

NEWS on diagnostics

Volume 4 2021



This volume of News on Diagnostics aims to simplify assay development and manufacture with a partner who understands the IVD market. Accelerate time to market with fit-for-use products from MilliporeSigma offering the quality, consistency, and documentation necessary for every step of your IVD development and manufacturing needs.

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Antibody Considerations for LFA

Kinetics

Antibody kinetics vary from one to another. One antibody may have a strong affinity but slow on-rate. Optimization for ideal kinetics, ensures adequate time for interaction between the antibody and analyte in transient flow conditions. Ideal antibodies for Lateral Flow conditions would have a very high on-rate and high affinity to ensure specificity and strength of bond in ambient conditions.

Antigen recognition

Protein condition and epitope presentation

Consider sample preparation steps and their impact on the analyte, as time, temperature, pH, and any chemical treatment of your sample may well affect epitope integrity.

Antigen design

A long peptide increases immunogenicity, but also increases the chance for cross-reactivity, while a short peptide improves the specificity, but may not be immunogenic.

Examining the structure of your target will help to appropriately identify where on your analyte the antibody is targeted. Exploring the homology of the antigen with other proteins will allow identification of any potential specific concerns.

Antibody validation

Consider the assay validation and how it relates to your LFA conditions and sample. Sample type and sample treatments, such as titres/dilution, formalin fixation, denaturation, heat treatment, etc., should be considered when evaluating vendor validation data. Demonstration of fluorescent staining in an over expressing cell line does not always transfer to identification/quantification in an endogenous sample.

Antibody structure-conjugation

Antibody structure is critical to consider for assay performance, as well as antibody conjugation. Amino acid sequence and post-translational modifications can alter the most appropriate bioconjugation technique employed. Managing the stoichiometry of bioconjugation chemistry will avoid adversely affecting antigen binding.

Common bioconjugation techniques are homobifunctional cross-linking methods targeting primary amines (i.e. NHS esters, EDC) and heterobifunctional methods targeting methionine residues and specific PTMs.

Antibody structure-Isotype etc.

The Isotype and the overall structure of the antibody will affect assay performance and conjugation considerations, eg. IgM's are sensitive to basic conditions.

Antibodies can be cleaved or recombinantly expressed as simply the Fab regions. Nanobodies present unique small form structure and increased stability.

Antibody form-formulation

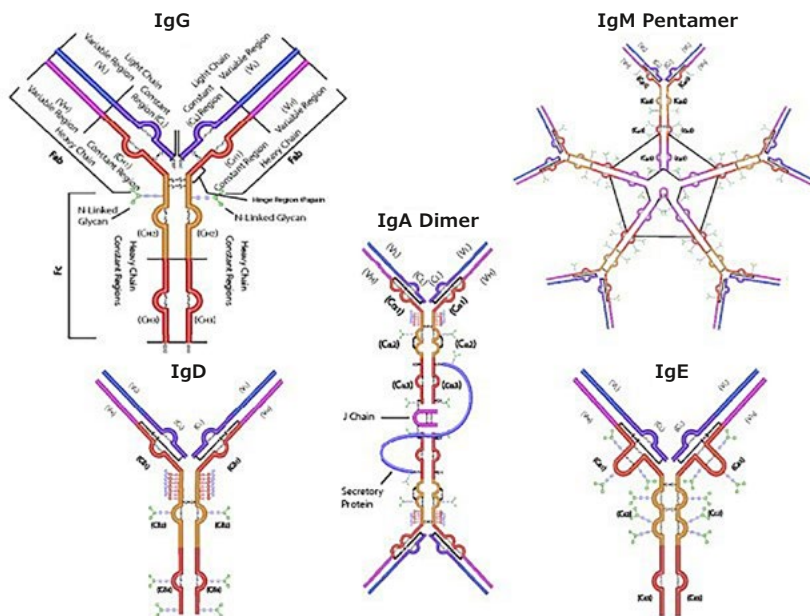
Antibodies can be presented as whole antisera, purified protein, IgG fractions, antigen affinity purified fractions, and be formulated with stabilizers (including sugars, and proteins such as BSA), preservatives, and other additives that can affect stability and performance in LFA conditions.

Antibody clonality should be considered for long term assay performance and supply.

Optimization

All of the *in silico* evaluation in the world cannot guarantee success on your sample in your specific application, but it can improve your success rate.

Common practice is to prequalify three potential antibodies through in-depth evaluation of data, and optimizing factors such as antibody concentrations, amount of sample introduced, incubation times, sample preparation, sample handling, temperature, antibody immobilization conditions, conjugation conditions, and detection conditions over many replicates to ensure a robust assay.



