Technical Note

Vena8 Glass Coverslip™ Biochips

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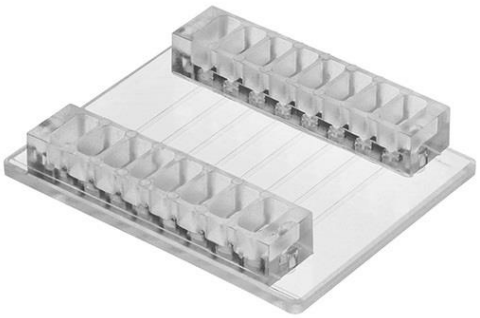
Vena8 Glass Coverslip Biochips: glass coverslips adhered or non-adhered glass coverslips treated/non-treated

Vena8GCS biochips contains 8 capillaries in parallel which can be coated with a protein or seeded with cells or microbes and subsequent study of drug interaction, imaging or molecular biology studies under shear flow. Within this range of biochips; the bottom substrate is a glass coverslip which is supplied separate or supplied adhered to the chip. The glass coverslip may be non-treated or treated with chelated Cu^{2+} ion tethered to the high-density PEG coating. The surface of the microcapillaries are easily coated via pipetting the protein into the capillary which then binds via the poly-histidine tag.



Each 10 pack contains 80 assays. These biochips are compatible with confocal microscopy. Compatible with Mirus Evo nanopump, ExiGo, UniGo and 4U microfluidic pumps for low shear stresses of 0.1–2 dyne/cm^2 (water-based solution) and 0.45–9 dyne/cm^2 (whole blood) and for high shear stresses of 20–40 dyne/cm^2 (water-based solution) and 90–180 dyne/cm^2 (whole blood). Compatible with Kima pump for cell culture.

Vena8GCS Features:

- High magnification; compatible with high NA oil immersion lenses.
- Brightfield / phase contrast / fluorescent / confocal microscopy.
- Suitable for a wide range of cell suspensions and whole blood.
- Easy to coat microcapillaries with a range of different adhesion molecules.
- Glass coverslip may be non-treated or treated with chelated Cu^{2+} ion tethered to the high-density PEG coating.
- Shear stress / shear flow rate may be pre-set to be incrementally increased during an assay.
- Real time imaging under flow conditions.
- No Luer lock connections which increase dead volume.
- Applications include, but are not limited to:
    - thrombosis assays; e.g. using biochips with glass coverslips treated with chelated Cu^{2+} ion tethered to the high-density PEG coating. Biochips perfect for high flow rates / shear stresses.
    - stem cell culture
    - biofilm applications; e.g. particularly when supplied without glass coverslip: user may attach any type of coupon to bottom of the biochip.

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Performance and Technical Specifications:

Performance specifications	
Biochip coatings — range of proteins	VCAM, ICAM, MAdCAM, fibronectin, vWF, fibrinogen, collagen, etc.
Cell types	T-cells: primary & cell lines, e.g. HUT 78
	Monocytes: primary and cell lines; e.g. THP-1
	Eosinophils
	Neutrophils
	Platelets
	PBMCs, whole blood, etc.
	Stem cells
	Bacteria

Assay recommendations		
Thrombosis assays — recommendations for whole blood	Biochips	Vena8 with glass coverslips adhered, treated with Cu^{2+} histidine tag; low flow rates; pack 10 OR Vena8 with glass coverslips adhered, treated with Cu^{2+} histidine tag; high flow rates; pack 10
	Pumps	ExiGo or Mirus Evo nanopump
	Low flow rates / shear stresses	0.45–9 dyne/cm^2
	High flow rates / shear stresses	90–180 dyne/cm^2
Stem cell assays — recommendations for stem cell culture	Biochips	Vena8 with glass coverslips adhered, non-treated; low flow rates; pack 10
	Pumps	Kima
	Low flow rates / shear stresses	1 dyne/cm^2
Biofilm assays — recommendations for biofilm culture	Biochips	Vena8 with adhesive bottom layer; low flow rates; pack 10; biochips have a protective cover which can be peeled away to reveal adhesive bottom layer to which any material may be attached by the user
	Pumps	Kima
	Low flow rates / shear stresses	1 dyne/cm^2; particularly suited pump achieving shear stresses for biofilm applications with the Kima of 1 dyne/cm^2 where different substrate materials may be easily tested

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Technical specifications	
Substrate (coverslip) thickness	170 µm = 0.17 mm
Material	Topas and glass coverslip
Number of channels per biochip	8
Low flow rate biochips	
Channel dimensions	160 µm (H) x 1600 µm (W) x 28 mm ≡ 0.16 mm (H) x 1.6 mm (W) x 28 mm
Volume of each channel	7.168 µL
Volume of protein required for coating	~20 µL
High flow rate biochips	
Channel dimensions	80 µm (H) x 800 µm (W) x 28 mm ≡ 0.08 mm (H) x 0.8 mm (W) x 28 mm
Volume of each channel	1.79 µL