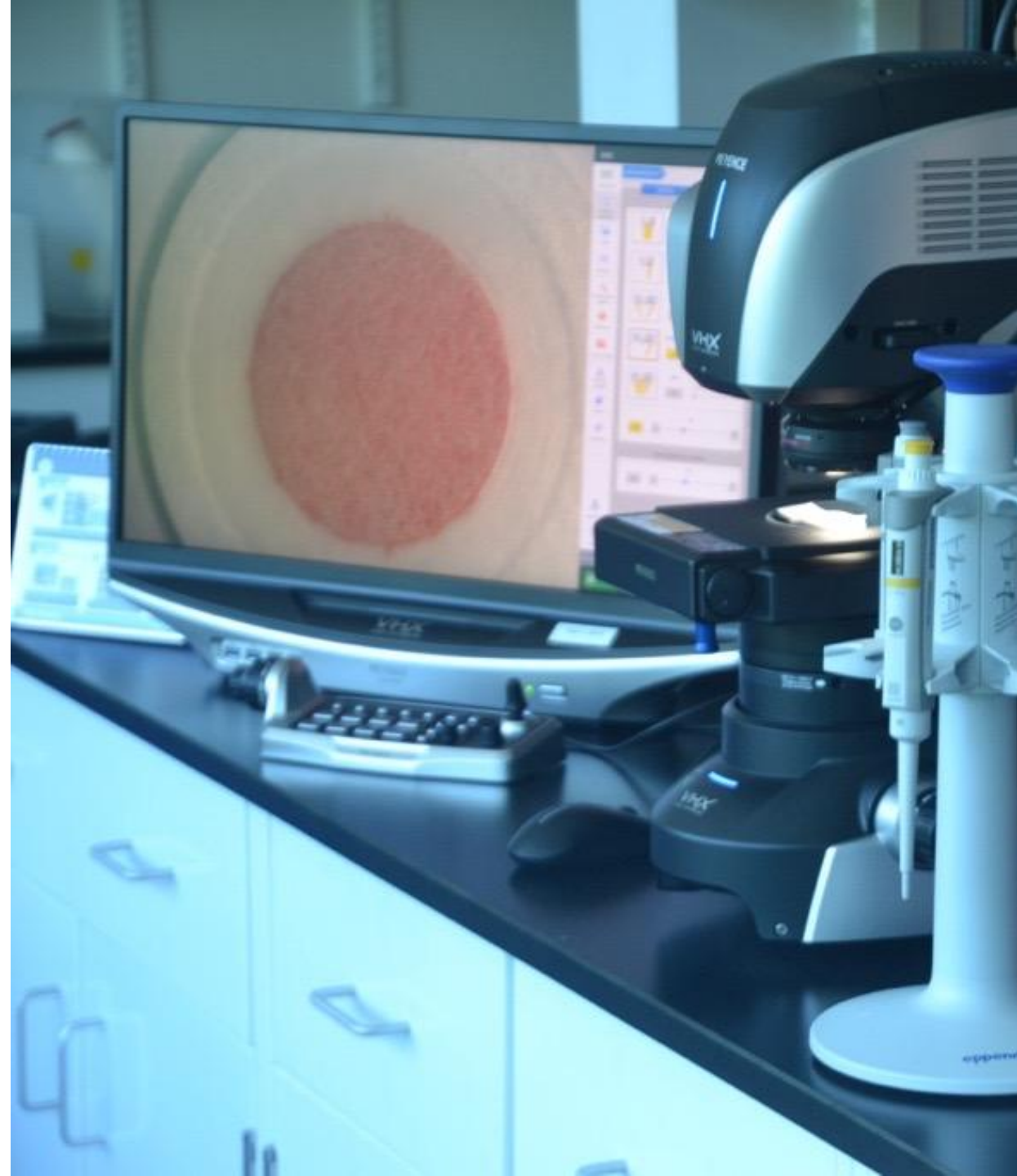




# Accelerating Innovation: Advancements in Blood Separation Membranes

28<sup>th</sup> of October 2025



# About the company

## Filtration Group

### Part of the fastest-growing filtration business in the world

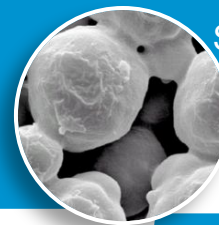
Filtration Group was created in 2009, bringing together a **powerful collection of brands** driving mission-critical systems across a diverse range of end markets and customers.

Affiliate of Madison Industries, one of the largest and most successful privately held companies.

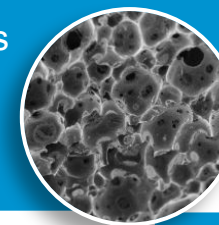
- Revenue: **>\$2 billion**
- Workforce: **9,200+**
- Global: **150+ locations**
- Brands: **30+**

## Porex, part of Filtration Group

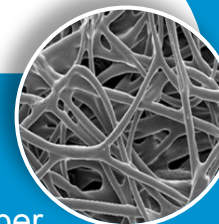
Unlock The Power of Porous Media



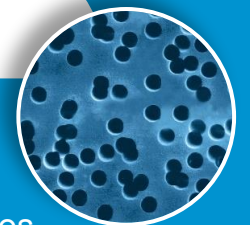
Sintered Porous Plastics



Porous Foam



Porous Fiber



Porous Membranes

# Agenda

- Macro-trends & Strategic Insights
- Solving Key Technical Challenges
- Product Selection & Integration
- Partnering with Porex

# Agenda

- **Macro-trends & Strategic Insights**
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# Macro-trends support the increasing demand for point-of-care solutions



## Miniaturization & Portability

Devices are getting smaller and easier to use



## Multiplex Testing

Single tests detecting multiple diseases simultaneously



## AI & Data Integration

AI-driven analysis and cloud connectivity for remote monitoring



## Lab-Quality & Accuracy

Improved sensitivity and specificity in rapid tests



## Consumerization & At-Home Testing

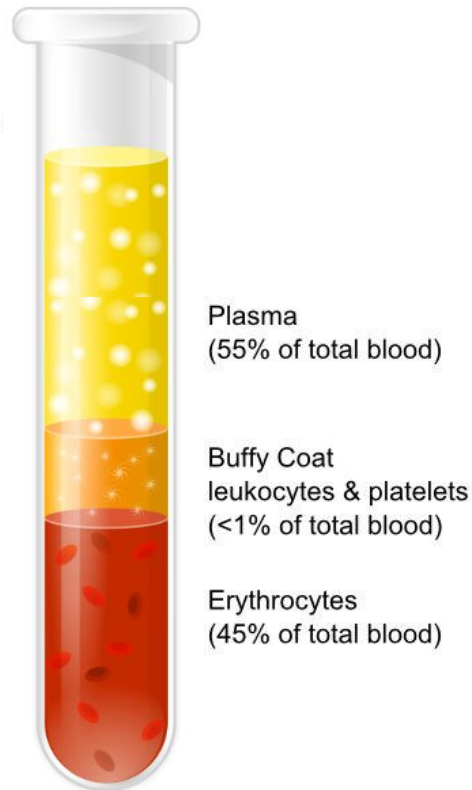
Increased availability of home-use diagnostic kits



## Regulatory & Market Growth

Evolving policies and rising investments in the PoC market

# A wide variety of tests can be done using the individual constituent components of blood



## Blood Components Uses

### Plasma / Serum

Plasma / Serum is the liquid component of blood, consisting mostly of water, electrolytes, proteins, hormones, and waste products. Its composition **provides important markers for assessing general health, diagnosing diseases, and monitoring chronic conditions.**

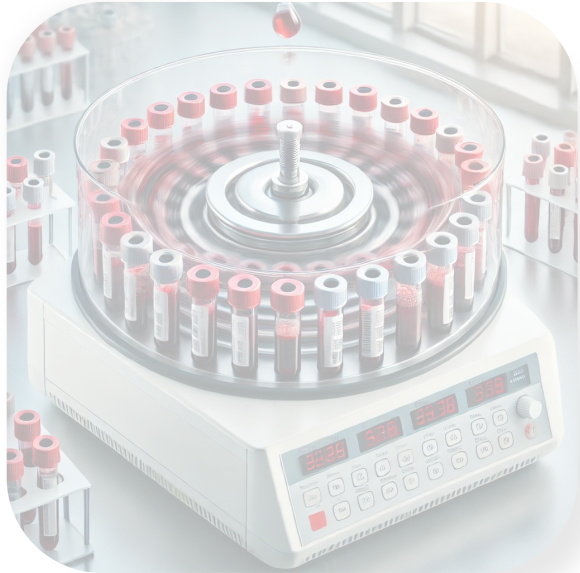
### Buffy Coat

The buffy coat, a layer containing white blood cells and platelets, is used in diagnostic tests to analyze immune function, detect infections, and isolate DNA or stem cells. It plays a key role in **hematological, genetic, and infectious disease testing**

