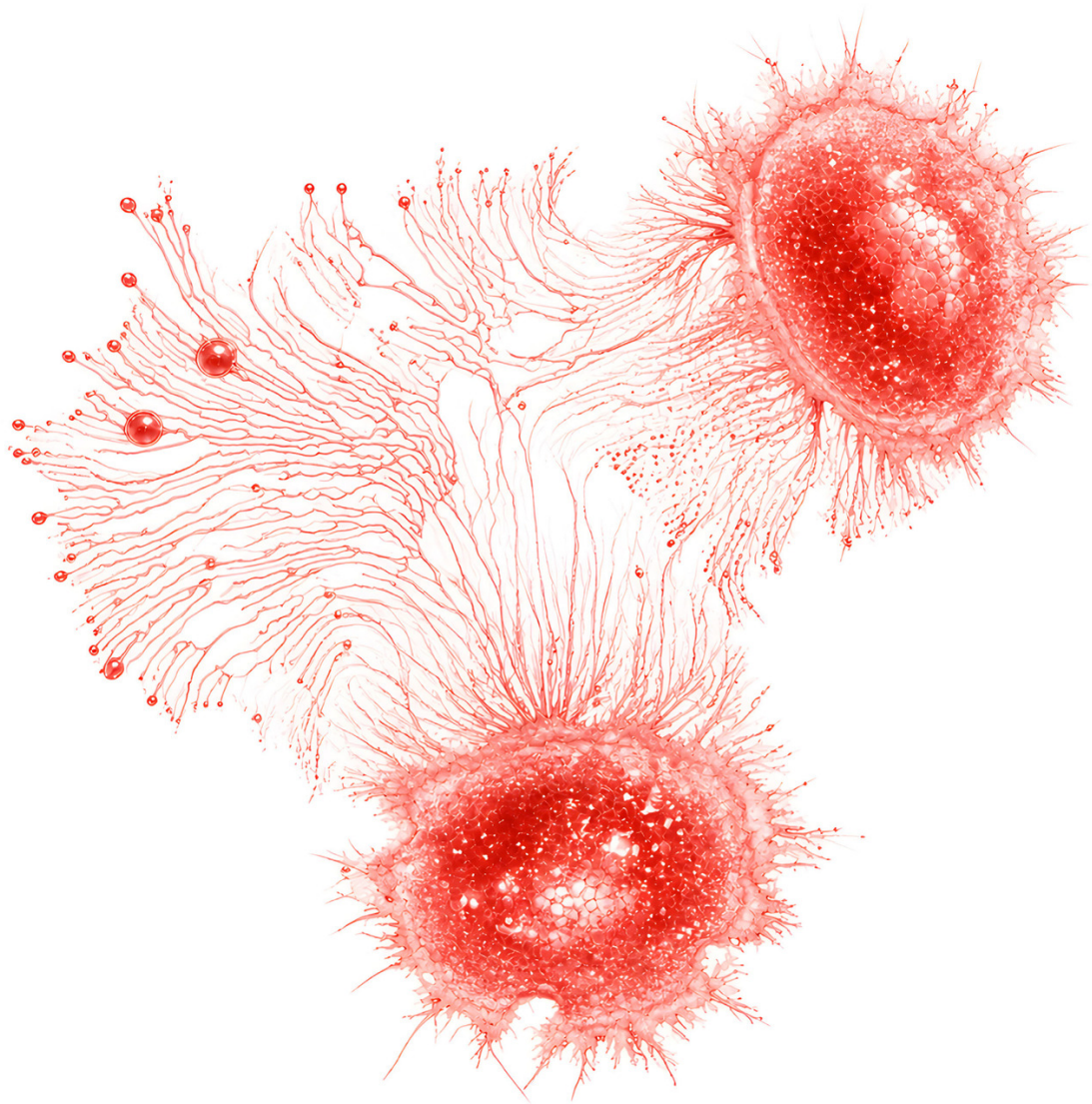


Migrasome Biology Research Tools Handbook

Isolation / Purification / Identification / Omics and functional studies

Tools for every stage of migrasome biology research



MIGRASOME
RESEARCH TOOLS & SOLUTIONS

15 OCTOBER 2026 | ENGLISH EDITION



Migrasome Therapeutics

Science that began with discovery



Driven by the original discovery of migrasomes

**Reshaping diagnosis and treatment.
Bringing breakthrough health benefits to patients worldwide.**

Founded in April 2022 and headquartered in Beijing Life Science Park, Changping, Beijing, Migrasome Therapeutics is a biotechnology company built on the original science of migrasomes and focused on translating innovative technologies for human health.

Professor Li Yu and his team first discovered and named migrasomes, a new type of organelle, and systematically revealed their important roles in intercellular communication, tissue development, immune regulation, and the onset and progression of disease.

With migrasome science at its core, the company brings together modern molecular biology, drug development, and engineering to establish new technology platforms for health. Its work supports research into major disease mechanisms and the development of innovative diagnostic technologies and therapeutic products. The company is also exploring the distinctive biological properties of migrasomes to develop next-generation disease-detection and drug-delivery platforms that address unmet clinical needs.

Linking cell migration and communication

Migrasomes are membrane-bound organelles generated during cell migration. They carry proteins, nucleic acids, and signalling molecules, and participate in intercellular communication, tissue development, cellular homeostasis, and disease regulation.

DISCOVERY & IDENTIFICATION / TOOLS & FORMATION / FUNCTION & TRANSLATION

