Storm

THE STANDARD IN GEL, BLOT, AND MACROARRAY ANALYSIS

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Amersham Biosciences

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Three detection capabilities — united in one system.

The Storm™ gel and blot imaging system unites the superior storage phosphor autoradiography technology of Molecular Dynamics™ with two nonradioactive detection capabilities. Now you can make the move to fluorescence gel and blot analysis methods without giving up popular radioisotope techniques. The Storm system gives you proven PhosphorImager™ capability for autoradiography, plus direct fluorescence for nucleic acid and protein gel analysis, plus chemifluorescence for fast blot analysis without exposures.

Storm lets you choose the best method available for your application. Many applications can be analyzed by more than one of the following detection modes:

Band shift assays ▼▼
Carbohydrate analysis ▼
CAT assays ▼
Colony hybridization ▼
DNA footprinting ▼
DNA quantitation ▼▼▼
DNA sequencing ▼▼
DNA typing ▼▼▼
Dot blots ▼▼
Enzyme assays ▼
In-vitro transcription ▼
Kinase assays ▼
Library screening ▼▼
Microsatellite mapping ▼▼
Northern blotting ▼▼
Plaque lifts ▼▼
Primer extension ▼
RAPD ▼▼
Restriction mapping ▼
RFLP ▼▼
RNA quantitation ▼▼
RNase protection ▼
RT-PCR* ▼▼
S1 mapping ▼
Slot blots ▼▼
Southern blotting ▼▼
SSCP ▼▼
Short tandem repeat ▼▼
TLC ▼
Western blotting ▼▼▼
Whole-body autoradiography ▼
VNTR ▼▼
1-D Protein gels ▼▼
2-D Protein gels ▼▼

Storage phosphor autoradiography ▼
Direct fluorescence ▼
Chemifluorescence ▼

Based on proven performance

The Storm system is known as the standard in gel, blot and macroarray analysis. Built on the technology of the first PhosphorImager system introduced by Molecular Dynamics in 1989, Storm seamlessly merges world class filmless autoradiography with fluorescence technology. The wide, linear dynamic range of the PhosphorImager system yields useful data at every exposure intensity, enabling researchers to visualize and quantitate data from their gels and blots on the first try—even if there are both strong and weak bands on the same sample.

Storm maintains this level of data quality, and offers the same wide, linear dynamic range that PhosphorImager users have come to rely upon for their research.

Now—along with high-resolution images, short scan times, large format capability, powerful software, and intuitive operation—Storm captures accurate data from radioisotopes, direct fluorescence, and chemifluorescence.

Intuitive operation

With Storm it doesn't matter whether you're using autoradiography, direct fluorescence, or chemifluorescence—you load and scan your sample the same way. Simply place your gel, blot, or storage phosphor screen on the glass plate; then point-and-click on the scan control window to start your scan.

ImageQuant™ software, included with Storm, can be used on both Macintosh™ and PC systems, providing a consistent cross-platform user interface along with powerful data analysis and reporting capabilities.

Direct access to all your data

The Storm system's three-in-one functionality also gives you the added convenience of having all your data and results saved in one place and in a common format. You can simultaneously review and compare all the gels, blots, and autorads related to a single project then print out your results for documentation or publication. You can also electronically archive your data and results, organized by project, for quick retrieval and review.

Better blot analysis with ECL Plus and chemifluorescence

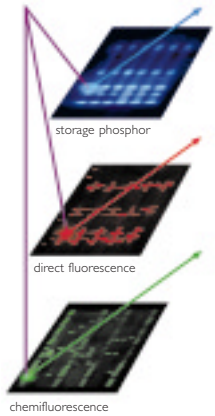
ECL Plus™ Western blot imaging system from Amersham Biosciences™ yields high sensitivity images on Storm. Storm delivers additional non-radioactive Southern, Northern, and Western blot imaging through the technology of chemifluorescence.