### Erythrocytes

Erythrocytes, or red blood cells (RBCs), play a crucial role in diagnostic tests because they are involved in numerous physiological processes that reflect health conditions. Diagnostic tests involving **erythrocytes can help detect a variety of diseases, including anemia, infections, and certain chronic conditions**

# Our membrane portfolio supports membrane separation solutions



**Centrifuge**

*Simple, cost-effective, widely used*

*Limited precision w/ potential for haemolysis, labour intensive*



**Plasma Protein Fractionation**

*High protein yield, used in therapies*

*Complex, expensive, time-consuming*

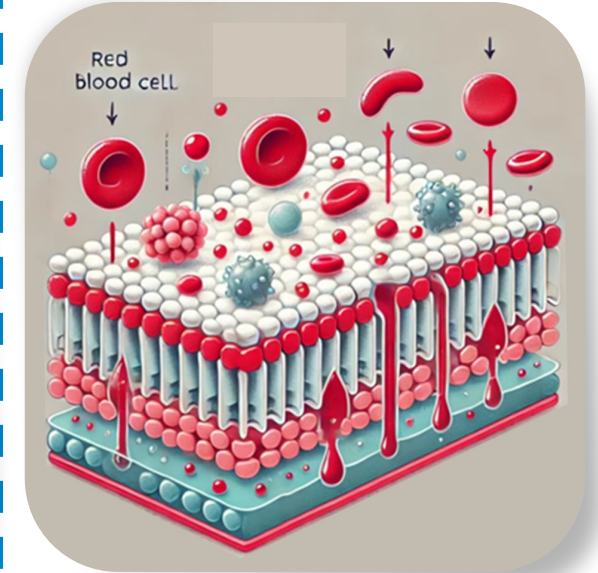


**Apheresis**

*High specificity, higher yield, minimally invasive*

*Expensive, time-consuming, requires trained staff*

## Porex Focus



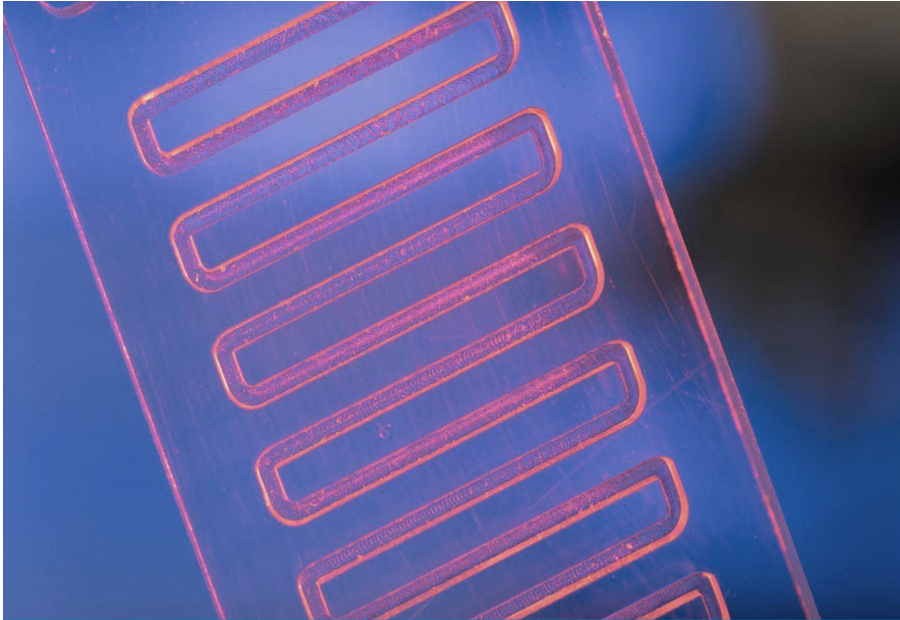
**Membrane Separation**

*Continuous, lower shear forces, fewer steps*

*Membrane fouling, less widely used*

# Agenda

- Macro-trends & Strategic Insights
- **Solving Key Technical Challenges**
- Product Selection & Integration
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## Innovative Approach: **Microfluidic Cartridge-Based Assays**

**Use of High-Yield Membranes:** Ensuring reproducible and reliable results

Leading the way in blood-based POC diagnostics with advanced membrane technology.

# Blood separation membrane challenges

- 1 **Handling Minimal Blood Volume**
- 2 **Maximising Plasma Yield**
- 3 **Speed of Separation**
- 4 **Mitigating Haemolysis**

# We focused our initial development on finger-prick volumes

Finger prick blood volumes increase efficiency while improving blood test accessibility

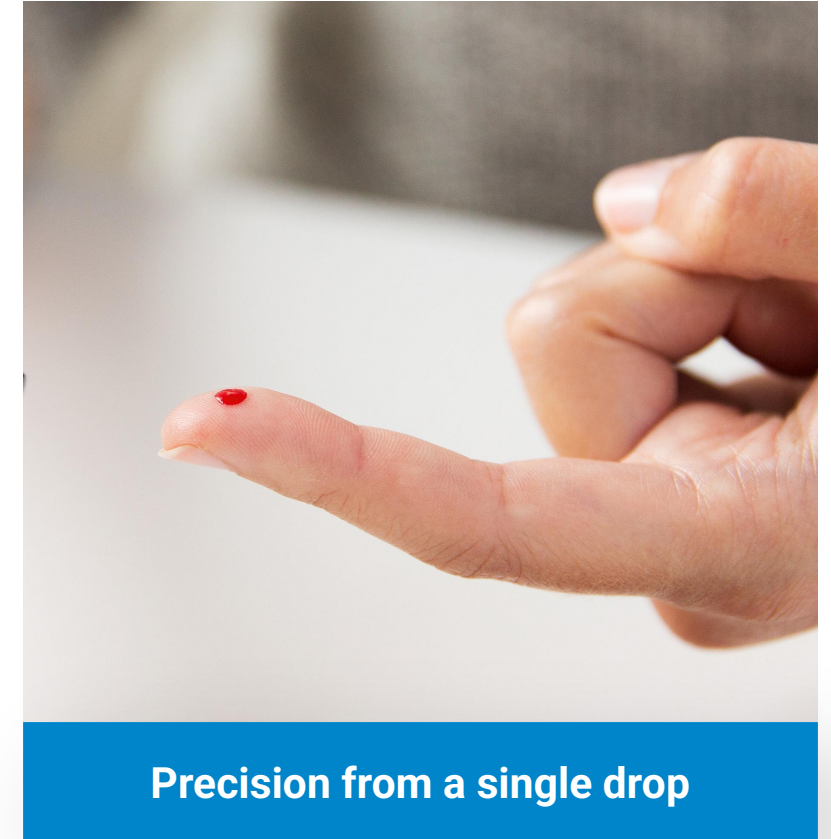


## Improved Accessibility

- Less invasive
- Great for infants, & those who struggle to give samples
- Faster to collect & can be done at home

## Increased Efficiency

- Better for instant results
- Less equipment needed
- Minimal medical staff needed



Precision from a single drop

# Handling small starting volumes

A true 'drop of blood' from a finger prick

Most current blood diagnostic analyzers  
require 20 - 250  $\mu\text{L}$  of blood,  
quoting "a single drop or two"

Abbott I-STAT Analyzer	17 - 95 $\mu\text{L}$
Cepheid GeneXpert (GX4, Omni)	1ml
DRW SAMBA II Analyzer (HIV 1)	100 $\mu\text{L}$
Molbio Diagnostic Trueprep Analyzer	250 $\mu\text{L}$
PixCell HemoScreen Blood Analyzer	20 $\mu\text{L}$
Roche Cobas Analyzer (liat, H232)	19 $\mu\text{L}$
Siemens epoc Blood Analysis	90 $\mu\text{L}$
Siemens Atellica® VTLi Immunoassay Analyzer	30 – 100 $\mu\text{L}$

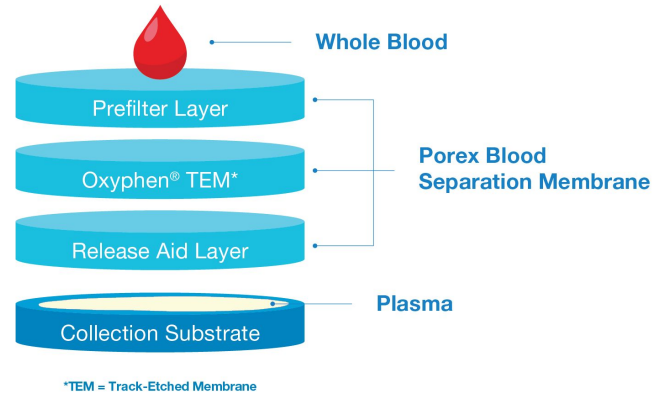
\* Specifications listed per system manuals, all varying per test type or labeling instructions