2012 First observation



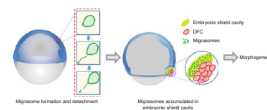
Professor Li Yu first observed migrasomes at Tsinghua University.

2015 Discovery and identification



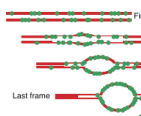
Liang Ma and colleagues first described and identified migrasomes.
Ma et al., Cell Res., 2015

2019 Organogenesis



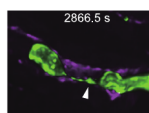
Dong Jiang and colleagues reported a role for migrasomes in zebrafish organogenesis.
Jiang et al., Nat. Cell Biol., 2019

2019 Formation mechanism



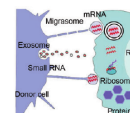
Yuwei Huang and colleagues identified a TSPAN-centred mechanism of migrasome formation.
Huang et al., Nat. Cell Biol., 2019

2021 In vivo imaging



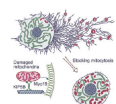
Jiamin Wu and colleagues developed DAOSLIMIT microscopy to observe tumour-cell migrasomes in living mice.
Wu et al., Cell, 2021a

2021 RNA and protein transfer



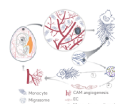
Mingli Zhu and colleagues found that migrasomes contain abundant mRNA and proteins and mediate material transfer between cells.
Zhu et al., Cell Res., 2021

2022 Mitochondrial quality control



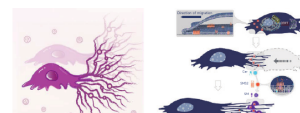
Haifeng Jiao and colleagues discovered that migrasomes remove damaged mitochondria from cells.
Jiao et al., Cell, 2021b

2022 Angiogenesis



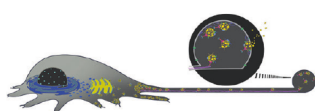
Cuifang Zhang and colleagues found that migrasomes promote angiogenesis.
Zhang et al., Nat. Cell Biol., 2022

2023 Lipid regulation



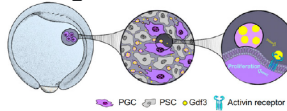
Tianlun Ding and Haisha Liang reported tight regulation of migrasome formation by multiple lipid enzymes.
Ding et al., Cell Res., 2023; Liang et al., Nat. Cell Biol., 2023

2024 Cargo transport



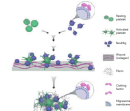
Haifeng Jiao and colleagues elucidated the mechanism of cargo transport into migrasomes.
Jiao et al., Cell Res., 2024

