

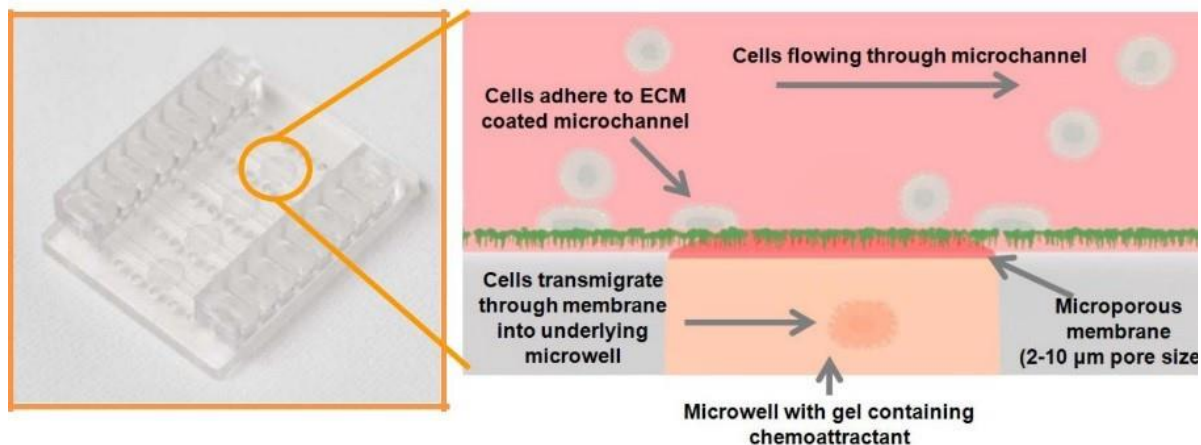


Technical Note

VenaT4™ Biochip

VenaT4 Biochip: for cell migration, transmigration, invasion and chemotaxis studies

VenaT4 biochips contain 4 parallel enclosed microcapillaries separated from 4 underlying microwells via a membrane with pores sizes of 2–10 μm . Applications include migration, transmigration, invasion and chemotaxis studies of leukocytes across the membrane embedded into the biochip. ECM proteins can be coated onto the membrane separating the flow channel and microwell containing the chemokine well. Cell suspensions may then be injected using Cellix's microfluidic pumps which supports a range of shear stresses / shear flow rates for dynamic flow-based assays. Leukocyte migration can be observed under conditions of continuously applied shear stress to mimic physiological conditions of blood vessels. VenaT4 biochips are supplied in packs of 10, facilitating 40 experiments per pack.



VenaT4 Features:

- 20x, 40x long working distance magnification microscopy.
- 4 microwells of $\sim 14 \mu\text{L}$ each volume to immobilize chemo-attractants inside ECM gel.
- Polycarbonate membrane with various pore sizes of 2–10 μm .
- Compatible with Kima pump for long term studies or for slow migrating cells.
- Brightfield / phase contrast / fluorescent microscopy.
- Suitable for migration, transmigration, invasion and chemotaxis experiments with leukocytes and cancer cells.
- Suitable for whole blood and blood cells analysis (e.g. leukocytes)
- Biochip plastic is optically clear permitting detailed microscopy studies.
- 0.05–200 dyne/cm^2 shear stresses / shear flow rates easily obtained and controlled by the Mirus Evo nanopump, ExiGo, UniGo and 4U pumps.
- Shear stress / shear flow rate may be pre-set to be incrementally increased during an assay.
- Real time imaging under flow conditions.

Performance and Technical Specifications:

Performance specifications	
Range of proteins for biochip coating	Laminin, VCAM, ICAM, fibrinogen, etc.
Cell types for suspension assay	T-cells: primary & cell lines, e.g. HUT 78
	Monocytes: primary and cell lines; e.g. THP-1
	Eosinophils
	Neutrophils
	PBMCs, whole blood, etc.
Range of chemokines	IL-8, SDF-1, MCP-1, etc.
Minimum sample volume	~12 µL
Maximum sample volume	100 µL (Vena microwells at input / output ports)
Shear stress precision	<0.5% CV
Shear stress range for cell suspension	0.05–10 dyne/cm ² ; steps of 0.05 dyne/cm ² (100 µL syringe)
Shear stress range for whole blood*	2.25–200 dyne/cm ² (1 mL syringe)
Volumetric flow rates**	100 nL/min–20 µL/min (100 µL syringe);
	5 µL/min–1 mL/min (5 mL syringe)
Sample volume aspiration accuracy	±1%
Shear stress accuracy	±0.5%
Sample volume aspiration precision	<1% CV

*Considering human whole blood with a viscosity of 4.5 cP.

**Given for the flow of distilled water in a microcapillary with dimensions: 400 µm (W) x 100 µm (D) x 28 mm (L).

Technical specifications	
Material	Acrylic (biochip), PDMS (channel walls), polycarbonate (membrane)
Number of channels per biochip	4
Volume of each channel	2.253 µL
Dimensions of each channel	800 µm (W) x 100 µm (D) x 28 mm (L)
Number of microwells per biochip	4
Diameter of each microwell	6 mm
Volume of each microwell	14.13 µL
Dead volume at input / output port	0.1 µL
Thickness of bottom substrate	0.5 mm