With Storm, chemifluorescence is fast and sensitive. DNA and protein samples visualized by chemifluorescence are scanned directly in the Storm system without any exposures to film or storage phosphor screens. The fluorescent product of chemifluorescence is long-lived, so it won't die out before you get your data.

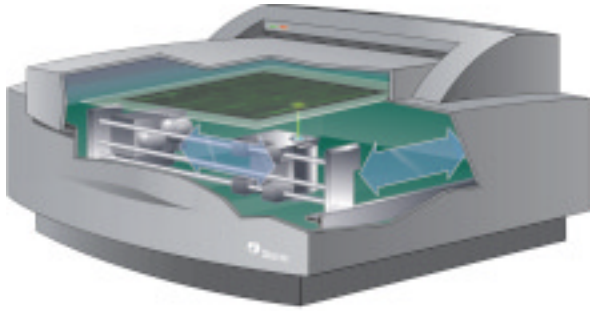
Chemifluorescence works with both nucleic acid and protein blots and is also compatible with strip and re-probe procedures.

Blotting protocols for chemifluorescence are very similar to those used for chemiluminescence, but use a different final substrate. Chemifluorescence makes nonradioactive blot analysis simple, direct, and convenient.

The Storm system's unique **VMI architecture** enables the integration of multiple stimulation and detection wavelength capabilities in a single compact optical component.



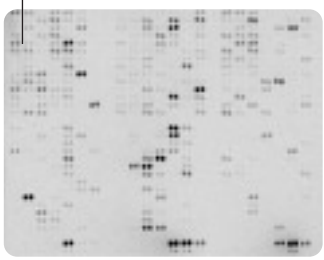
Breakthroughs in mechanical and electro-optical design* enable Storm to achieve both high sensitivity and high resolution at fast scanning speeds.



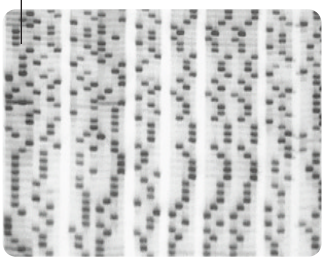
*See legal information.

STORAGE PHOSPHOR autoradiography

Macroarray imaging
on Storm of small or large format cDNA arrays is easily performed for gene expression profiling.

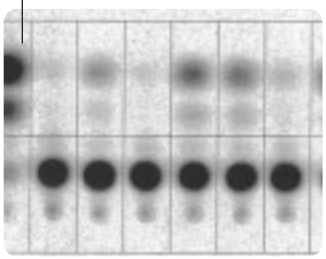


DNA sequencing gels
and other large samples fit on the Storm system's 35 × 43 cm scan area. Storm offers the high resolution you need for DNA base identification.



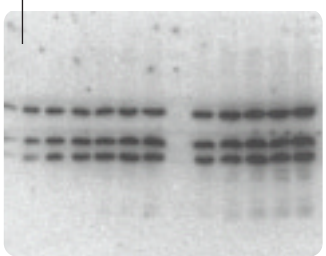
Tritium-labeled samples
can be imaged with tritium screens from Molecular Dynamics. The Storm system's 50 µm pixel resolution enables visualization of even the fine detail of tissue structure.

CAT assays
are used for measuring the rate of gene transcription, transcript stability, and translation efficiency. Storm automates reporter gene assays from image to final report.



Southern, Northern, Western, and other radiolabeled blotting assays
produce images on storage phosphor screens 10–100 times faster than with film. And Storm lets you choose any radioisotope (or use nonradioactive chemifluorescence) for blotting applications.

Courtesy of Christopher Hug, Dept. of Cell Biology, Washington University Medical School, St. Louis, Missouri, U.S.A.



Storage phosphor vs. film
exposures that would take a month with film can be completed in just 3 days with storage phosphor technology.

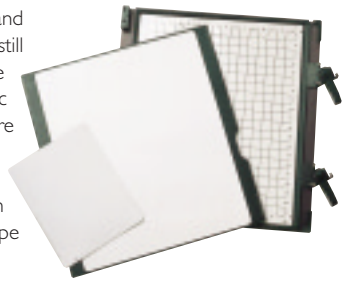
Courtesy of Dr. Alan Schroit, Department of Cell Biology, M.D. Anderson Cancer Center, Houston, Texas, U.S.A.