2026 PGC proliferation and migration



Boqi Liu and colleagues revealed a migrasome-mediated mechanism coupling PGC proliferation with migration.
Liu et al., Nat. Commun., 2026

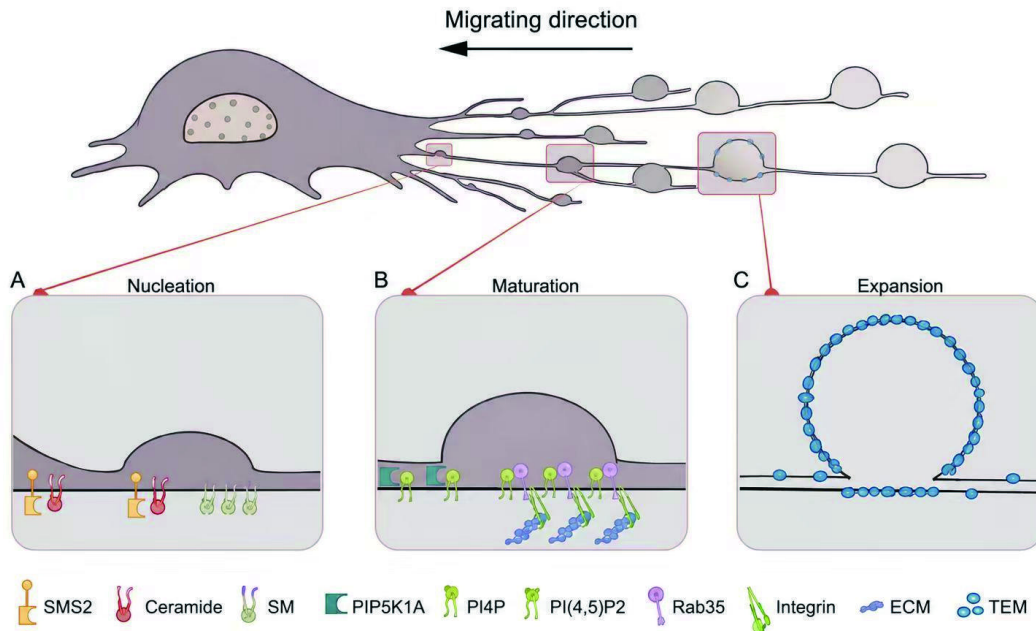
2026 Coagulation



Dong Jiang and colleagues found that neutrophil-derived migrasomes are an essential component of coagulation, with translation into an in vitro diagnostic kit.
Jiang et al., Nat. Cell Biol., 2024

Formation and biological functions

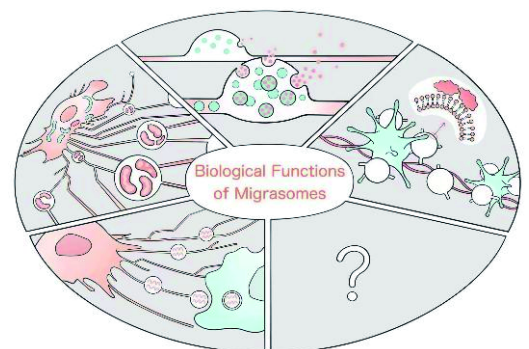
Migrasome formation is jointly regulated by molecular signalling, membrane organisation, and biophysical remodelling.



SMS2 converts ceramide into sphingomyelin (SM). SM microdomains mark sites of migrasome formation and recruit integrins and TSPAN4, supporting migrasome formation.

A new dimension of intercellular communication

- **Developmental regulation.** Mediates developmental signals and contributes to organ formation and angiogenesis.
- **Cellular homeostasis.** Promotes clearance of damaged mitochondria to maintain cellular function.
- **Information exchange.** Transfers mRNA and functional molecules between cells.
- **A natural delivery platform.** Can carry multiple bioactive molecules for targeted delivery.



