NEWS ON CLINICAL TESTING

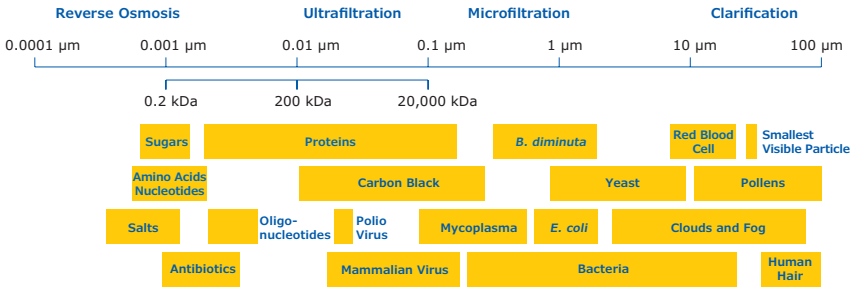
2020 Volume 1 – Special Filtration

Welcome to Volume 1 of News on Clinical Testing

Highlights of this edition:

- Microfiltration and Ultrafiltration
- Stericup® & Steritop® filter units
- Multiscreen® plates
- ELISpot
- Amicon® Ultra / Centrifugation

This issue focuses on filtration for everything from clarification to sterilisation of solutions (e.g. media preparation prior to cell culture), cell culture growth, and the concentration of proteins and small particles.



Reverse Osmosis *(ionic separation)*	**Microfiltration** *(particle retention/exclusion & sterilisation)*
Separates ions or molecules using a semipermeable membrane or barrier. Applied pressure overcomes osmotic pressure and forces solvent to move from a high solute concentration to a low solute concentration	Separates/removes particles (both rigid and deformable types) and biological entities – such as bacteria and cells – based on particle size
Rejects a high percentage of organic matter, other particulates and >99% of salts	Carried out in syringe, multi-well plates, filter units, or disc filters
Typical rating is based on sodium chloride retention: ≤0.001 µm (<100 Daltons)	Typical rating: 09025 – 10 µu; and rated as nominal (~98% retention) or absolute (100% retention of the size equal to the pore size rating)
Ultrafiltration *(macromolecule separation)*	**Clarification Filters** *(prefiltration, particle analysis)*
Separate particles and dissolved molecules from fluids based on particle size	Retains/removes large particles, aggregates, and debris based on size
Used for concentration, fractionation, desalting and buffer exchange	May serve as a primary filtration step before microfiltration
Carried out in pressure-driven, vacuum-driven, or centrifugal devices	Carried out in syringe filters, multi-well plates or disc filters
Typical rating: 0.001 – 0.05µm (1-1000kDa Nominal Molecular Weight Limit [NMWL])	Typical rating: > 5µm

Microfiltration and Ultrafiltration

There are similarities between both techniques:

- Both involve separating particles and from liquids / gases.
- A 'driving force' is required for the liquid/gas to pass through the membrane.
- Driving forces can be:
  - Centrifugal
  - Vacuum
  - Pressure

But also, some differences:

- Microscale particles are removed through microfiltration (Absolute Retention).
- Nanoscale particles are removed through ultrafiltration (Nominal Retention).
- Microfiltration membranes are categorised by membrane pore size.
- Ultrafiltration membranes are categorised according to the size of the particle they retain.

Factors to consider for microfiltration

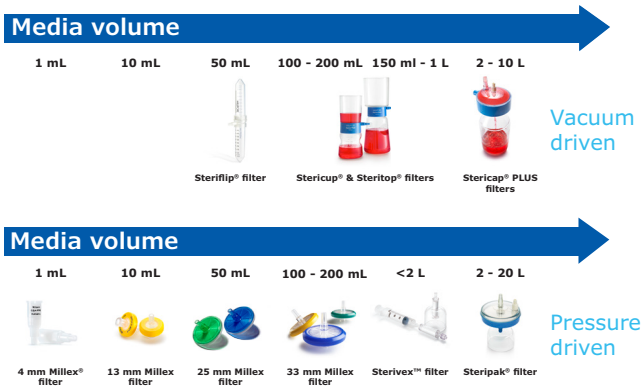
Sample characteristics	Fouling characteristics	Cross flow
Throughput & flow rates	Prefiltration	Agitation
Membrane pore size	Membrane support	Flow rate and filter life
Membrane wettability	Backwashing	Scale of filtration system

We have a wide variety of membranes for both microfiltration and ultrafiltration applications, at lab and process scales.