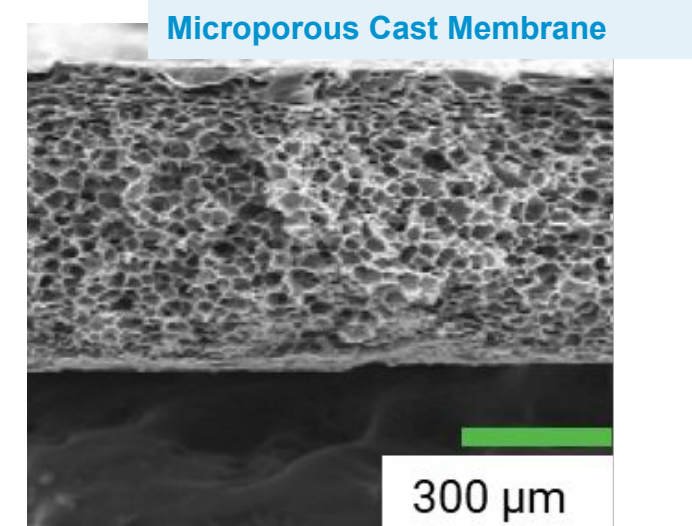
**A finger-prick is closer to 5 - 10  $\mu\text{L}$**

# Ideal membrane for blood-plasma separation

Our true surface filter provides unparalleled control over pore size & improved consistency



*Patent Pending*



	New Porex Blood Separation Membrane	On-Market Microporous Cast Membrane
Pore Structure, Thickness Consistency	High	Low
Holdup Volume	Low	High
Surface Area / Protein Binding	Low	High
Tear Resistance / Elasticity / Handleability	High	Low
Ultrasonic Bonding / Sealing	Easy	Difficult

# Blood-plasma separation with our new membrane

Our membrane separates a true finger-prick volume with predictable plasma yield



## Blood Application Video Overview

- 10  $\mu$ L whole blood (EDTA)
- 10 mm disk (0.71 cm<sup>2</sup>)
- Membrane Thickness <300 $\mu$ m

## Membrane Images Post-Sample Application

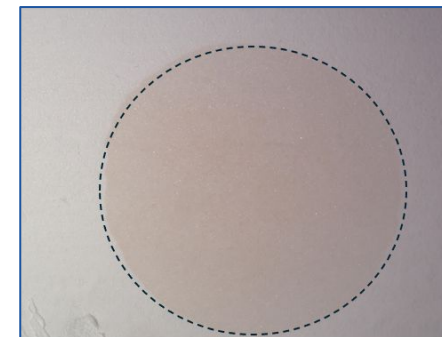


Top Of Membrane

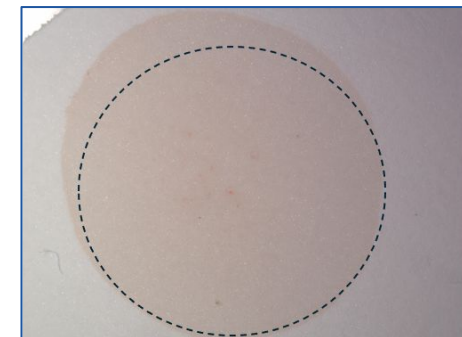


Bottom Of Membrane

## Plasma Yield For Different Filtration Times



1 Minute



2 Minutes

# Consistent methods underpin our data acquisition

We quantify plasma yield & haemolysis from blood where we have a lot of background data



Plasma  
(55% of total blood)

Buffy Coat  
leukocytes & platelets  
(<1% of total blood)

Erythrocytes  
(45% of total blood)

## What We Test

- EDTA blood
- Attain a full patient workup
  - Blood type
  - Hematocrit
  - BMI
  - Age, etc.

## What We Measure

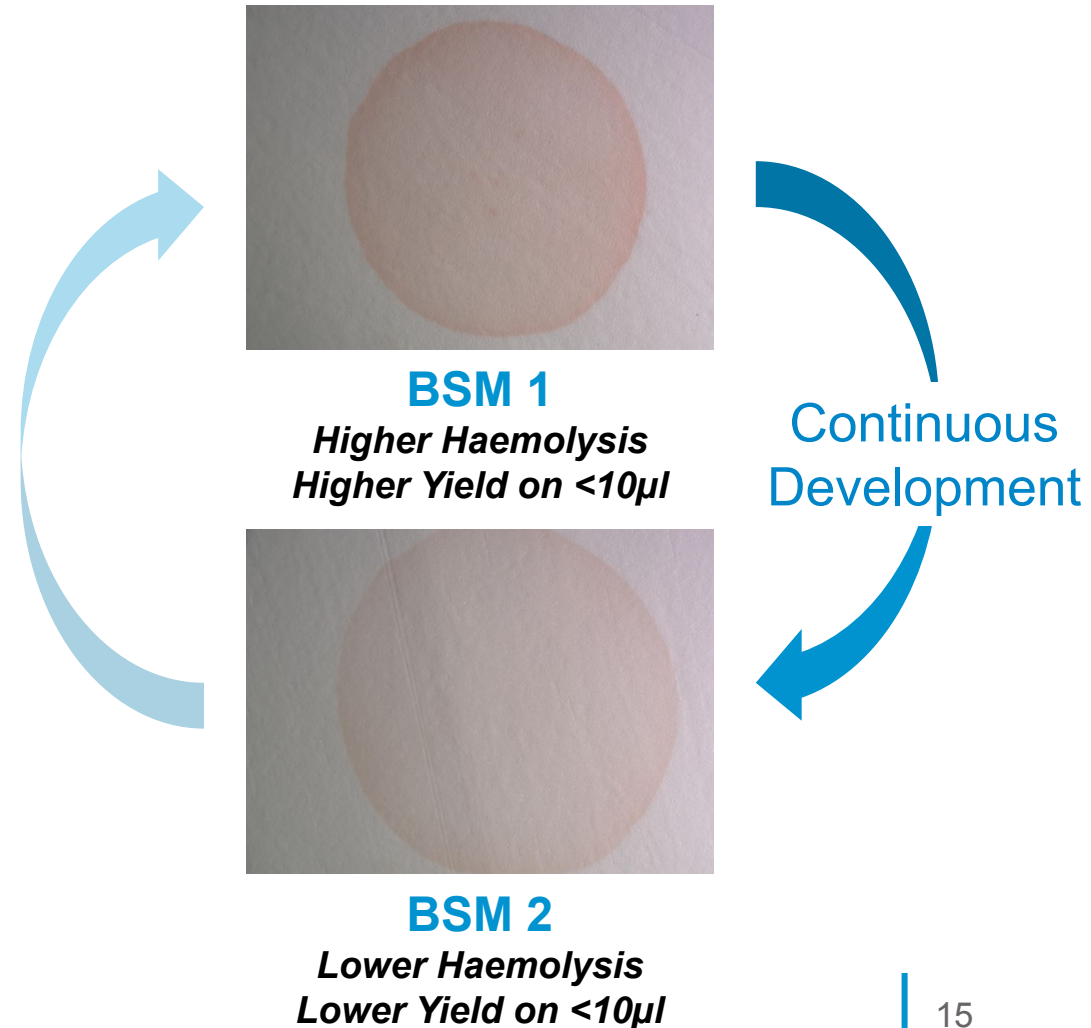
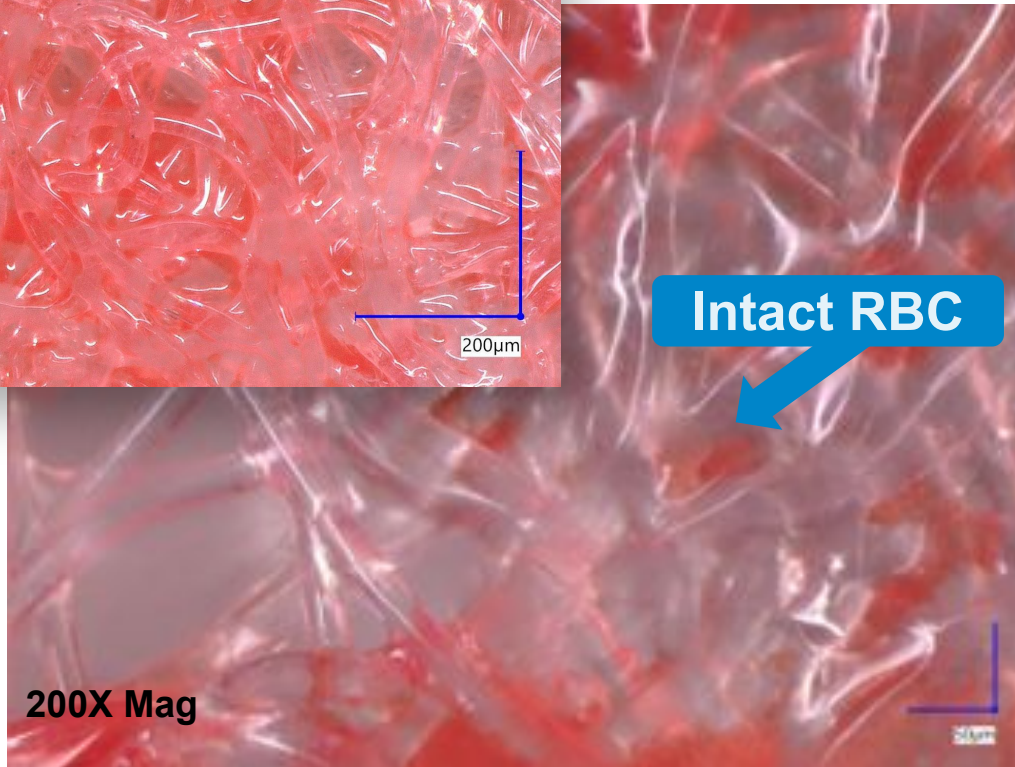
- **Plasma content:** Albumin is the measured as it is the most abundant protein present in plasma & is equated to plasma yield
- **Haemolysis:** Hemoglobin is measured because it is not usually found in plasma unless there is some kind of RBC breakdown & is equated to haemolysis rates

