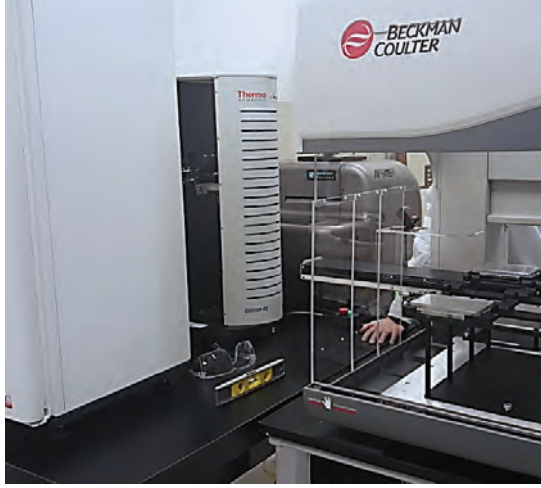
Less False Negatives: Quantifying Cell Viability by Simultaneous Triple Staining



Presenters: Oliver Kepp, PhD., Research Scientist, Kroemer Lab and Allan Sauvat, Research Engineer, Institut Gustave Roussy







Custom automation solutions

Automated plate handling for increased productivity

The Molecular Devices Custom Solutions team can help you expand the capabilities of your imaging and detection platform with validated solutions to increase the throughput, capacity, and functionality of your research. Our experts can help you design the right customizations for your imager and labware, or assemble a turnkey automated platform to scale up and complete your goals quickly. When “out of the box” is not good enough – we are here to help.

The Custom Solutions team is a group of engineers and scientists with one goal in mind—to give you the ability to do more with your Molecular Devices instruments. Up to date with the latest technologies, instrumentation and science, we are keen to discuss new applications and collaboratively develop hardware and software products to enhance your research. In addition to custom imaging devices, we offer biological feasibility studies, labware selection, engineering design, and custom software development. Our products and services are warrantied and backed by our excellent support team.

QPix™ series: Automated colony plating and picking

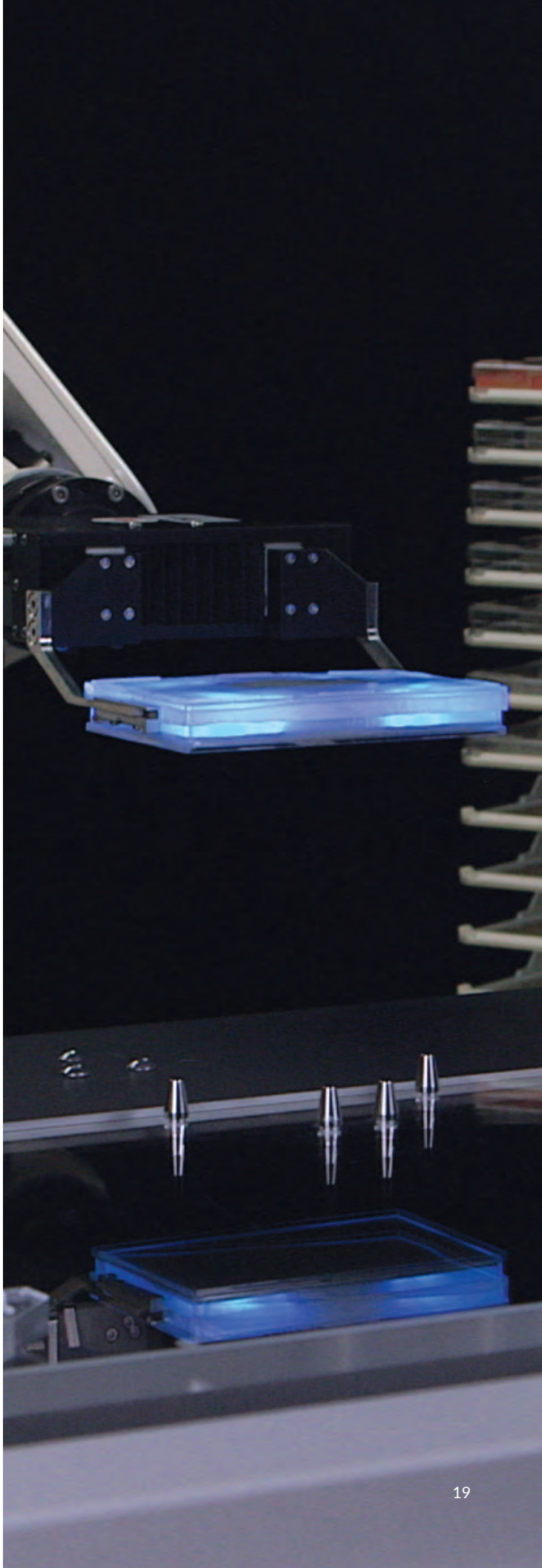
- Solutions to minimize contamination
- Automated agar to agar colony picking
- Customized picking and grinding heads and pins for novel applications (gelzan media use, unique biological morphology)
- Customized filters for screening and picking by color (i.e. blue/white, rose/white, YFP)
- Software integration of sample data with in-house LIMs system or databases
- Remote control or robotic control for colony picking, plating, and screening applications
- Support for picking and plating with non-standard plate types and Qtray
- Custom plating patterns and configurations