30 days, film

3 days, storage phosphor

Built-in PhosphorImager system functionality

Although nonradioactive methods are increasing in popularity, most gel and blot studies involving nucleic acids still use radiolabeled probes. Some applications, such as metabolic uptake assays, will continue to require the use of radioisotopes. With Storm, even as you adopt new nonradioactive alternatives, you can continue to use popular radioisotope labeling and detection methods.



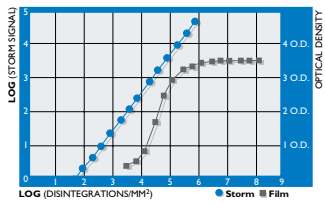
Molecular Dynamics' proven storage phosphor screens are available in 20 × 25 cm and 35 × 43 cm sequencing gel sizes. With proper care, storage phosphor screens last indefinitely, regardless of how often they're used. A ten minute exposure to visible light prepares the screen for reuse.

Publication-ready data in one-tenth the time

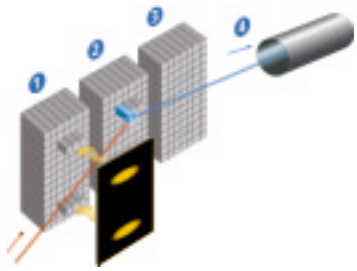
Storm uses storage phosphor screens instead of film to capture quantitative data from radioactive gels and blots. Manufacturing technology from Kodak™ allows Amersham Biosciences to offer a choice of screens to detect different isotopes. Screens are sensitive to any source of ionizing radiation, including commonly used isotopes such as ^{32}P, ^{33}P, ^{35}S, ^{14}C, ^{3}H and ^{125}I. The Storm system's wide exposure range and accurate signal quantitation give you publication-ready data on the first exposure, plus greatly simplified band intensity analysis—even if you have both strong and weak bands on the same exposure. Additionally, you can reduce your exposure times from days to hours, or from hours to minutes, as Phosphor Imager technology built into Storm is many times more sensitive than film.

Large sample area for maximum applications versatility

Storm has a 35 x 43 cm (14"× 17") sample area that accepts large samples so you can scan sequencing-sized gels. Or, you can use the large sample area to expose many small gels and blots simultaneously for maximum throughput. Sample exposures take place in cassettes—not in the instrument—so Storm is always available for scanning. With the Windows NT™ or Windows™ 2000 operating system, scanning can continue even while you're using the same computer to perform other functions.

