

Western blotting 精準定量全方案

# Integrated Imaging Solutions

for Reliable Results



# LI-COR®

## 優質的 Data 是不平凡發現的開始

面對快速改進的實驗室 Best Practices 規則，與期刊不斷更新的 Reporting Guidelines 研究報告準則，助於降低操作誤差與實驗變異的技術，已成為各實驗室的必要配備。

LI-COR 公司的儀器設備、試劑與分析軟體，能帶給研究者最優質的數據，超過 25 年來已深受研究者的信賴。



## 10k+ 文獻的見證

Publications citing Odyssey® Imaging Systems for detection and quantification of protein expression.

## 12+ 應用專利

Cyanine-based dye patents on composition of matter and methods worldwide.

## 50+ 技術專利

Patents for imaging technologies worldwide.

## 20+ I & II 級臨床試驗案例

Phase I and II clinical trials utilizing IRDye® reagents and LI-COR imaging systems.

## 滿滿的信心面對期刊的要求

The need for consistent, replicable data has never been as pressing. Leading journals and granting agencies have identified common sources of reproducibility error in Western blot data and have developed stringent new requirements for researchers to achieve reliable results:

- Validation 抗體驗證
- Normalization 定量運算
- Replicate Analysis 重複試驗
- Documentation of Statistical Analysis 統計分析說明
- Proper Image and Data Format 正當的影像與數據格式

LI-COR offers comprehensive imaging solutions and the only analysis software specifically designed to meet these requirements, consistently delivering the most reliable Western blot data.

From experiment design to formatting your final submission, work with confidence knowing that you are always producing the highest quality data based on the latest scientific best practices and publication requirements.

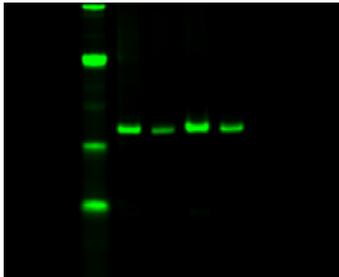
# Odyssey<sup>®</sup> Imaging Systems:

## 近紅外光螢光影像系統的優異表現

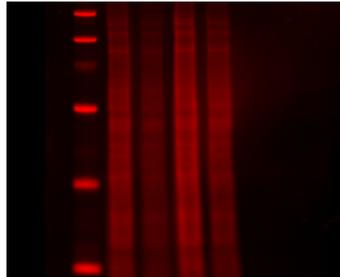
Minimize variation and maximize precision with near-infrared(NIR) detection. NIR wavelengths provide stable detection chemistry, which is vital for reliable, reproducible quantitative data.

- 可再現的穩定訊號。
- 具有高廣度的 **Dynamic Range**，偵測濃度範圍廣，訊號不飽和。
- 自動掃描功能確保一致的偵測條件與最佳的影像品質。

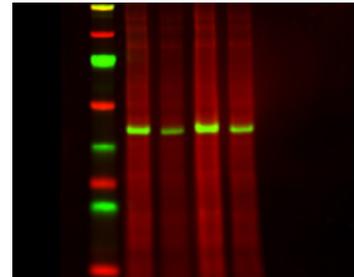
800 nm Channel



700 nm Channel



Overlaid Images



**Multiplex with ease.** See targets and loading controls on the same blot with multiplex detection using 700 nm and 800 nm channels.

### See All of Your Bands Reliably 以穩定的 NIR 螢光訊號獲取可靠的數據

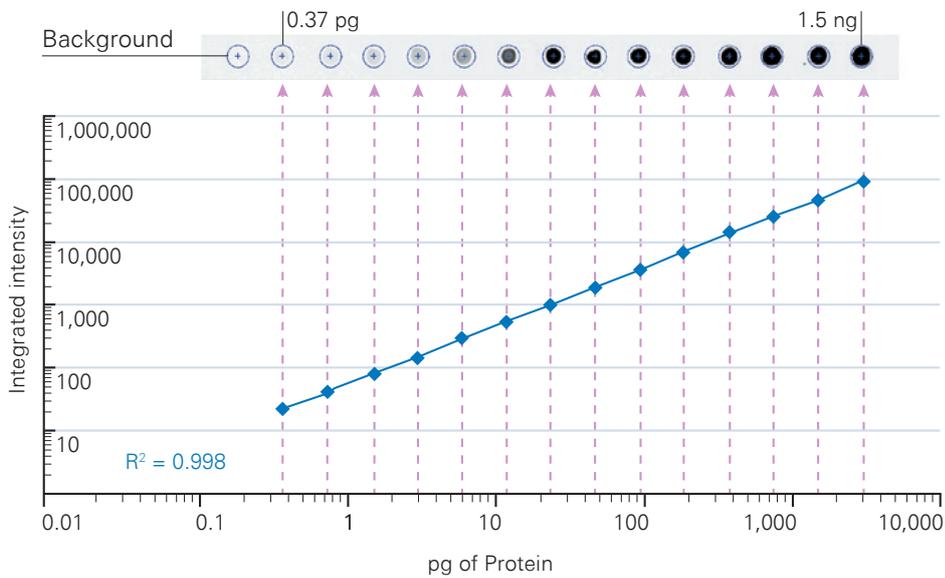
Capture the true complexity of your data with stable direct fluorescence.