High-content imaging and detection

- Robot-compatible environmentally controlled plate nest
- Incubation and sample environment control for plates and slides, including hypoxia, CO_2 control, heating, cooling, and light sensitivity
- Automated workflow solutions for live cell assays
- Customized light sources for most spectra of interest (e.g. UV, NIR)
- Feasibility studies for novel biological or imaging applications

CloneSelect™ Imager

- High resolution imaging and detection of cells
- Fluorescence and white light imaging for monoclonality
- Automated workflows for cell growth and maintenance, with online plate imaging
- Data export and hit picking solutions to streamline time to results
- Integrated liquid handling solutions

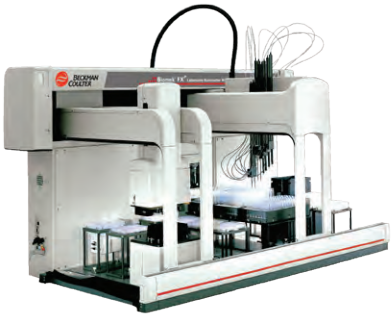


Automation instruments

Beckman Coulter Life Sciences Instruments

Biomek 4000 Workstation

Biomek NX^{P} Workstation



Biomek FX^{P} Workstation

Molecular Devices Instruments

EMax Plus Microplate Reader

SpectraMax i3x Microplate Reader
with MiniMax Imaging Cytometer

MultiWash+
Microplate Washer

ImageXpress Micro Confocal
High-Content Imaging System

QPix 400 Series Microbial
Colony Pickers

ClonePix™ 2 System

Danaher

Innovation Defines Our Future — And Yours

As Danaher Life Science companies, we help customers get answers to science's most pressing challenges. We are automating the workflow in laboratories and unraveling the complexities of biological systems. We are revolutionizing light microscopy, and evolving life science research. Around the globe, we are empowering scientists to unleash their brilliance for future discoveries they can only dream of today. Customers of the Life Science group at Danaher get the science right, and we help to make that happen by staying true to our core values. We listen to our customer's needs and practice continuous improvement or 'Kaizen' to accelerate product development and deliver innovative solutions that exceed customer expectations. We focus on innovation to not just define our future, but to define the future of our customers worldwide.

We listen to the science just like you, because we know it is the foundation for the innovations of tomorrow. So you see, at Danaher, we really are all about the science.

Beckman Coulter Life Sciences

Dedicated to Advancing Science Through Discovery

For more than 75 years, scientists have been using Beckman Coulter Life Sciences research instruments to study the complex biological underpinning of disease, and to explore new therapies or drugs. Today, our instruments are performing vital roles in labs and universities around the globe. By listening to its customers, Beckman Coulter Life Sciences has become a trusted brand in the scientific community.

Beckman Coulter Life Sciences enables scientists to automate critical steps in the discovery process with a comprehensive range of flexible and scalable automated liquid handling systems. The company's products enable next generation sequencing, cellular analysis, proteomics, as well as nucleic acid sample preparation.

In all of these areas, Beckman focuses on a consultative approach with customers and a focus on the Danaher core value of continuous improvement, or 'Kaizen,' in the design of workflows, applications and services to better address customer needs.

Molecular Devices

Unraveling the Complexity of Protein and Cell Biology

Our innovative analytical solutions for cell and protein biology enable customers to see more, do more, and know more, and to answer life's most important questions.

As one of the world's leading providers of high-performance bioanalytical measurement solutions for life science research, pharmaceutical and biotherapeutic development, we have over 130,000 placements in laboratories around the world. Our instruments have catalyzed brilliant scientific research described in over 25,000 peer reviewed publications.

Included within a broad product portfolio are platforms for high-throughput screening, genomic and cellular analysis, colony selection and microplate detection. These leading-edge products empower scientists to improve productivity and effectiveness, ultimately accelerating research and the discovery of new therapeutics.

To learn more about Life Science products and solutions from our operating companies, visit their websites.

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