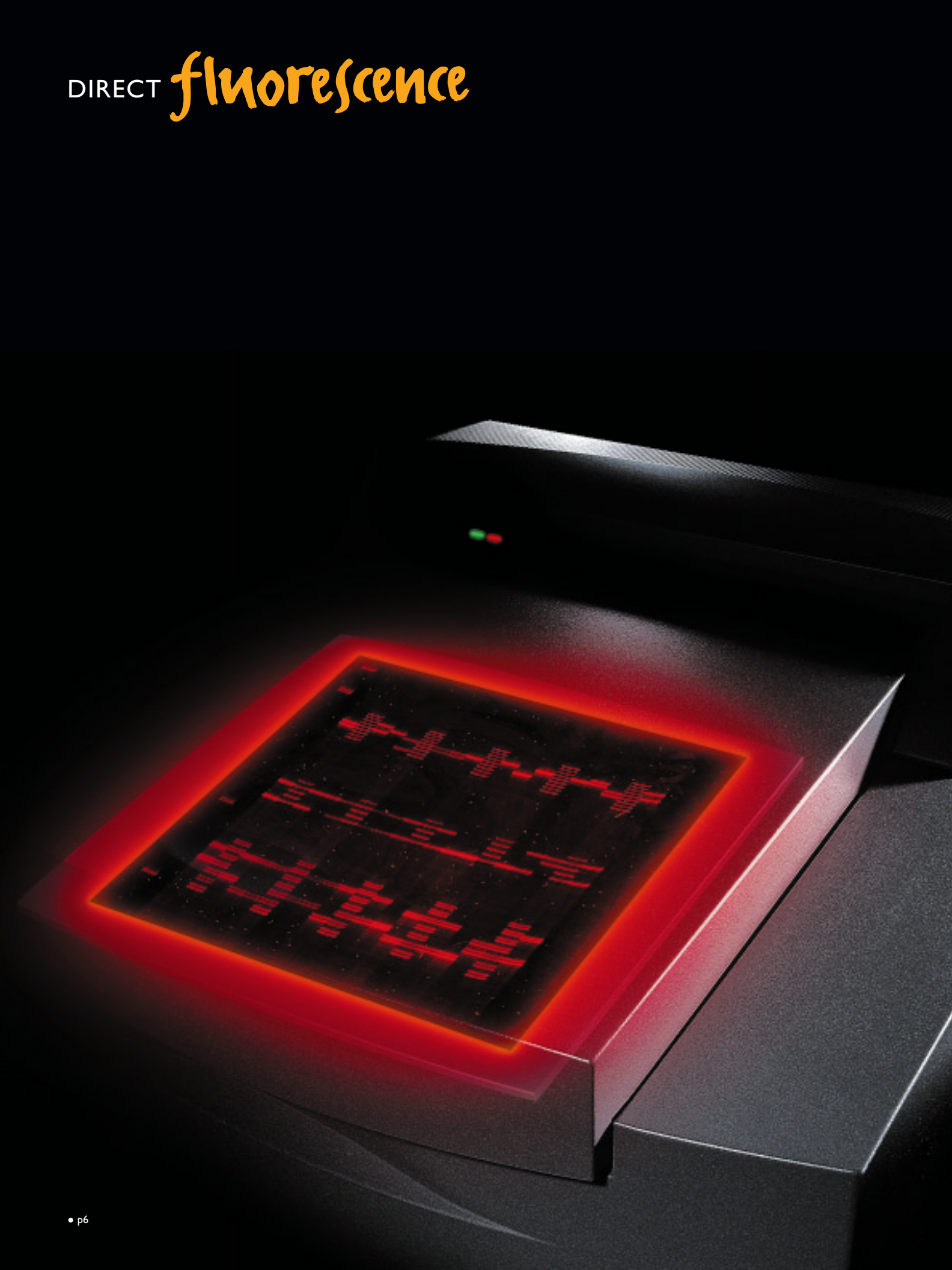


With five orders of linear dynamic range, Storm captures the image from both strong and weak signals in a single exposure. The Storm system's linear dynamic range is 1000 times greater than film.



How storage phosphor works
Exposure of the storage phosphor screen to ionizing radiation induces latent image formation ❶. During laser scanning, the Europium complex crystals in the screen release energy as blue light ❷ and return to ground state ❸. Blue light is collected and measured to form a quantitative representation of the sample ❹.

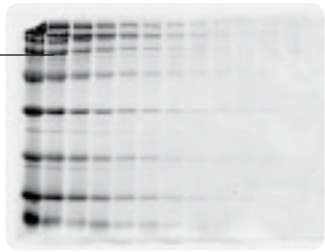
DIRECT fluorescence



Protein gel staining

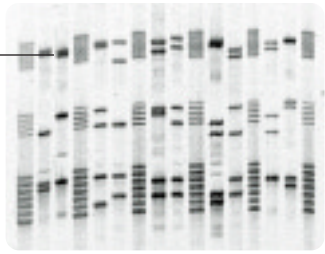
Protein standards were separated on acrylamide and stained with SYPRO™ Orange.