### Get the Full Story in a Single Image 完全的影像訊號一次搞定

Increase the consistency and reproducibility of your results by capturing a single image, rather than comparing multiple exposures captured under variable conditions. Changing image display settings with Odyssey imagers never alters your raw data or signal intensities.

### See Multiple Targets on the Same Blot 單張 blot 同時偵測多個目標

With multiplex fluorescence, you can detect two colors in each sample lane with great sensitivity. This allows for highly-accurate normalization without variation introduced by stripping and reprobing.



### 準確度大幅提昇

The wide dynamic range of Odyssey imagers enables high-sensitivity detection without instrument saturation.



“The brilliant signal-to-noise ratio in combination with the ability to truly quantify the data is really outstanding.”

- Geir Bjørkøy, University College of Sør-Trøndelag

## 以數十載的經驗為基礎，建構獲取正確數據的完全方案

Having pioneered near-infrared detection technology in the 1990s, LI-COR offers the most complete discovery platform for near-infrared imaging. **The Data Integrity™ Bundle** provides a comprehensive imaging solution that meets the highest standards for reproducibility and transparency:



Accurate Detection with Odyssey® Imaging Systems



Reliable Image Capture and Analysis with Image Studio™ and New Empiria Studio™ Software



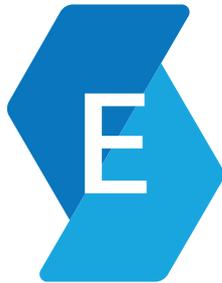
IRDye® Infrared Reagents



Comprehensive Training, Support, and Protocols



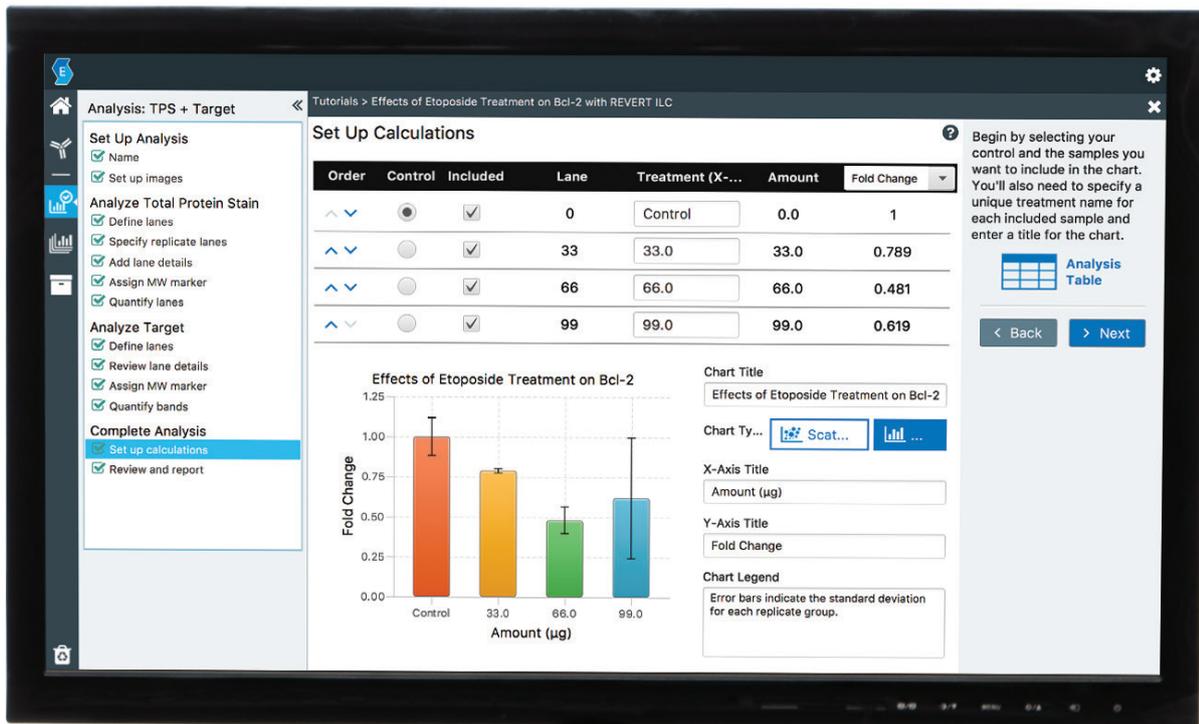
Accessible Expertise with Custom Services