Find out more about our antibody portfolio at [SigmaAldrich.com/antibodies](https://www.sigmaaldrich.com/antibodies)

Membranes and Pads

Hi-Flow™ Plus membranes

Quality Hi-Flow™ Plus membranes sealed in an easy-to-use card format.

As an industry leader and partner to global diagnostic manufacturers, we offer materials, components and custom services including membrane cards for rapid diagnostic test applications. The preassembled membrane cards reduce prep time and simplify your manufacturing design process and production. The precise assembly of our membrane cards results in exceptional consistency in performance for your test.



All Hi-Flow™ Plus membrane materials are manufactured in our state-of-the-art manufacturing facility. We recommend storing these membranes and pad component materials in ambient humidity and temperature conditions. Store out of direct light while not in use during normal production.

Tighter tolerances reduce your incoming quality control (QC).

- Our tight release criteria ensure that your membrane will perform consistently between different product supply lots, which means minimal incoming QC testing on each new supply you receive.

Detailed Certificate of Analysis

- Every lot of Hi-Flow™ Plus membrane includes a certificate of analysis to provide details ensuring that:
- The lot complies with all test specifications
- There have been no changes in critical raw materials (membrane polymers)
- The membrane was produced in compliance with validated and documented manufacturing processes and material specifications

On each quality certificate, you will find the recommended storage temperature of 10-25 °C and 30-70% RH as well as specific lot information and QC test data for your product.

ISO, GMP manufacturing

Our manufacturing sites are ISO 9001:2000 certified and GMP compliant. Customer plant audits are available upon request. We provide the precision, compliant components and expert services you

need to manufacture and optimize your diagnostic products. In the development and production of your lateral flow assay, we are your global partner from concept to clinic.

Hi-Flow™ Plus membranes for speed and consistency

- 5 flow ranges to suit any assay sensitivity
- Consistent performance speeds assay designs and simplifies troubleshooting
- Available as membrane cards to simplify your manufacturing design process and production

Hi-Flow™ Plus membrane card type has a distinctive flow range.

Speed	Sensitivity	Membrane Type	Description
Fast	Low	HF075, HF090	For assays where sample and analyte are abundant and sensitivity is not a major concern
Medium	Moderate	HF120, HF135	For assays that require moderate speed and sensitivity
Slow	High	HF180	For assays where sample is limited or high sensitivity is needed

SureWick® pad materials

For use as sample, absorbent, and conjugate pads.

Glass Fiber diagnostic pads

Our glass fiber pads have low extractables and excellent consistency. These glass fiber pads are typically used as diagnostic pads in lateral flow test strip configurations. Advances in the production of these glass fiber substrates ensure uniform surfaces and low cost.

Sample and absorbent pads

Made from nonwoven, 100% pure cellulose fiber, these pads can be used as sample or absorbent pads. As with the diagnostic pads, these pads are manufactured to ensure consistency in your assay. These pads do not contain binders or glues that can interfere with assay performance.



For more information about our membrane portfolio, please visit <https://www.sigmaaldrich.com/GB/en/products/clinical-diagnostics/lateral-flow-membranes>

Detection Technologies

Estapor® Beads

For over forty years, Estapor® Microspheres has been a leading brand of polymeric supports for *in vitro* diagnostics, life sciences and biotechnology applications. We develop, manufacture, and provide a broad portfolio of Estapor® microspheres worldwide.

Lateral Flow Assays – IVD test strips, based on the principles of immunochromatography, exist for a wide array of target analytes. This technology has advanced rapidly since the first human gonadotropin (hCG) tests. Today, there is an extensive offering of commercially available tests with Estapor® microspheres, the top choice for many. As part of our lateral flow microsphere offering, we provide dyed microspheres for simple qualitative or semiquantitative readings as well as fluorescent and magnetic microspheres for quantitative assays.

NEW! To learn more about the lateral flow assay development process, download our newly released application note “Development of a Quantitative Lateral Flow Test using Estapor® Europium Microspheres and visit us at EMDMillipore.com/Estapor



Lateral flow tests using Estapor® Dyed Microspheres (reference: K1-030 blue for the control, K1-030 red and K1-030 green for the analytes) and Millipore Hi-Flow™ membrane.

Gold nanoparticles

Gold nanoparticles are also used to detect biomarkers in the diagnosis of heart diseases, cancers, and infectious agents. They are also common in lateral flow immunoassays, a common household example being the home pregnancy test.