Courtesy of Dr. Vicki Singer, Molecular Probes, Eugene, Oregon, U.S.A



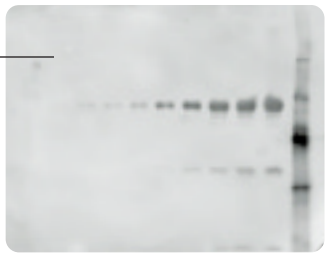
DNA gel analysis

Short Tandem Repeat (STR) analysis of CSF1PO, TPOX, and THO1 loci. PCR* products were separated on acrylamide and stained with SYBR™ Green I.



Western blotting

Tubulin was detected on PVDF membrane using a Cy™5-labeled secondary antibody.



Fast and easy gel analysis

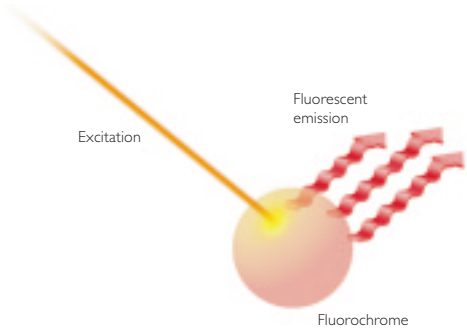
Storm lets you visualize your nucleic acid and protein gels just minutes after electrophoresis. To see and quantitate your DNA, RNA or protein samples, soak your gels in dye solution and rinse away the excess — just as for well-known ethidium bromide and Coomassie™ protocols.

High resolution and direct quantitation

In addition to fast detection and analysis, you also get great image resolution. Fast pixel-by-pixel fluorescent excitation eliminates fluorescent blooming caused by constant UV excitation in traditional systems, so you get better resolution of closely-spaced bands. Quantitation is simplified, because unlike instant film, Storm offers a linear response to fluorescent signal intensities. Just scan your gel and determine band intensity ratios directly — there's no UV light box, camera system, or darkroom time required.

Analyze and print gels over multiple platforms

After scanning and analysis, print your gel on any printer to make hard copy documentation for your notebook or for publication. If you use the same gel for a follow-on blotting experiment, you can either print the blot, or open both images on the screen for actual-size comparisons and easy band identification. The Storm system's ImageQuant software works over multiple platforms. Whether you're using PC or Mac, you have the same display, analysis and printout choices, as well as a consistent user interface.



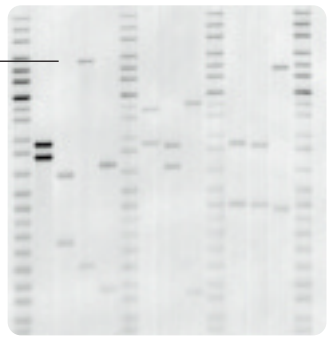
How fluorescence works
Fluorochromes are excited to higher energy states by the Storm system's light source. As they return to ground state, energy is emitted as light of a longer wavelength. The Storm system collects and quantitates the emitted fluorescent light.

*See legal information.

chemifluorescence

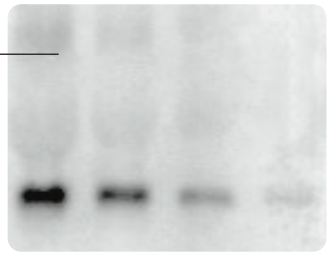
Southern blotting

Bands were visualized by chemifluorescence in this Southern blot of human genomic DNA.



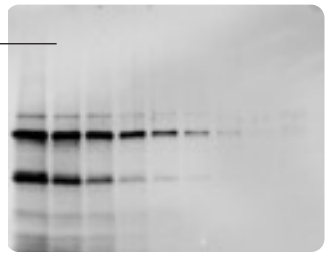
Northern blotting

A fluoresceinated cDNA probe was used to identify p53 mRNA in A172 glioblastoma cells. Bands were visualized by chemifluorescence.



Western blotting

Total brain extract was probed for β-tubulin using HRP-conjugated antibody and ECL Plus substrate and visualized by chemifluorescence.



Fast blot analysis with chemifluorescence

Chemifluorescence is an easy-to-use technique for nonradioactive DNA, RNA, and protein detection on blots. With chemifluorescence, there's no exposure step to wait for—the Storm system reads your chemifluorescence blots in minutes. Further, quantitative analysis is simplified because there's no film intermediate.