隆重  
介紹

# Empiria Studio™ Software

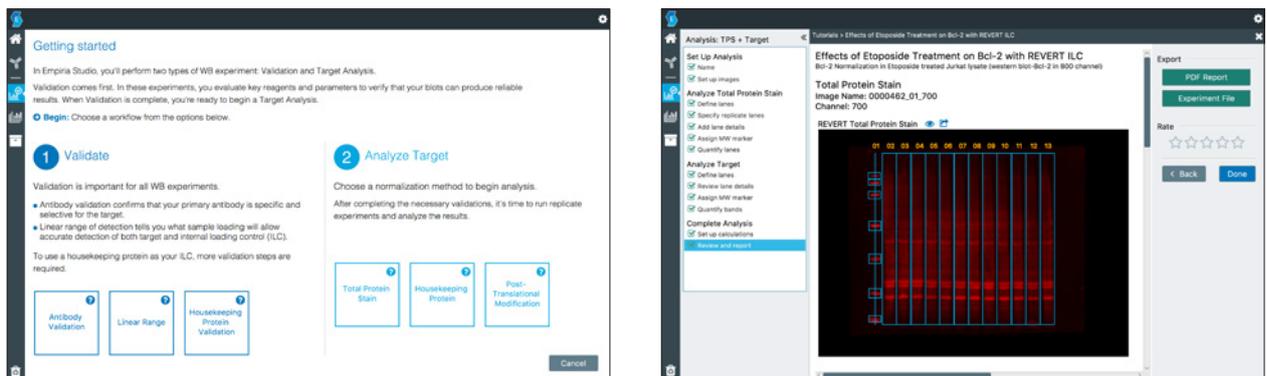
## 專家級 Western blot 數據定量分析



## 與知名期刊群合作設計

Validate and document the critical aspects of your quantitative Western blot procedure and ensure you gather all of the supporting data reviewers require.

Demonstrate robust experiment design and quickly find experimental data and related validation data with intuitive project-based organization. Share all of your images, supporting data, and target analysis in a single file.



## 幫助研究者獲得最優質的數據

Straightforward workflows in Empiria Studio software automate the critical steps of your analysis. Minimize user-to-user variability and error within your lab and ensure that analyses are completed correctly the first time, every time.

Remove the guesswork from quantification with automatic calculation of key parameters in validation and analysis and confirm the validity of your results with replicate and internal analysis. Simplify interpretation of your results with elegant graphing and formatting.

**Empiria Studio 30 天免費試用**  
[www.licor.com/empiria](http://www.licor.com/empiria)



# 邁向不同凡響的 **Western blots** 結果 就從現在開始

Powerful validation, analysis, and reporting features provide complete coverage of publisher requirements for quality data from raw images to replicate analysis.

## 驗算工具功能

Evaluate key reagents and parameters to verify that your blots produce reliable, reproducible results.



### **Antibody Validation**

Confirm that the primary antibody is specific and selective to the target.



### **Housekeeping Protein (HKP) Validation**

Verify that experimental conditions do not affect HKP expression before using as an internal loading control.



### **Combined Linear Range of Detection**

Determine sample loading that will fall within a combined linear range of the target and internal loading control.

## 定量分析與報告輸出功能

Confidently determine sample loading and utilize flexible parameters for replicate analysis to achieve consistently high-quality results.



### **Normalization**

Automatically correct for sample-to-sample and lane-to-lane variation with a variety of internal loading control types.



### **Replicate Analysis**

Confirm the validity of observed changes using biological or technical replicates on the same blot or across multiple blots.