## How We Measure It

- Yield: **Albumin quantification**
  - Nanodrop: Correlate plasma yield
- Haemolysis: **Hemoglobin quantification**
  - Nanodrop: Correlate hemolysis rate

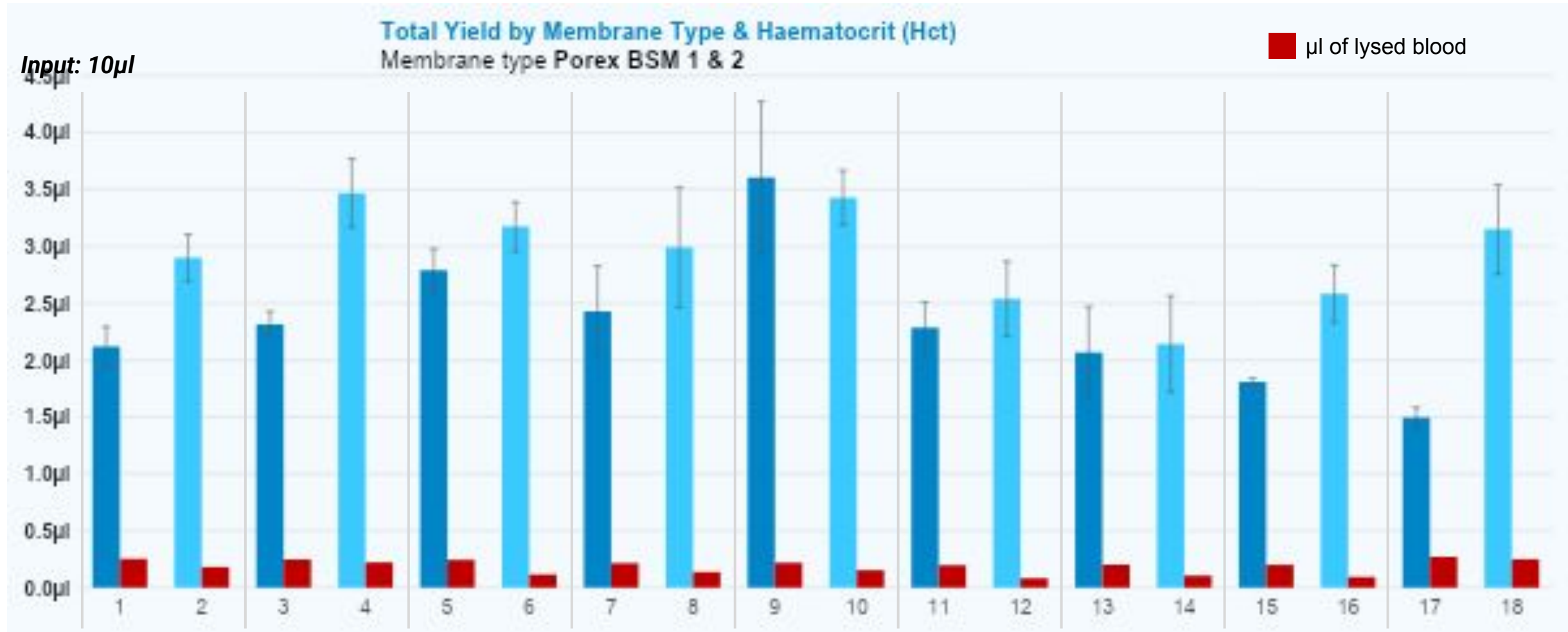
# We continue to refine our product offering

We continue to broaden our offering for additional product requirements across various markets



# We have seen higher yield & lower haemolysis with BSM2

There is variance across yield & haemolysis, accounted for by more than haematocrit alone



# Haematocrit appears to have a considerable impact

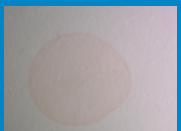
The lower the haematocrit, the higher the yield