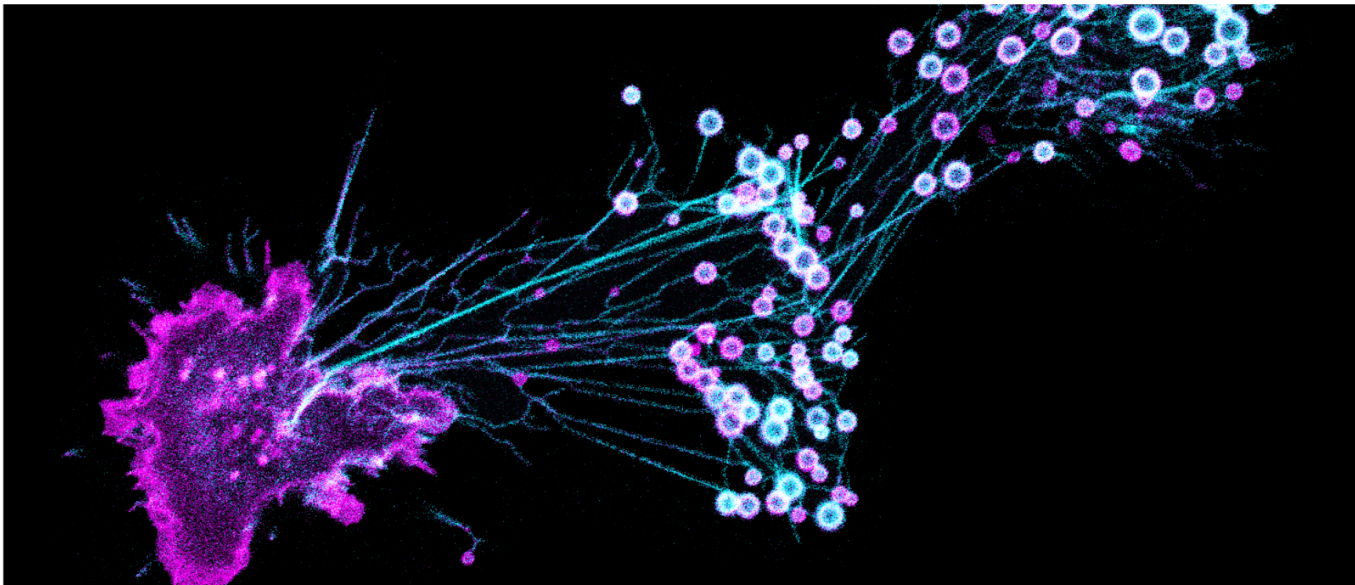
Organelle homeostasis / Short-range communication
Long-range signalling and secretion / Coagulation

PHYSIOLOGICAL FUNCTIONS: homeostasis • communication • secretion • coagulation

Migrasomes and conventional EVs

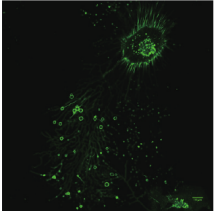
Distinctive biology and research applications

	Migrasomes	Exosomes	Microvesicles	Apoptotic bodies
Location	Membrane-attached organelles; become EVs after detachment	Extracellular vesicles detached from the cell body	Extracellular vesicles detached from the cell body	Extracellular vesicles detached from the cell body
Size	Approx. 0.5-3 µm	35-150 nm	Approx. 1 µm	>1 µm
Formation	Retraction fibres; TSPAN4-dependent	Multivesicular-body pathway	Plasma-membrane budding	Apoptosis
Typical markers	Integrins, TSPAN4	Alix, CD63, Tsg101	Arf6, Kif23	Cleaved caspase-3, PS
Biological roles	Directed migration; short-/long-range communication; organ development; mitochondrial quality control; coagulation	Long-range communication; immune regulation; tumour microenvironment; delivery	Coagulation, inflammation, angiogenesis and tumour microenvironment remodelling	Macrophage engulfment; avoidance of excessive inflammation
Research value	Tumour metastasis and microenvironment; cardiovascular and inflammatory disease; liquid-biopsy biomarkers; complex drug carriers	Liquid-biopsy biomarkers; natural drug carriers	Cardiovascular and coagulation mechanisms; disease activity and acute-injury monitoring	Apoptosis pathways and mechanisms; immune tolerance and autoimmune disease