Easy, familiar protocols

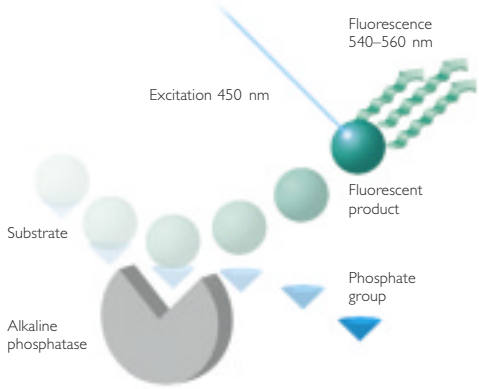
Chemifluorescence sample preparation is very similar to chemiluminescence sample procedures, but chemifluorescence produces a stable, fluorescent reaction product—so you can scan your blot at your own convenience. Chemifluorescence works with strip and re-probe procedures and doesn't require you to change your hybridization conditions.

ECL Plus Western blots with no change in protocol

Although it is most commonly used in chemiluminescence procedures, Storm sensitively detects the fluorescent signal produced by the ECL Plus substrate. ECL Plus Western blotting protocols are based on HRP-conjugated antibodies. This offers a useful complement to the AP-conjugates used in chemifluorescence.

Storm reads chemifluorescence right off the blot

- No guessing when to expose—chemifluorescence is stable for weeks
- No over- or under-exposures
- No film intermediate to complicate quantitation
- No darkroom processing



How chemifluorescence works
Alkaline phosphatase cleaves a phosphate group from the chemifluorescent substrate, releasing a highly fluorescent product. The product absorbs 450 nm light, and emits light at 540–560 nm.

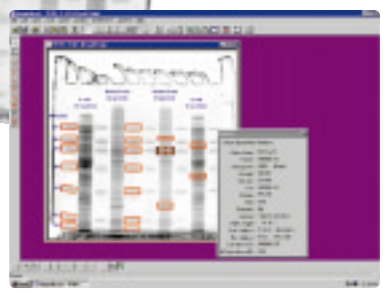
FROM DATA TO RESULTS, quickly

ImageQuant software for gel and blot analysis

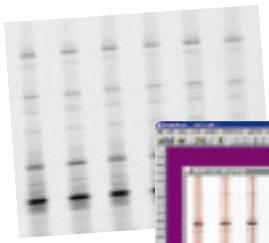
ImageQuant software, included with Storm, gives you point-and-click control over the analysis of your gels and blots and helps you turn your data into results quickly. Use pushbutton tools to select software objects and functions for defining and analyzing your bands. For quantitative analysis, choose between line integration with automatic peak detection and quantitation, or volume integration, which sums the entire signal over areas you specify on the image.

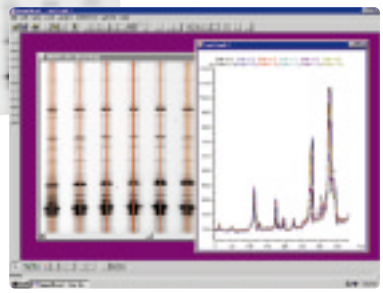
Just point and click to select one of the three scanning modes. Storm scan control software does the rest.

Sample courtesy of Dr. John Schultz, Promega Corporation, Madison, Wisconsin, U.S.A.

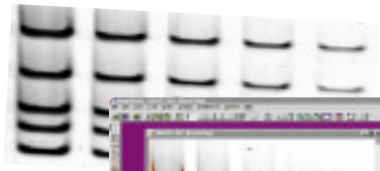


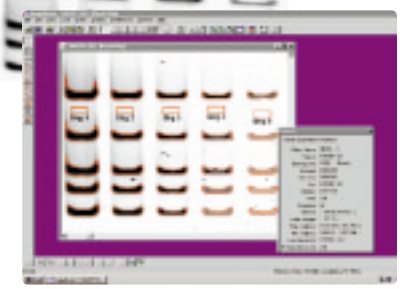
Use straight or rotated rectangles to define bands and compare their intensities.