# We observe $>1\mu\text{L}$ of yield from even $5\mu\text{L}$ of input whole blood

We observe a threshold volume capacity for varying membrane surface areas


**BSM 1**  
10mm disk  
( $0.71\text{ cm}^2$ )



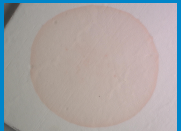
Input Volume:  $5\mu\text{L}$



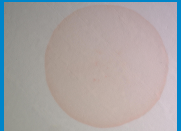
Input Volume:  $7.5\mu\text{L}$



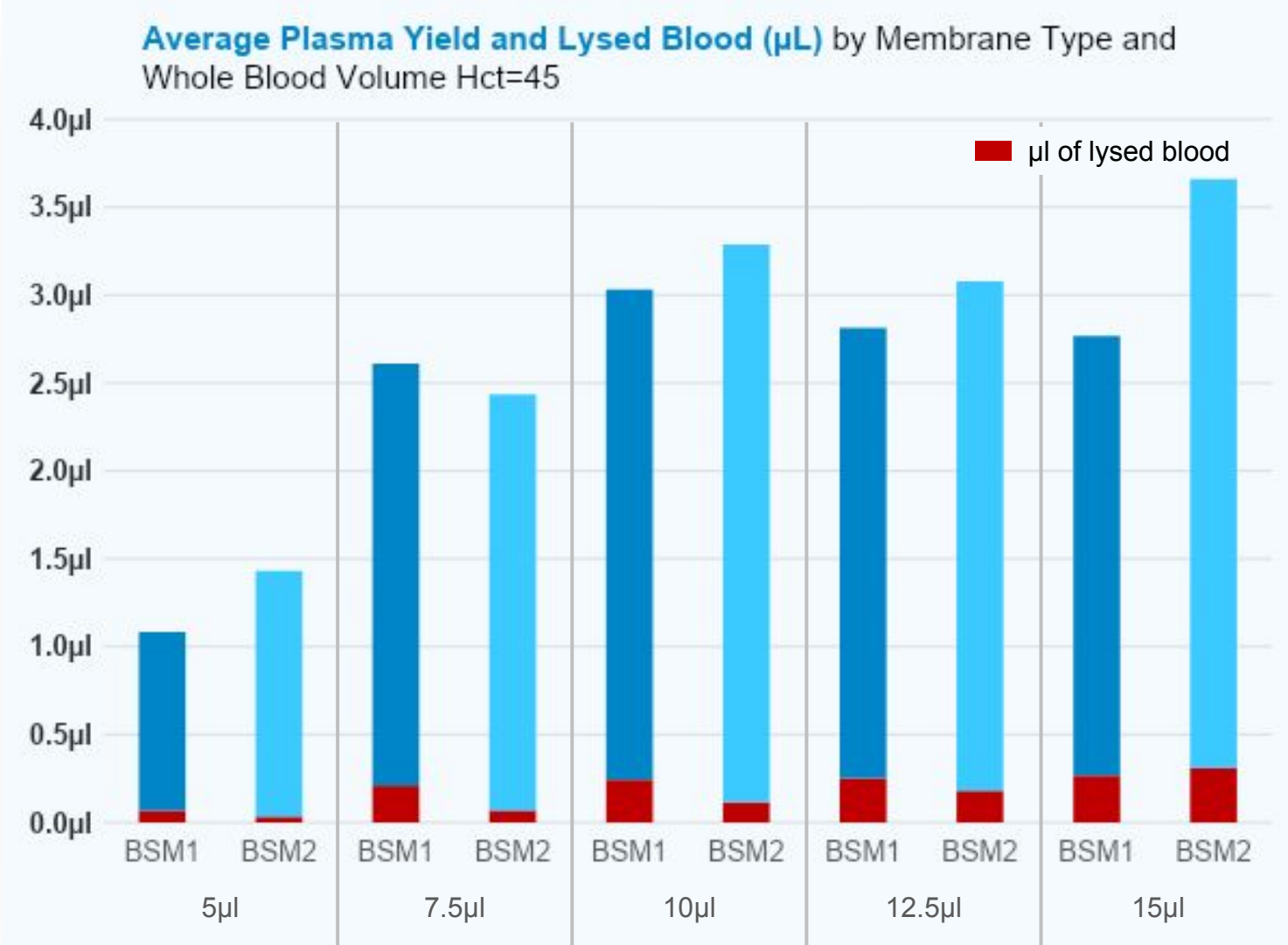
Input Volume:  $10\mu\text{L}$




Input Volume:  $12.5\mu\text{L}$




Input Volume:  $15\mu\text{L}$




**BSM 2**  
10mm disk  
( $0.71\text{ cm}^2$ )




Input Volume:  $5\mu\text{L}$



Input Volume:  $7.5\mu\text{L}$



Input Volume:  $10\mu\text{L}$



Input Volume:  $12.5\mu\text{L}$

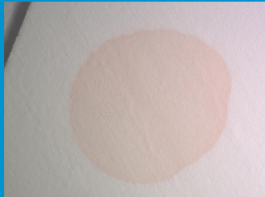


Input Volume:  $15\mu\text{L}$

# Design factors: volume and membrane area

We have varied membrane area & input volume & seen extremely consistent results

10mm disk  
(0.71 cm<sup>2</sup>)



Input Volume: 5µl

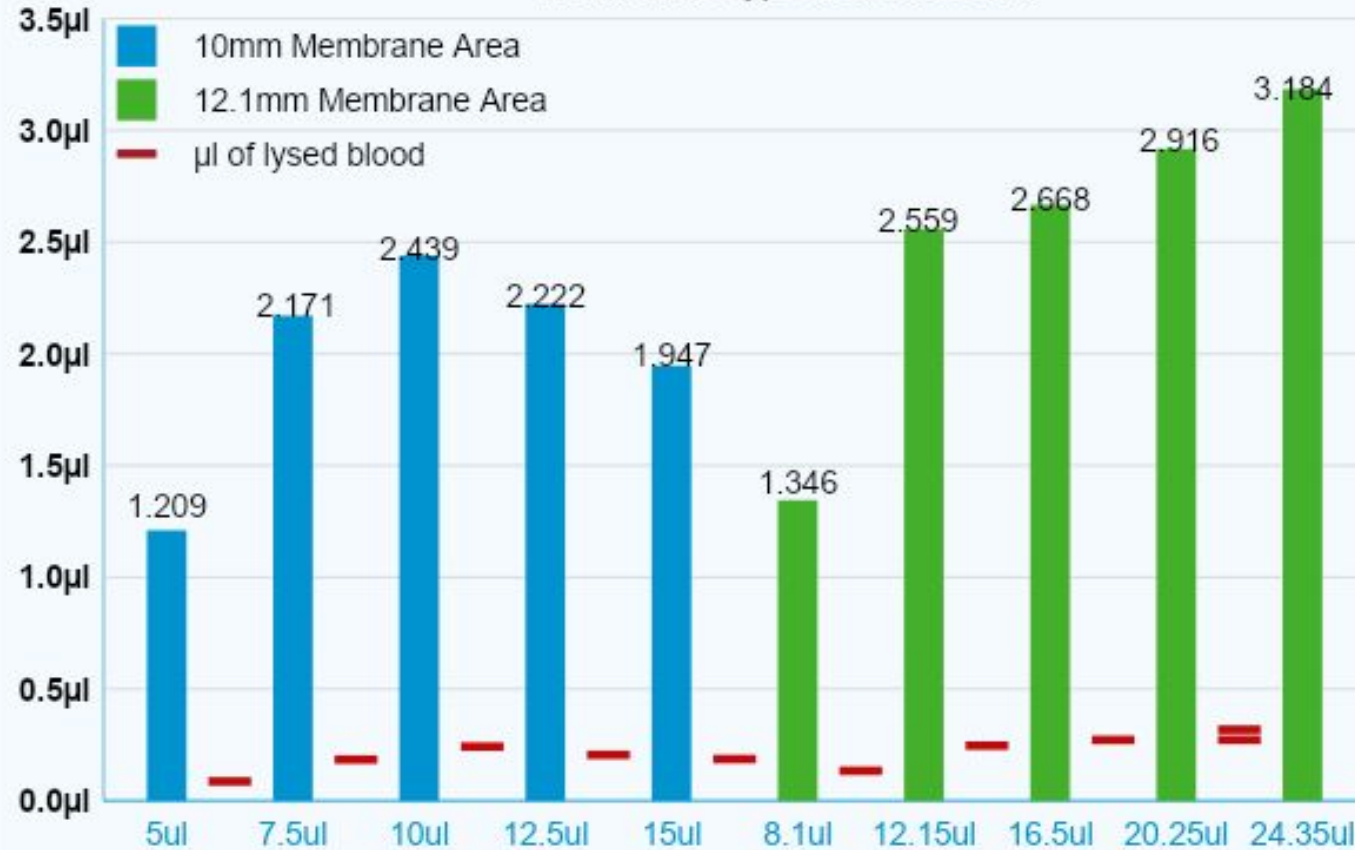


Input Volume: 7.5µl

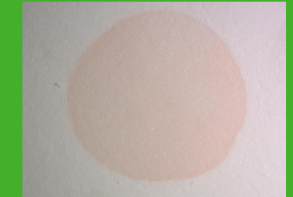


Input Volume: 10µl

Total Plasma Yield For Varying Input Volumes  
Membrane type Porex BSM 1



12.1mm disk  
(1.15 cm<sup>2</sup>)



Input Volume: 8.1µl



Input Volume: 12.15µl



Input Volume: 16.5µl

# Nanoindentation analysis

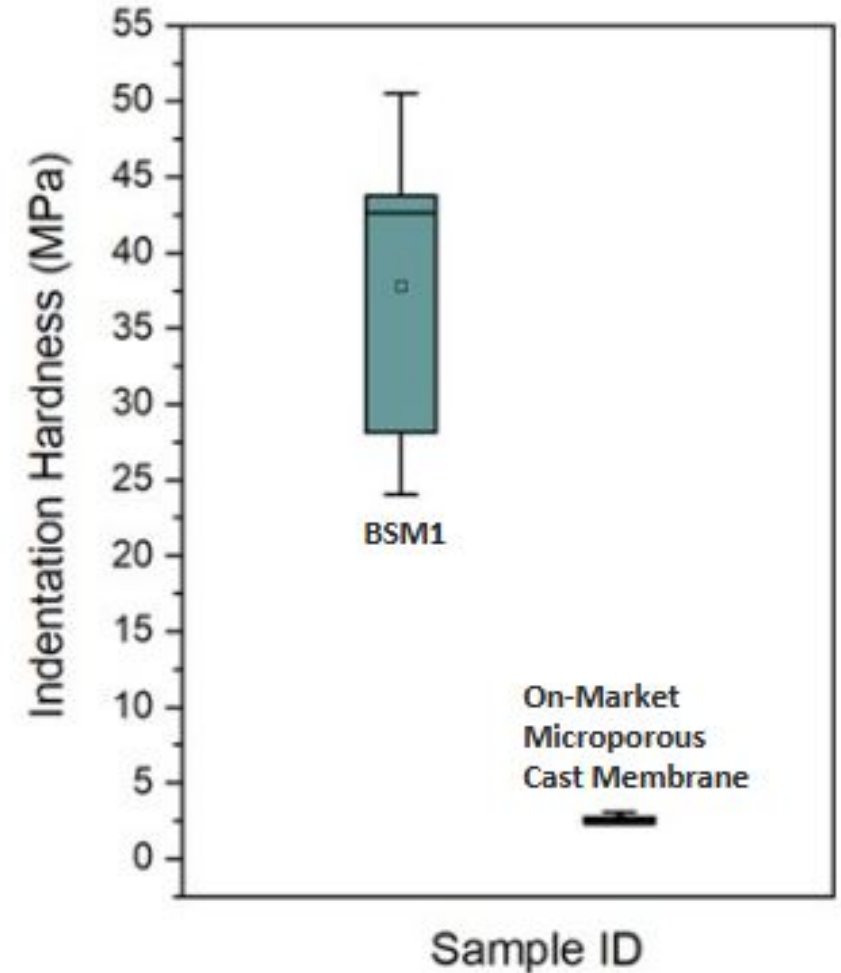
Membrane type **Porex BSM 1**

Sample #	Elastic Modulus $E_{IT}$ (GPa)	Indentation Hardness $H_{IT}$ (MPa)	Maximum penetration depth $h_{max}$ ( $\mu\text{m}$ )
<b>BSM1*</b>	<b><math>0.22 \pm 0.08</math></b>	<b><math>37.81 \pm 11.22</math></b>	<b><math>27.00 \pm 4.63</math></b>
On-Market Microporous Cast Membrane	$0.01 \pm 0.01$	$2.59 \pm 0.34$	$37.22 \pm 6.20$