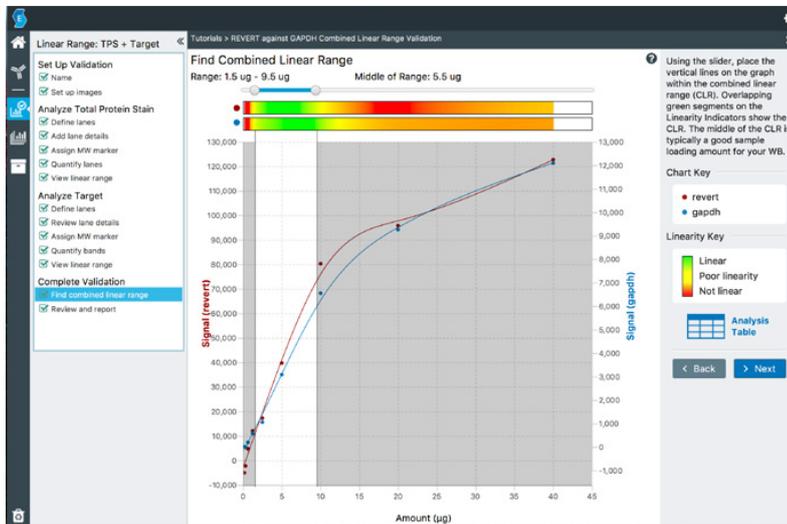
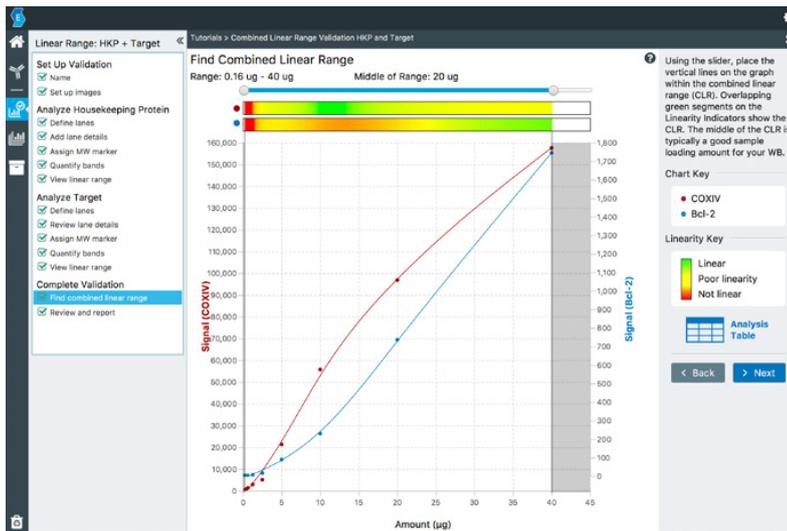


### **Publication Packs**

Provide complete documentation of experimental data and procedures in an easy-to-share package.

# Odyssey 系統 + Empiria Studio 軟體 就是與眾不同

Be more confident in your Western blot analysis than ever before. Streamline your analyses with straightforward workflows guiding you from your raw image data captured in Image Studio™ software to publishable results. Minimize user-to-user error with analysis based on scientific best practices. All of your Odyssey workstation users will perform the analysis correctly each and every time.



輕輕鬆鬆就能整合 Target 與 Internal Loading Control 的線性範圍，  
快速就找到最適當的蛋白樣本 Loading Amount。

# Odyssey<sup>®</sup> CLx Imaging System

## 近紅外光螢光影像系統

Minimize variation and maximize precision with high-sensitivity NIR fluorescent detection optics engineered to enable definitive analysis of protein expression changes.

### 主要特色

The Odyssey CLx combines precision laser illumination, large scan area, and high image resolution to deliver accurate, replicable data capture.

- Superior dynamic range and sensitivity
- Largest scanning bed for higher throughput
- High-precision 21-micron resolution
- Widest selection of imaging applications

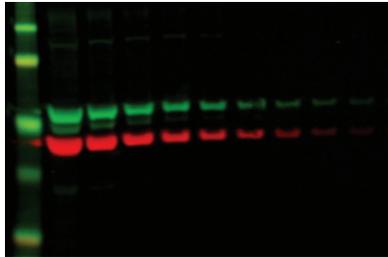


“We are finding that we can use the Odyssey CLx for just about everything protein-related we do in the lab.”

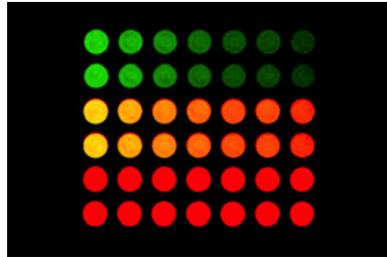
-Dr. Jeremy Chambers, Florida International University



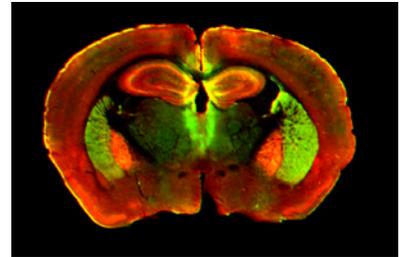
## 應用範例



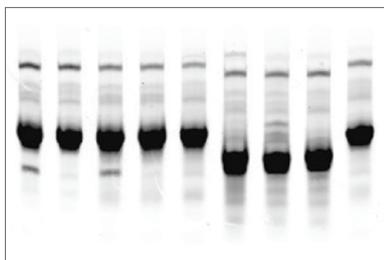
Near-Infrared Fluorescence  
Western Blot