Generate lane profiles even for curved lanes and view them side-by-side, or overlaid for comparison of lane-to-lane differences.





ImageQuant software's Auto Tracer tool gives you fast, accurate whole band quantitation. Just point-and-click to outline irregular shapes.

Rectangle
Outline bands

Ellipse
Outline dots and 2D spots

Region
Outline irregular spots

Volume Quantitation
Calculate and report band intensities

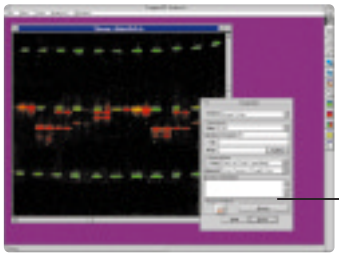
Grid
Overlay matrices

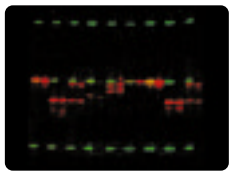
Auto Tracer
For point-and-click band outlining

Magnifier
Zoom in on areas of interest

Create Graph
Create density profiles of your gel lanes

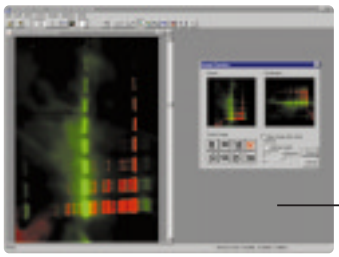
GETTING THE most FROM YOUR INVESTMENT

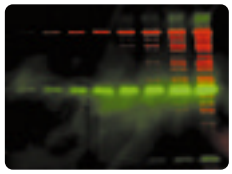




Fragment Analysis

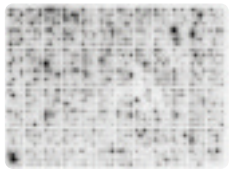
Molecular weight and isoelectric point determination





ImageQuant Tools

Image post-processing rotation and filtering



ArrayVision™

High-density array identification (spot finding) and analysis software

Service and support

Amersham Biosciences equipment and systems are supported in the laboratory by Labcrew™ service professionals. The Storm system's one-year service warranty entitles buyers to on-site services as needed and can be extended with additional support agreements on a year-to-year basis. Amersham Biosciences is dedicated to providing the service and support you need to get the most value from your investment.

Amersham Biosciences product family

In addition to the Storm system, Amersham Biosciences offers a variety of related systems for densitometry, filmless autoradiography, fluorescence imaging, sequencing automation, and microarray analysis.

Typhoon™ 9410
combines gel, blot and microarray analysis.

FluoroImager™ 595
provides fast, fluorescence gel and blot imaging analysis.

Personal Densitometer™ SI
offers high-speed imaging with laser accuracy.

To schedule a demonstration of the Storm system or to request more information on any other product, please contact the Amersham Biosciences sales office nearest you.

www.amershambiosciences.com

Selection Guide — Storm system capabilities

storm system	storage phosphor autoradiography	direct red-excited fluorescence	direct blue-excited fluorescence
820	•		
830	•	•	
840	•		•
860	•	•	•

Ordering information

product	code no.
Storm 820 & ImageQuant Solutions for PC	63-0035-52
Storm 820 & Workstation	63-0035-54
Storm 820 & ImageQuant Solutions for MAC	63-0035-55
Storm 830 & ImageQuant Solutions for PC	63-0035-67
Storm 830 & Workstation	63-0035-42
Storm 840 & ImageQuant Solutions for PC	63-0035-57
Storm 840 & Workstation	63-0035-59
Storm 840 & ImageQuant Solutions for MAC	63-0035-60
Storm 860 & ImageQuant for PC	63-0035-62
Storm 860 & Workstation	63-0035-64
Storm 860 & ImageQuant Solutions for MAC	63-0035-65
Array Vision Station License	63-0008-18

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