Migrasome research workflow

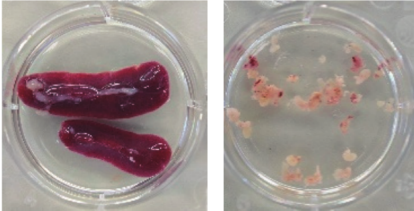
Cultured cells



Body fluids



Tissues



01 Crude isolation

Differential centrifugation removes most contaminants to obtain a crude migrasome preparation.

1,000 × g

Collect supernatant

Remove cell bodies

4,000 × g

Collect supernatant

Remove organelles

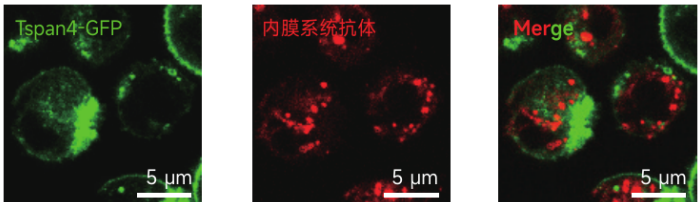
20,000 × g

Collect pellet

Remove small EVs

02 Purification

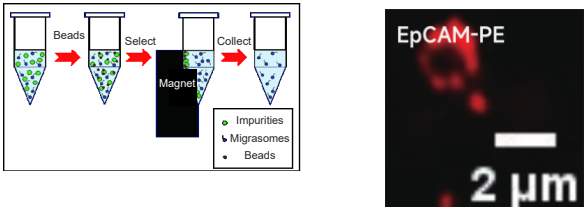
Negative selection removes cell debris, organelles and other contaminants.



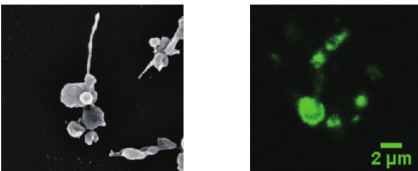
Channels: TSPAN4-GFP; endomembrane-system antibody; merge.

03 Migrasomes from a target cell type

Use negative selection based on surface markers of non-target cells, or positive selection based on surface markers of target cells.



04 Identification and downstream functional studies



Combine identification of the recovered particles with subsequent functional experiments.

Migrasome isolation

Obtain high-quality migrasomes from biological samples

Product	Catalog no.	Pack size	Sample	Main use
Migralso™ Mouse Total Blood Cell-Derived Migrasome Isolation Kit	PRMB001 PRMB001S	20 tests 5 tests	Mouse blood / plasma	Isolation and purification of total blood migrasomes
Migralso™ Mouse Blood Neutrophil-Derived Migrasome Isolation Kit	PRMB002 PRMB002S	20 tests 5 tests	Mouse blood / plasma	Isolation and purification of neutrophil-derived migrasomes
Migralso™ Human Blood Total Migrasome Extraction Kit	PRHB001 PRHB001S	20 tests 5 tests	Human peripheral blood / plasma	Isolation and purification of total blood migrasomes
Migralso™ Human Blood Neutrophil-Derived Migrasome Extraction Kit	PRHB002 PRHB002S	20 tests 5 tests	Human peripheral blood / plasma	Isolation and purification of neutrophil-derived migrasomes
Migralso™ Human Blood T-Cell-Derived Migrasome Extraction Kit	PRHB003 PRHB003S	20 tests 5 tests	Human peripheral blood / plasma	Isolation and purification of T-cell-derived migrasomes
Migralso™ Human Blood B-Cell-Derived Migrasome Extraction Kit	PRHB004 PRHB004S	20 tests 5 tests	Human peripheral blood / plasma	Isolation and purification of B-cell-derived migrasomes