Mean and std dev reported from 5 indents

**\*BSM1 = Porex Blood Separation Membrane 1**

- *BSM1* exhibited significantly higher stiffness (mean elastic modulus of 0.22 GPa) and hardness (mean hardness of 37.8 MPa) compared to *On-Market Microporous Cast Membrane* (mean elastic modulus of 0.01 GPa and mean hardness of 2.6 MPa).
- **These differences are nearly an order of magnitude, indicating that *BSM1* is much more resistant to deformation and therefore more durable.**



# Agenda

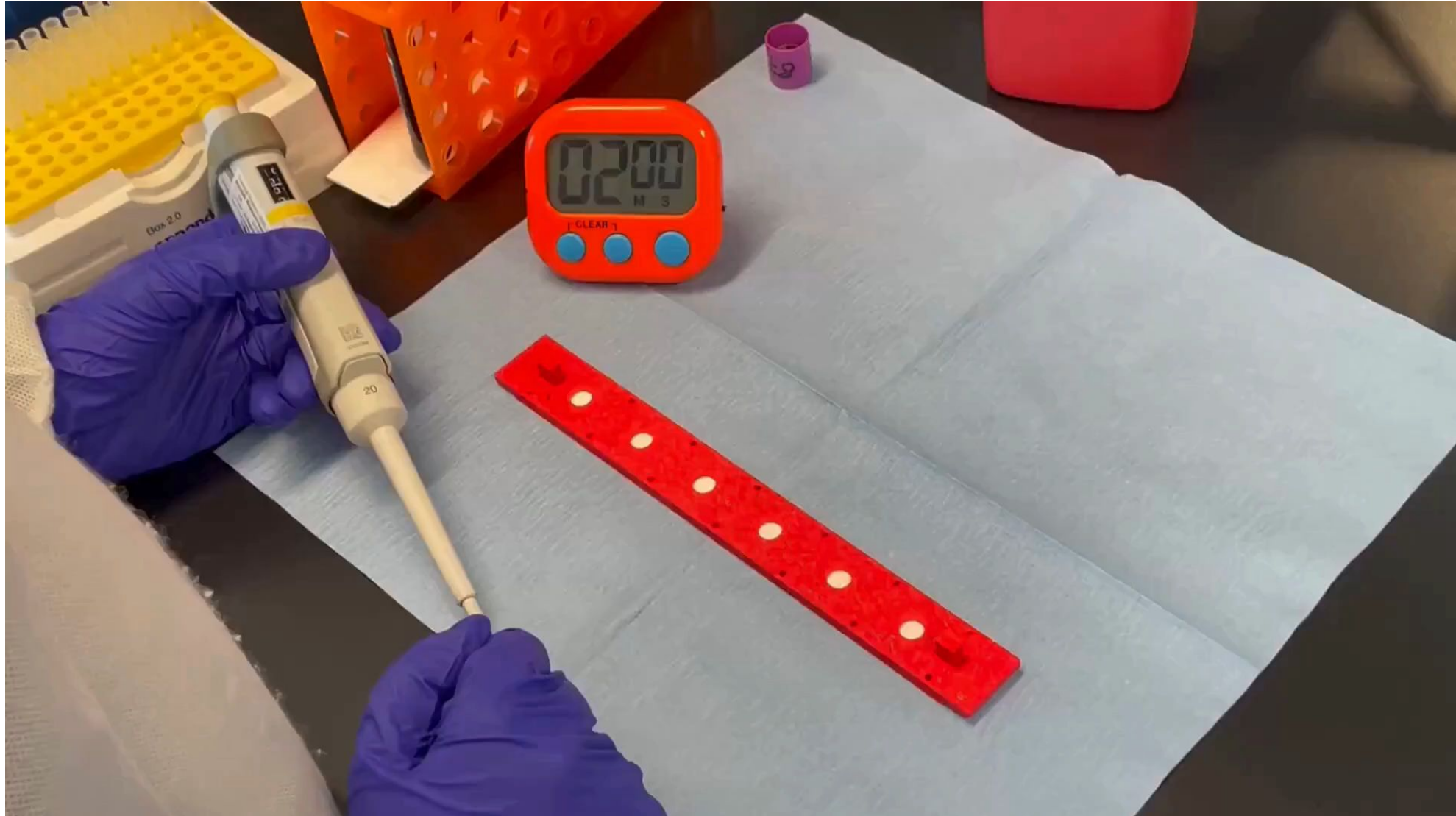
- Macro-trends & Strategic Insights
- Solving Key Technical Challenges
- **Product Selection & Integration**
- Partnering with Porex

# Use cases are both across traditional & emerging markets

This technology can be effectively leveraged across Clinical Diagnostics, PoC Testing, etc.

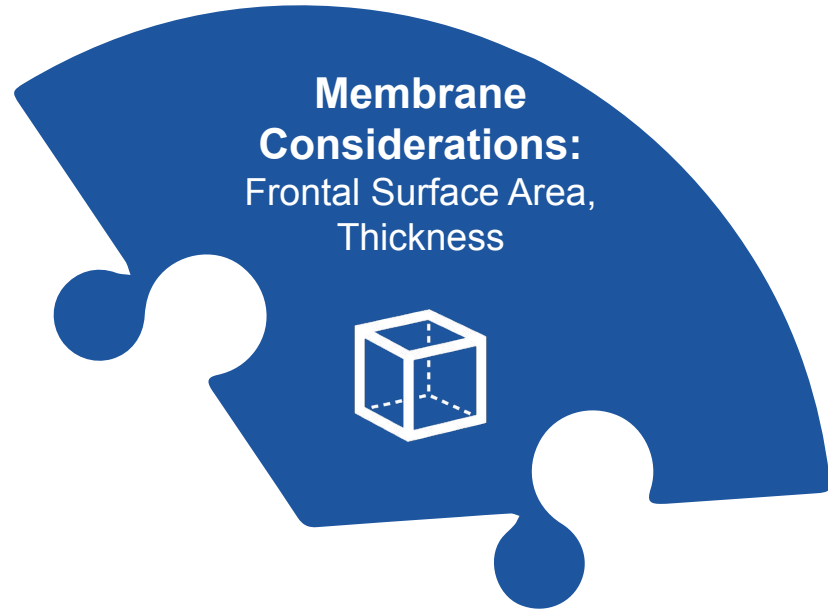
	<i>Established Use Cases</i>	<i>Emerging Use Cases</i>
<b>Clinical Diagnostics</b>	<b>Central Lab Testing</b>	<b>Military &amp; Disaster Response</b>
<b>Life Science</b>	<b>Translational Research</b>	<b>Plasma Spot Analysis</b>
<b>PoC Testing</b>	<b>Lateral Flow / PoC Devices</b>	<b>Decentralised Labs In Emerging Markets</b>