Learn more about nanoparticle reporters in our technical paper

[Sensitivity of lateral flow diagnostic assays with ultra-bright gold nanoshell reporters](#)

Quality Ancillary Materials

Buffers

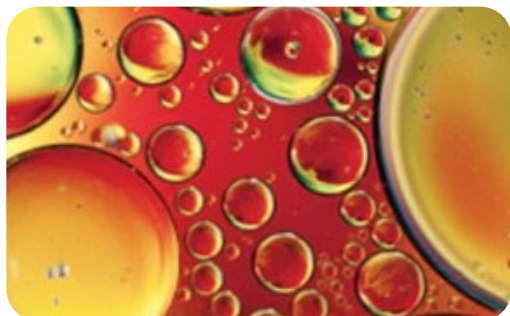
Visit our [Buffers & pH Adjusters page](#) and access our technical article ‘Reproducibility with Biological Buffers’ for help and information on choosing the right buffer for your application.

[Our Buffer Calculator](#) provides an easy-to-use tool to calculate buffer molarity and prepare buffer solutions using the formula weight of the reagent and your desired volume (L, mL, or μ L) and concentration (M, mM, or nM).

Detergents

Download [our detergents selection guide here](#).

Get more information on which [detergents REACH regulations impact, and download a list of suggested alternatives here](#).



Blockers

Probumin® BSA is a commonly used bovine serum albumin for buffers, non-specific blocking, protein stabilization and other diagnostic applications. Superior lot-to-lot consistency, unfailing reliability and expert technical assistance make Probumin® BSA the quality choice for laboratory scientists.



Visit our [Probumin webpage](#), to download our helpful guide, which highlights the most appropriate products for IVD use.

Technical Notes & Brochures

Accelerate your time to market with fit-for-use products, which offer the quality, consistency, and documentation necessary for every step of your IVD development and manufacturing needs. Our technical notes give you valuable information, hints and tips, when you are developing an assay.

Tech Article: [Lateral Flow Assay Development](#)

Tech Article: [IVD Lateral Flow – Sample, Conjugate and Absorbent Pad Basics](#)

Application Note: [Bed Volumes of SureWick® Pad Materials](#)

Brochure: [Hi-Flow™ Plus Membranes and SureWick® Pad Materials](#)

Brochure: [Complete Solutions for Lateral Flow Assay Development](#)

Brochure: [Rapid Lateral Flow Test Strips](#)

On-Demand Webinars

Participate in our complimentary, live webinars, where you'll interact with experts who are breaking ground in their fields of scientific research. You'll learn about the newest tools and technologies while gathering valuable tips and troubleshooting strategies for the applications most relevant to your processes. Alternatively, you can browse our on-demand webinar library to watch and learn advanced research techniques, valuable tips and advice from leaders in their fields of scientific research.



Discover the entire range of live and on-demand sessions at SigmaAldrich.com/webinars

Lateral Flow On-Demand webinars



Optimized Lateral Flow Test Strips: Design Considerations for Optimal Performance

Speaker: Michael Mansfield, Ph.D., Applications Development Scientist, Merck KGaA, Darmstadt Germany.

[Watch Now](#)



Applying AnteoBind™ Activated Estapor® Europium Microspheres for Development of Fluorescent Lateral Flow Immunoassays

Speaker: Charlie Huang, B.Sc., M.Sc., Ph.D., Head of Diagnostics and Life Science, AnteoTech Ltd.

[Watch Now](#)



Optimised Lateral Flow Assays Using Dyed and Fluorescent Estapor® Microspheres

Speaker: Hugues (Augier) de Crémiers, Application Specialist, Diagnostic Solutions, Estapor® Merck KGaA, Darmstadt Germany.

[Watch Now](#)

Dealing with unpredictability: Manufacturing COVID-19 lateral flow tests during the pandemic

Manufacturing COVID-19 lateral flow tests during a pandemic

Dr. Michael Mansfield and Shawn Gaskell outline the current manufacturing bottlenecks within lateral flow diagnostics.



RENEWED COMMITMENT

IMPROVED CAPACITY. PROVEN PORTFOLIO.

Hi-Flow™ Plus Lateral Flow Membranes

As part of our renewed commitment to your success in developing and manufacturing IVD assays and kits, we are pleased to announce improvements that will provide a consistent and reliable flow of membranes to meet your research and production needs. Discover the benefits of our increased capacity of Hi-Flow™ Plus membranes, our workflow expertise, and ancillary product portfolio.