Find out more at SigmaAldrich.com/millex

We have a range of microfiltration systems for clarification and sterilization with volumes from 1 mL to 20 L:

Sterile filtration for all scales



Refined with you in mind

The Stericup® vacuum filtration system can process and store volumes from 150 mL to 1 L. The new, no-tip/easy-grip flask design and compact profile improve stability during filtration and make Stericup® filter units ideal for use in laminar flow hoods. As an added convenience, the bottom of the receiver flask is slightly recessed, enabling capped flasks to be stacked for easy storage.

Applications

- Tissue culture media +/- additives
- Buffers
- Biological solutions

Stericup® & Steritop® filter units

Stericup® and Steritop® sterile filtration devices combine superior flow rates and throughput with low non-specific binding and a stable, no-tip design.

Fast flow, low-binding membranes

Membranes with low protein binding ensure that key growth factors and proteins won't be absorbed into the filter. Millipore Express® PLUS membranes feature low protein binding and faster flow than other membranes. For applications that require ultra-low protein binding, use a device with Durapore® PVDF membrane.

Explore the full line of Stericup® filter units and applications at SigmaAldrich.com/stericup

Introducing the Stericup® E and Steritop® E sterile filtration devices– evolved with an eco-conscience

The new 'E' (eco-friendly) additions to the Stericup® family eliminate the plastic filler funnel entirely by threading directly onto the media bottle. Stericup® E and Steritop® E filter devices reduce environmental impact by cutting down on:

- Disposable plastic
- Hazardous waste
- Lab storage space requirements

Learn more about the Stericup® E and the Steritop® E at: SigmaAldrich.com/Stericup-E

Millipore®
Preparation, Separation,
Filtration & Monitoring Products

Sterile Millex® Filters

Millex syringe filters are ideal for sterilizing 1 mL – 200 mL of cell culture reagents, such as cell culture media, antibiotics, supplements, sera, viruses for infection, and other biological solutions. Many sterile Millex filters are CE-marked and/or are approved as medical devices, meaning that they can be used to filter pharmaceutical solutions before they are introduced into human patients.

Because of the quality of their design, manufacturing, and quality control, sterile Millex filters are known for superior performance compared to syringe filters from other suppliers:

- Less clogging, faster flow
- Minimal leaching of impurities into filtered solutions
- Minimal non-specific binding of desirable biomolecules, such as high value antibiotics, growth factors, and serum proteins

To select your Millex filters, ask for our Wall Chart

We also offer microfiltration devices, in a microplate format especially suitable for cell growth or ELISpot applications:

Millicell®: Microporous Membrane-Based Cell Culture for Cell Growth

Millicell® products promote natural cell growth and incorporate unique design features to improve flexibility in today's laboratories. Unlike cells grown on plastic plates, membrane-supported cell cultures can access media from both their apical and basolateral sides, resulting in cell morphology that mimics cells grown *in vivo*.

See all Millicell® plates:
SigmaAldrich.com/millicell

Multiscreen® Solvinert Filter Plates

The MultiScreen® Solvinert Filter Plate is a single-use, automation-compatible 96-well device with chemically-resistant 0.45 µm PTFE membrane providing high flow for use in the processing of a wide range of applications, including total drug analysis, peptide synthesis, determination of compound solubility, solid-phase combinatorial chemistry, chemical cleavage applications and sample preparation prior to HPLC.

See all MultiScreen® plate specifications
SigmaAldrich.com/solvinert-filter

ELISpot

Developed in 1983, the ELISpot assay represents the convergence of plate-based Enzyme Linked Immunosorbent Assays (ELISAs) with membrane-based western blotting technologies, permitting detection of secreted analytes at the single cell level.