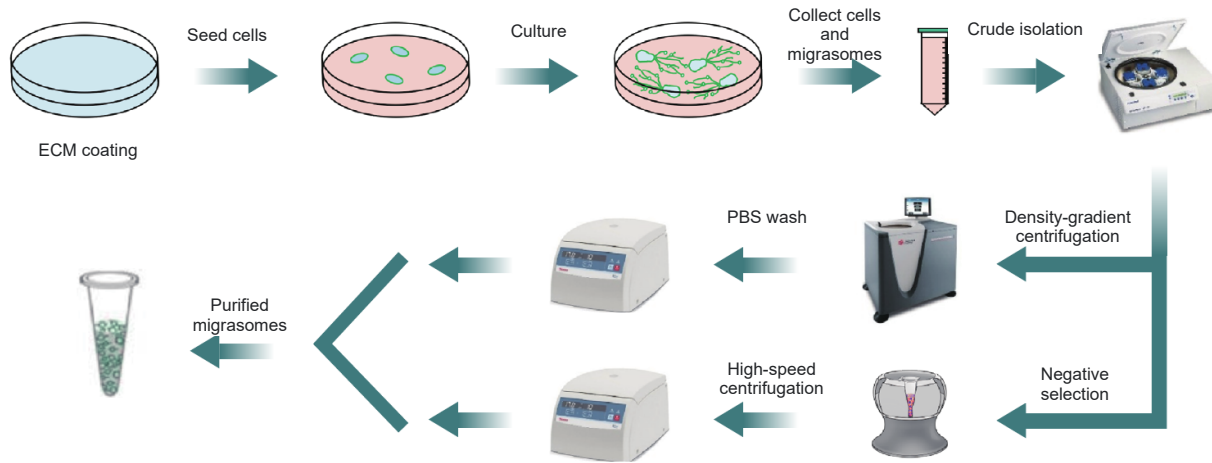
Migrasome purification

Obtain high-purity migrasome preparations

Product	Catalog no.	Pack size	Sample	Main use
MigraPrep™ Cultured-Cell Migrasome Production and Purification Kit (Density Gradient)	PRC001 PRC001S	50 tests 10 tests	Cultured cells	Production and purification of cultured-cell migrasomes
MigraPrep™ Production - Cultured-Cell Migrasome Production Kit (Crude Isolation)	PRC002 PRC002S	50 tests 10 tests	Cultured cells	Production of cultured-cell migrasomes
MigraPure™ Purification - Cultured-Cell Migrasome Purification Kit	PRC003 PRC003S	10 tests 2 tests	Crude cultured-cell migrasome preparation	Further purification of cultured-cell migrasomes
MigraPrep™ Turbo - Density-Gradient-Free Rapid Cultured-Cell Migrasome Production and Purification Kit	PRC004 PRC004S	50 tests 10 tests	Cultured cells	Production and purification using immunomagnetic negative selection, without a density gradient
MigraPure™ Turbo - Density-Gradient-Free Rapid Cultured-Cell Migrasome Purification Kit	PRC005 PRC005S	10 tests 2 tests	Crude cultured-cell migrasome preparation	Purification using immunomagnetic negative selection, without a density gradient
Migralso™ Tissue Migrasome Purification Kit	PRT001 PRT001S	50 tests 10 tests	Crude tissue preparation PRT001: 50 × 100 µg PRT001S: 10 × 100 µg	Purification of crude tissue migrasomes

Isolation from different sample types

Cultured cells



ECM coating → Cell seeding → Culture → Collect cells and migrasome suspension → Crude isolation.