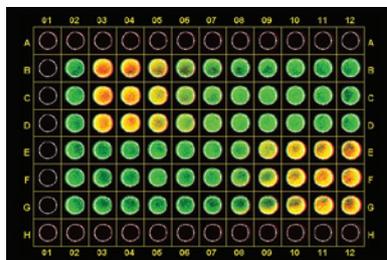
In-Cell Western™ Assay



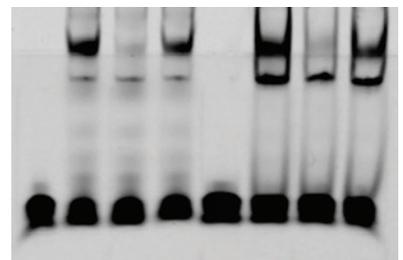
Macroscopic Tissue Section  
Analysis



Coomassie Protein Gel  
Documentation



On-Cell Western Assay



EMSA / Gel Shift Assays

### Other Applications

ELISA

Fluorescence Protein Arrays

Whole Organ Imaging

In-Gel Western

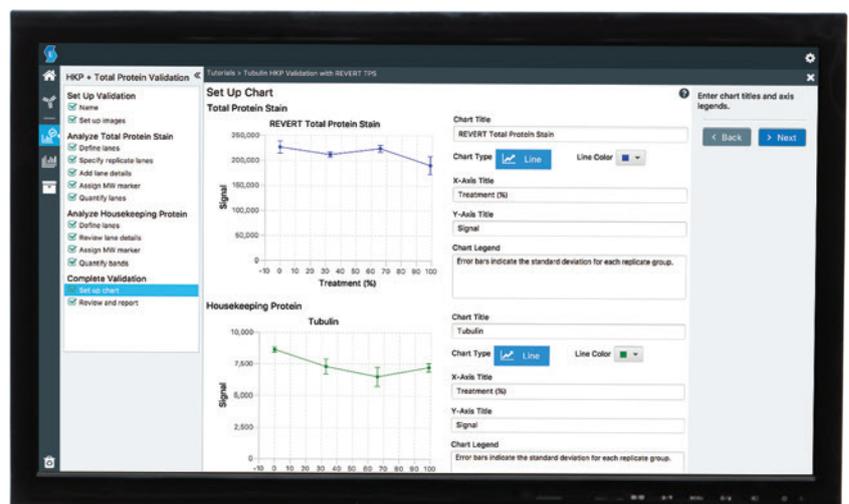
*In Vivo* Imaging

Glycoprotein Detection

Transcription Factor Assay

Transporter Targeting

*And More...*



# Odyssey<sup>®</sup> Fc Imaging System

## 近紅外光暨冷光影像系統

Streamline your ECL protocol or perform two-color multiplex detection using near-infrared fluorescence with high-performance laser powered excitation reinforced by the FieldBrite™ XT<sup>2</sup> core.

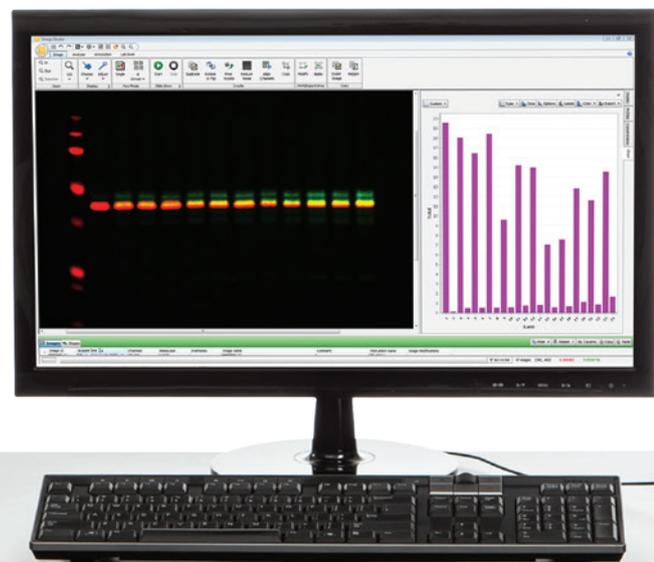
### 主要特色

- 4-channel, multi-modal, 2 IR, chemiluminescent, and DNA stain imaging
- Uniform detection across the entire imaging area
- Detect multiple targets on the same blot
- Capture a single image without changing camera settings
- Minimize variability with direct near-infrared fluorescence



“Instead of getting two or three different instruments for imaging Western blots, agarose gels, SDS-PAGE gels, and other assay, we purchased a single instrument that can be used for all of these applications.”