# Example: Blood tests with BSM1 & BSM2 in ABS housing



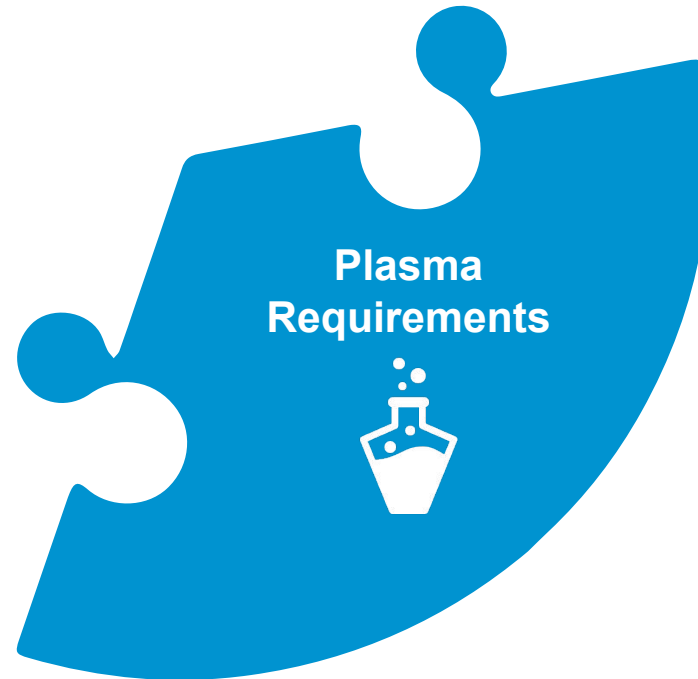
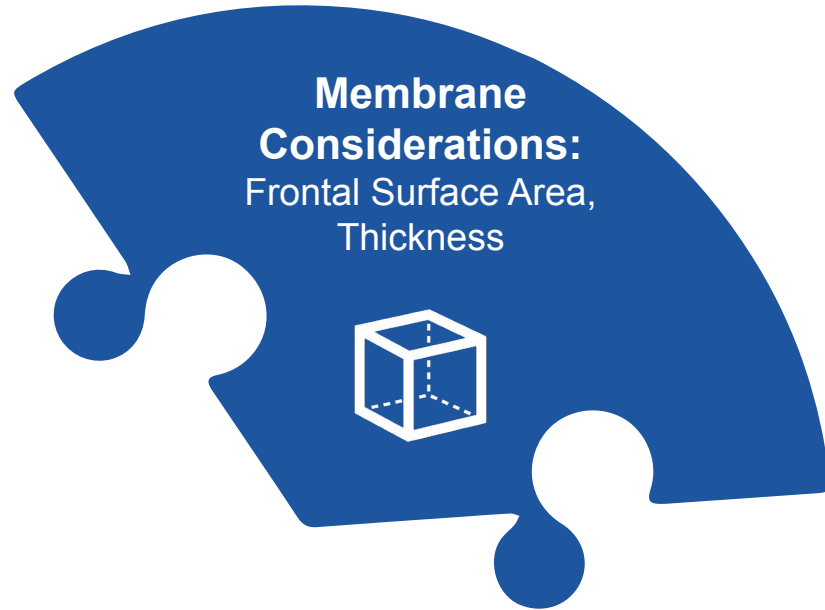
# Optimal solution selection requires careful consideration

When we work with our partners, we consider their specific product requirements



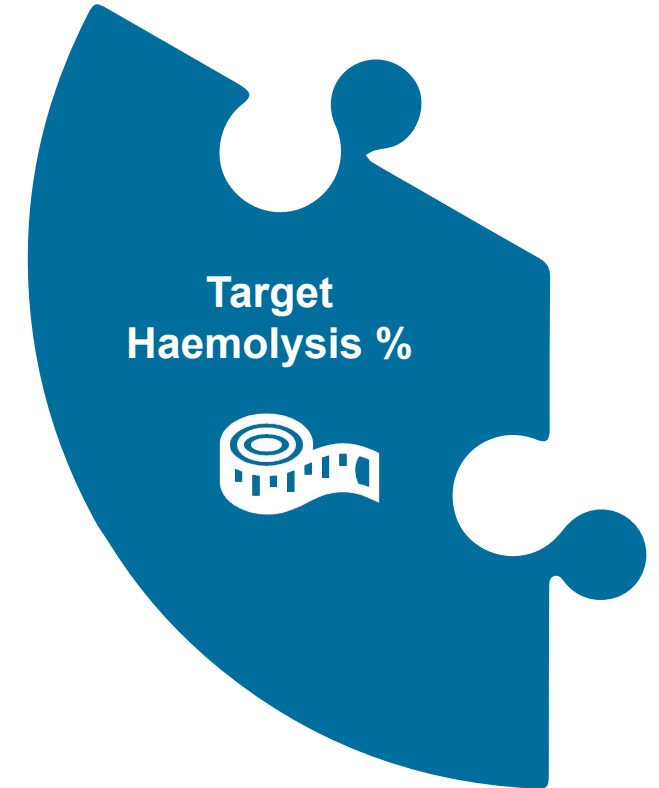
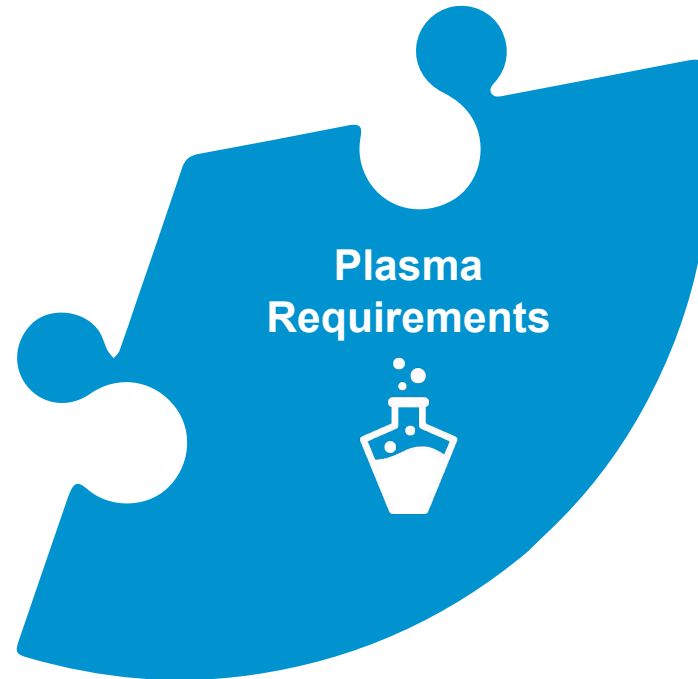
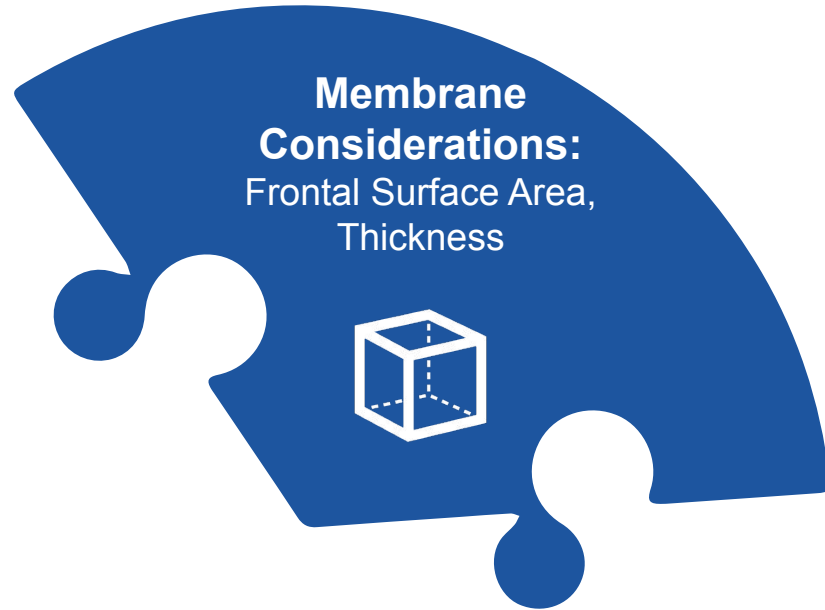
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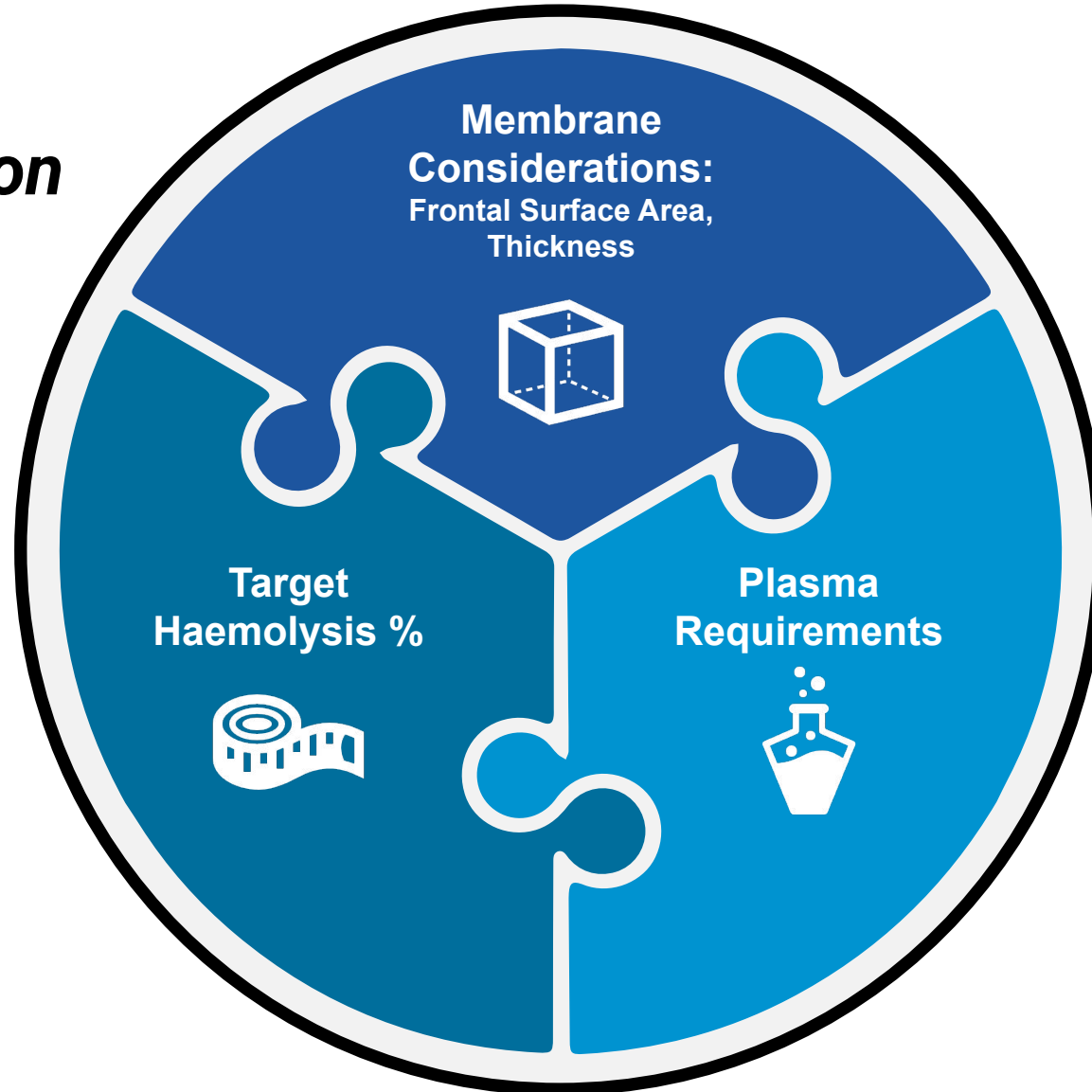
When we work with our partners, we consider their specific product requirements