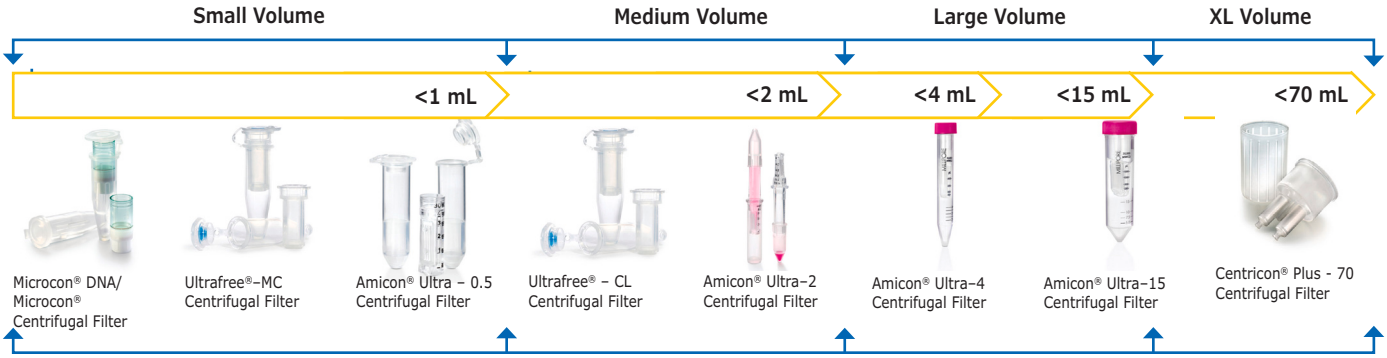
Membranes offer vastly improved binding characteristics over standard polystyrene surfaces. While many options exist, most ELISpots are currently performed on polyvinylidene fluoride (PVDF) membrane plates. Binding of capture antibody is governed by hydrophobic interactions between amino acids such as phenylalanine or leucine and PVDF; this association is much stronger than the electrostatic interactions at nitrocellulose surfaces.

Stronger binding interactions translate to greater antibody density on the membrane's surface, resulting in better-defined spots. Because the readout for an ELISpot is "spots/well", the PVDF membrane's white color provides the ideal backdrop.

Learn more about ELISpot assays, their applications and validation at SigmaAldrich.com/elispot

Ultrafiltration is often the method of choice to separate compounds such as proteins (antibodies for example), viruses, and nucleic acids.

We have a broad variety of devices working with centrifugation or pressurization.



Centrifree® Ultrafiltration for Clinical Samples

Centrifree® Ultrafiltration

With the clinical laboratory in mind, we designed Centrifree® devices to rapidly and efficiently separate free from protein-bound micro-solute in small volumes (0.15–1.0 mL) of serum, plasma, and other biological samples using ultrafiltration. Accurate partitioning occurs in minutes without dilution, change in physiologic pH, ion composition, or unbound microsolute concentration.

These devices contain low-adsorptive hydrophilic membranes and O-rings without plasticizers to ensure excellent recovery.

Applications

- Separation of free from bound microsolute in serum, plasma, and other biological samples
- Determine free therapeutic drugs, testosterone, thyroxin
- Binding studies
- New drug investigations
- Deproteinization

Minicon® Concentrator

Minicon® concentrators are non-sterile, disposable, multiwell ultrafiltration devices designed for concentrating macromolecules in clinical specimens such as urine, cerebrospinal fluid (CSF) or other biological solutions. The concentrators, which require no additional equipment and can be operated unattended, are used by researchers and clinical laboratories worldwide as a preparatory step to increase the sensitivity of subsequent tests.

Features and applications

- Concentrate urine and cerebrospinal fluid to intensify proteins that indicate abnormal or pathological states prior to analysis by electrophoresis or immunoelectrophoresis (e.g., Bence Jones proteins in urine)
- Static concentrator, requiring no accessories
- Absorbent pulls solvent and salts through ultrafilter, concentrating sample

Amicon® Ultra Centrifugal Filters for *in vitro* diagnostic use

The Amicon® Ultra-4* and -15* Centrifugal Filter Units are the premier devices for concentrating 1 – 4 mL and <15mL of sample, respectively. These units are designed for *in vitro* diagnostic use and intended for concentrating serum, urine, cerebrospinal fluid and other body fluids prior to analysis.

* The Amicon® Ultra-4 and Amicon® Ultra-15 with Ultracel-10 membrane are CE marked.

Amicon® Ultra Centrifugal Filter Advantages :

- Avoids spinning to dryness
- Provides a predictable concentration factor
- No need to calibrate for several samples to run in parallel

Reverse Spin Recovery

- Reverse spin devices enable you to maximize protein recovery, especially with small dilute samples, without introducing pipetting errors
- Low binding membrane and polypropylene housing for > 90 % sample recovery

Learn more about Amicon® applications at SigmaAldrich.com/amicon

Product number	Description	Maximum initial sample volume (mL)	Final concentrate (retentate) volume (µL)	Molecular weight cut-off (MWCO)
UFC8010	Amicon® Ultra-4 Centrifugal Filters*	4	30-70	10000
UFC9010	Amicon® Ultra-15 Centrifugal Filters*	15	150-300	10000

*Certified for clinical applications.

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