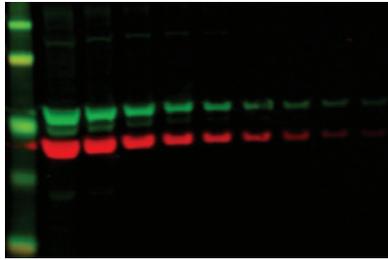
- Rick Page, Miami University



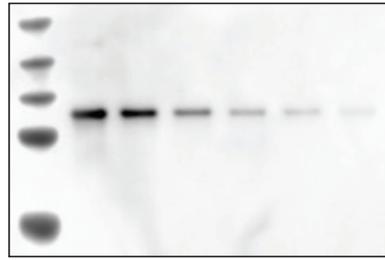
12

precision

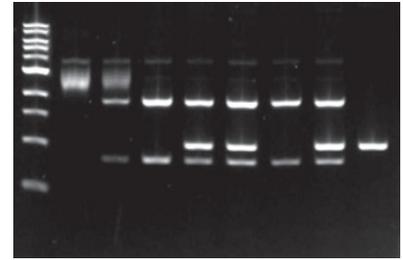
## 應用範例



Near-Infrared Fluorescence  
Western Blot



Chemiluminescent Western Blot



Nucleic Acid Gel Documentation

### Other Applications

Fluorescence Protein Arrays

RNAi Analysis

ECL Protein Arrays

Coomassie Protein Gel Documentation

## 直接取得優質的原始影像，不經過軟體再修飾

Capture uniform, low-background images that are not subjected to image correction for superior reproducibility. The patented optics of the Odyssey Fc deliver uniform, low background images every time with no post-capture image manipulation. Other digital imagers modify images after capture to correct for non-uniform image brightness or artificially improve the exposure.



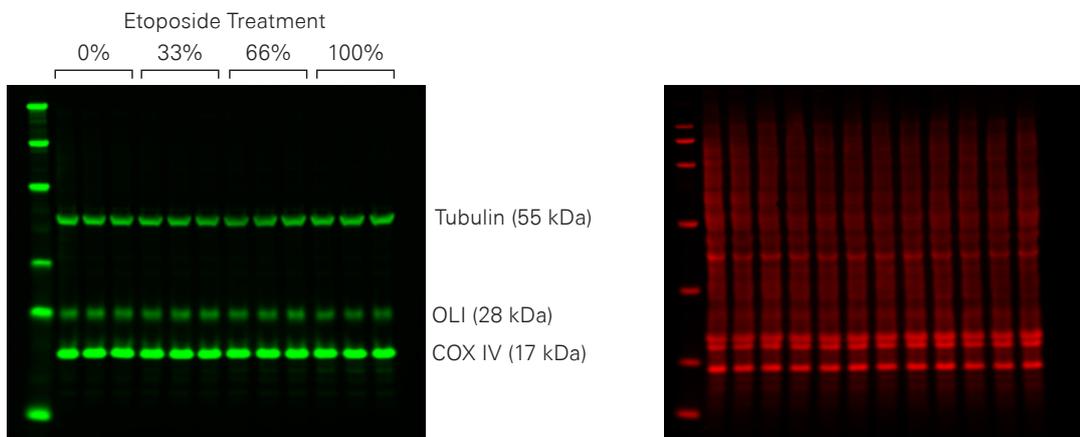
## 近紅外光螢光 Western blots 相關試劑

Get quality results from stable detection chemistry by combining quality LI-COR reagents with Odyssey® imagers and Empiria Studio™ software.

### Precise Validation and Accurate Normalization

Measure protein expression changes with accuracy, whether you normalize targets to total protein or validated housekeeping proteins.

- REVERT™ Total Protein Stain  
適用於轉印在 PVDF 與 NC 膜上的蛋白質，10 分鐘內完成染色，可退染。
- Primary Antibodies  
適用於 Housekeeping protein，包括  $\beta$ -Actin,  $\alpha$  /  $\beta$ -Tubulin 及 COX IV。
- Odyssey Loading Indicators (OLI)  
與蛋白質樣本混合後上樣，適用於評估 loading 操作的一致性，以及轉印過程的均勻度。