# Holistic solutions factor in a broad range of constraints

Technical & physical constraints can be effectively considered & optimised

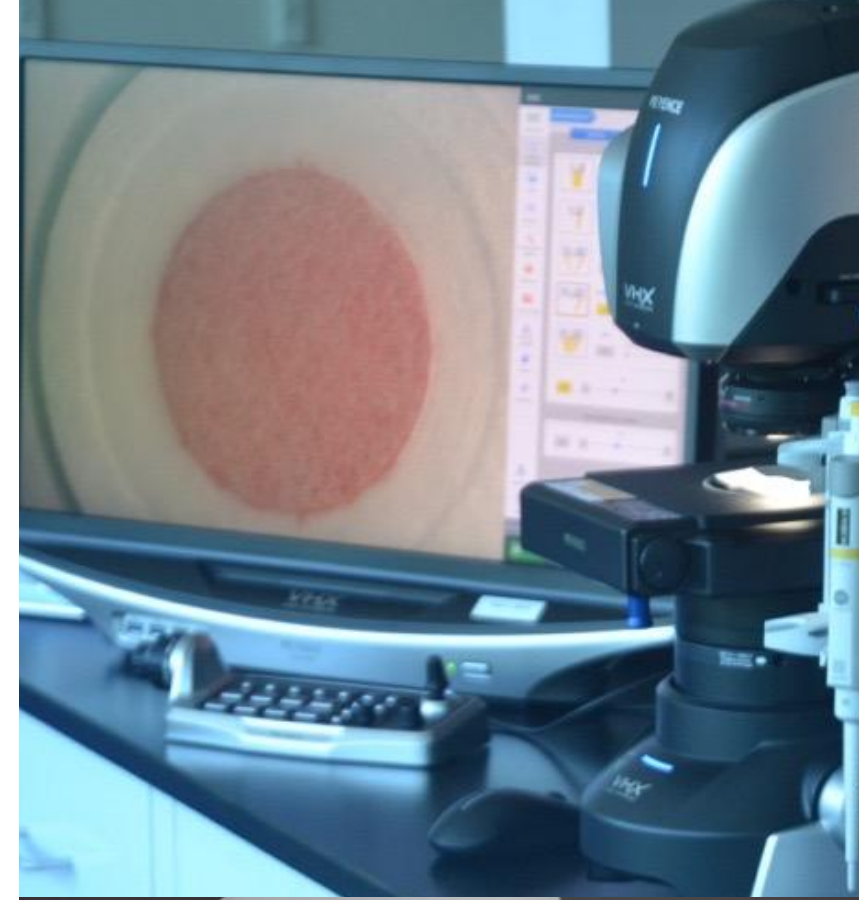
## *Holistic Solution*



# Picking the optimal solution for you

Comparing two of our membrane solutions

	BSM 1	BSM 2
<b>Thickness</b>	250-300 $\mu\text{m}$	420-470 $\mu\text{m}$
<b>Plasma Output</b>	1-3 $\mu\text{l}$	1-5 $\mu\text{l}$
<b>Haemolysis Rate</b>	5 - 10%*	<5%*
<b>Assembly Process &amp; Form Factor</b>	Roll Stock	Specialist manufacturing process step



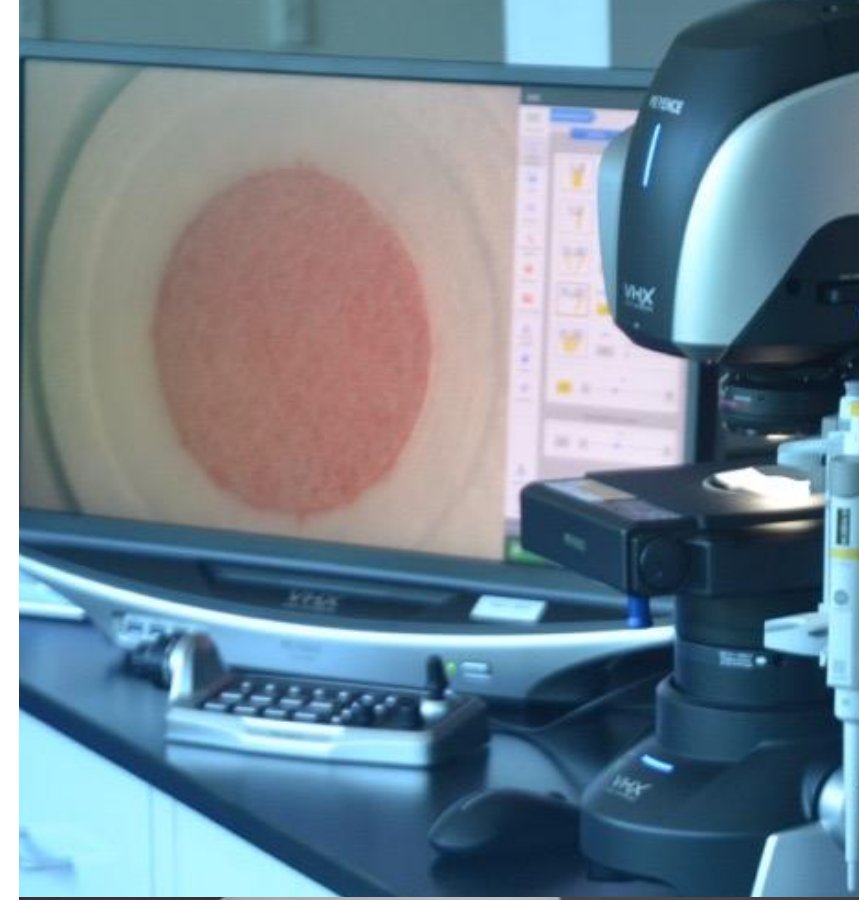
# Picking the optimal solution for you

Comparing two of our membrane solutions

	BSM 1	BSM 2
Thickness	250-300 $\mu\text{m}$	420-470 $\mu\text{m}$
Plasma Output	1-3 $\mu\text{l}$	1-5 $\mu\text{l}$
Haemolysis Rate	5 - 10%*	<5%*
Assembly Process & Form Factor	Roll Stock	Specialist manufacturing process step

“Great for replacing existing material. May be more cost effective given more data acquired.”

“Still in-development, better suited for new product development & manufacturing integration.”



# Agenda

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# Porex your partner

## How we work with you

Working with us is a simple process. Our R&D team knows how to engage with you to find **the best solution**.



We offer **consultative/ feasibility/ innovation** and **technical support** to **make your requirements come to life**.

**Thank you**

We're here to help.

Learn more at [porex.com](https://www.porex.com)

# Generally, we are seeing higher yield for lower haematocrits

We have also seen slightly lower yield for higher haematocrits with a handful of exceptions