**A.** OLI and Housekeeping Proteins  
800 nm channel

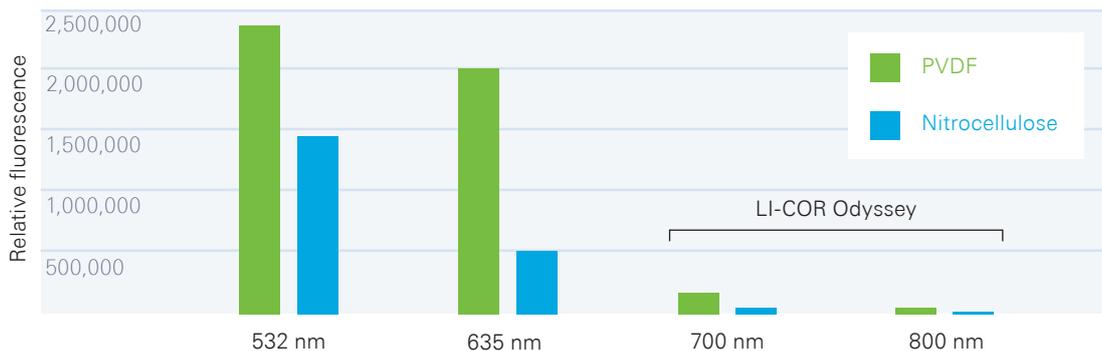
**B.** REVERT™ Total Protein Stain  
700 nm channel

**Detection of OLI 800.** (A) Odyssey Loading Indicator was detected simultaneously with the housekeeping proteins COX IV and tubulin in the 800 nm channel with the Odyssey CLx imaging system. (B) REVERT Total Protein Stain was detected in the 700 nm channel. Targets were detected in Jurkat lysate, which had varying levels of Etoposide treatment.

## Enhanced Detection Sensitivity

Minimize background autofluorescence and improve detection sensitivity with reagents optimized for near-infrared fluorescence imaging.

- Immobilon®-FL PVDF and Odyssey Nitrocellulose Membranes  
螢光相關實驗專用，降低自體螢光背景干擾。
- Odyssey Blocking Buffer  
品項包含：Odyssey® Blocking Buffer (TBS)  
Odyssey Blocking Buffer (PBS)  
Casein Blocking Buffer  
Blocking Buffer Optimization Kit
- Protein Sample Loading Buffer  
4X Orange Protein Sample Loading Buffer。



Near-infrared fluorescence imaging gives you low membrane fluorescence and high sensitivity. Visible fluorescent dyes have poor sensitivity, due to undesirable membrane autofluorescence.

## Track and Measure Targets with Stable Chemistry

Get sensitive detection and multiplexing options with IRDye® Infrared Dyes and dye-conjugated products.

- IRDye Fluorophore-Conjugated Secondary Antibodies  
適用於 Odyssey® 系列影像系統。
- Odyssey® and Chameleon® Molecular Weight Markers  
多色預染型蛋白質分子量標準品，明視野下可見且於近紅外光螢光系統下可偵測。
- IRDye Infrared Fluorescent Dyes  
適用於標示蛋白質分子與抗體分子。

## 我們提供的資源 / 技術諮詢 / 教學服務

### Webinars and Training Programs 線上演講與教學課程

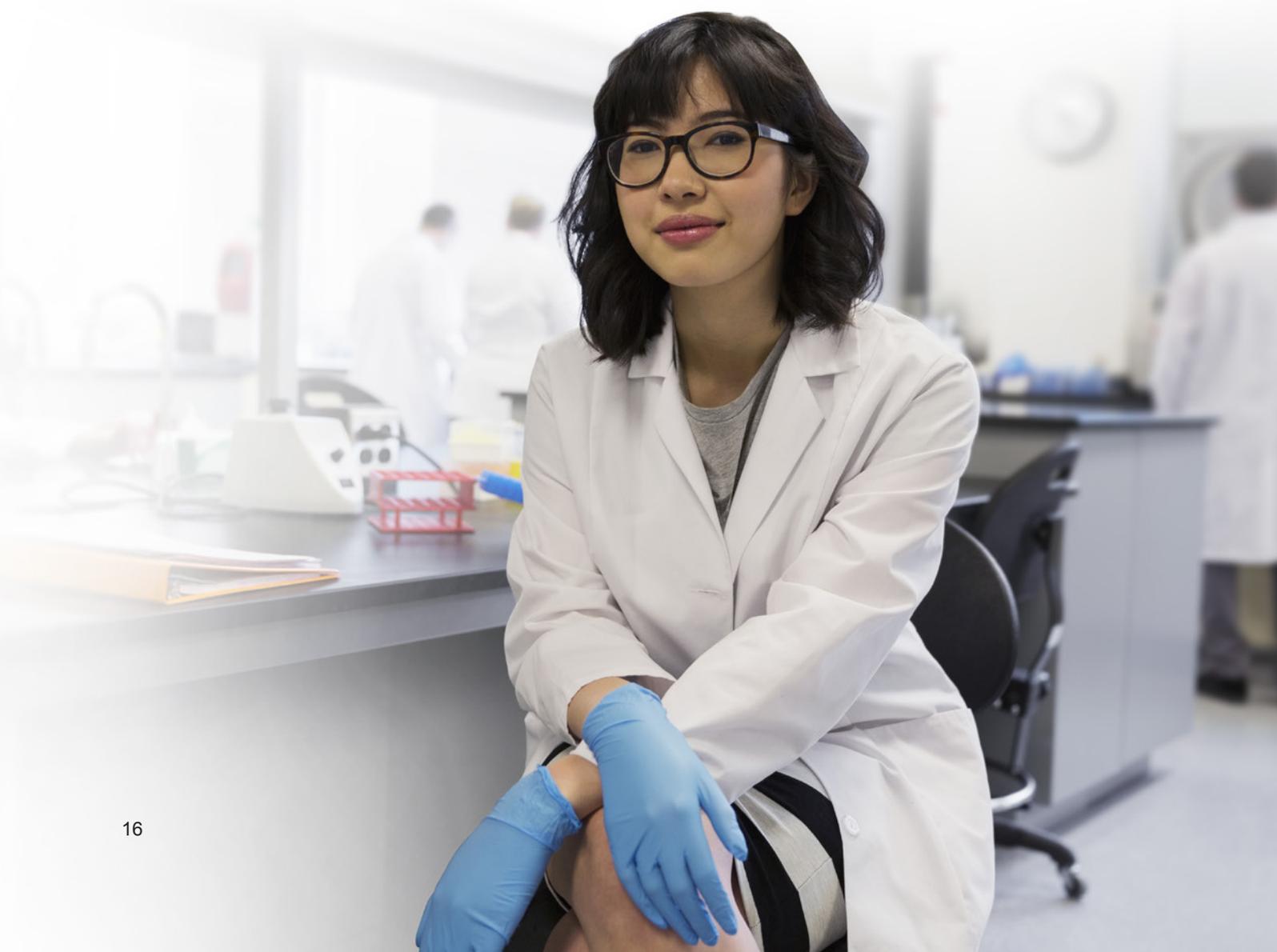
Join industry expert LI-COR scientists for interactive webinars on prominent topics in molecular imaging and related topics. Onsite training programs for new users and consultation with traveling support scientists are available for new and long-time customers alike.

### Support and Technical Literature 支援與技術文件

Comprehensive support library contains manuals, brochures, protocols, technical and application notes, FAQs and more for all LI-COR imaging systems, reagents, and software products.

### Your Personal Coach 免費諮詢

Highly qualified LI-COR Sales and Support Scientists are available for consultation, instrument installation and start up, and remain on standby to provide ongoing support for the life of your LI-COR products.





# Lambda U™ 線上教學網

隨時隨地學習 **Western blot** 實驗設計與操作

Lambda U courses are designed to help your lab achieve consistency in procedures and techniques and to produce the highest-quality, replicable data.



理論與實踐兼具的平衡性內容



可自訂進度的模組化課程



專業人士擔綱相關指導

## Lambda U™ Learning Paths 課程內容

The modular course design of Lambda U learning paths allows you to focus only on what you need to learn, with topics ranging from Western blot foundations to advanced validation and analytical techniques.



### **Free Introduction to Western Blotting**

Master the foundations of Western blotting, including sample prep, gel prep, electrotransfer, and more.



### **Meeting Western Blot Publication and Grant Funding Requirements**

Take your research to the next level with this 7-part learning path featuring advanced topics focused on meeting Western blot publication guidelines.



## 客製化服務

Customize our technology solutions to your research needs. Take your project forward with innovative near-infrared fluorescence imaging solutions from bench to translation to manufacturing.

### Biological Assay Services 生物性檢測服務

Comprehensive protein assay services for a wide range of project applications

- Experimental Design, Protocol Development, and Imaging
- Reagent Validation and Optimization
- Data Quantification, Normalization, and Analysis
- Higher-Throughput Analysis
- Confirmatory Studies

### Regulatory Services 實驗室規範服務

Partner with LI-COR custom services for your confirmatory studies and get on the fast-track to approval. LI-COR offers a number of regulatory products and services including IQ/OQ services, product verification, and 21 CFR Part 11-ready software.

### cGMP Manufacturing cGMP 規格生產

Building on decades of reagent and dye experience, LI-COR has expanded services to include synthesis and conjugation for early-phase cGMP production.



## 參考資料

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3. Baker, Monya. 1,500 Scientists Lift the Lid on Reproducibility. *Nature* 533: 7604 (2016, May). Web. DOI: 10.1038/533452a.
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7. Instructions for Authors. *The Journal of Biological Chemistry*. American Society for Biochemistry and Molecular Biology. Web. <http://www.jbc.org/site/misc/ifora.xhtml>.
8. Recommendations to Funding Agencies for Supporting Reproducible Research. American Statistical Association. Web. <https://www.amstat.org/asa/files/pdfs/POL-ReproducibleResearchRecommendations.pdf>.
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**LI-COR®**

Accelerating  
Your Research! 