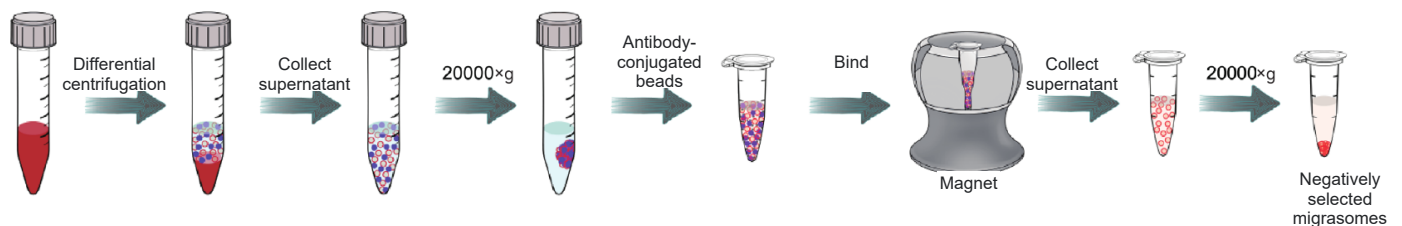
Purify by density-gradient centrifugation and PBS washing, or by negative selection and high-speed centrifugation.

Tissue-derived migrasomes



Tissue collection → Dissociation → Crude isolation → Negative selection → Centrifugation → Purified migrasomes

Blood-derived migrasomes



Differential centrifugation → Collect supernatant → 20,000 × g → Add antibody-conjugated magnetic beads → Magnet → Collect supernatant → 20,000 × g → Negatively selected migrasomes

Reference: Jiang, D., Jiao, L., Li, Q. et al. Neutrophil-derived migrasomes are an essential part of the coagulation system. Nat. Cell Biol. 26, 1110-1123 (2024).

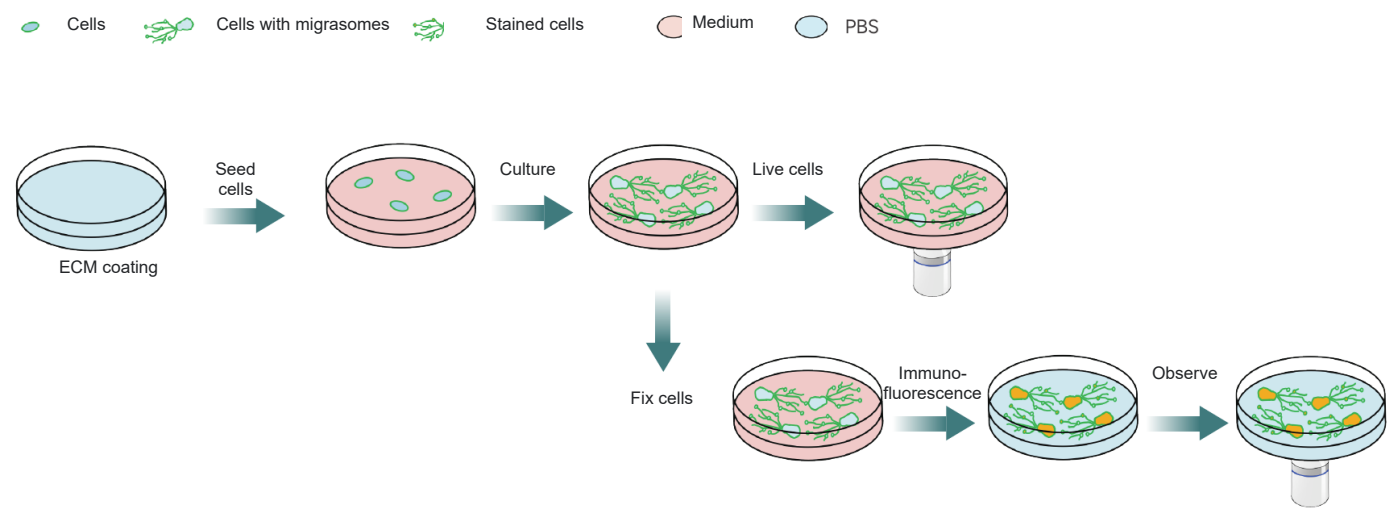
Migrasome imaging and detection

Characterise migrasome morphology and spatial distribution

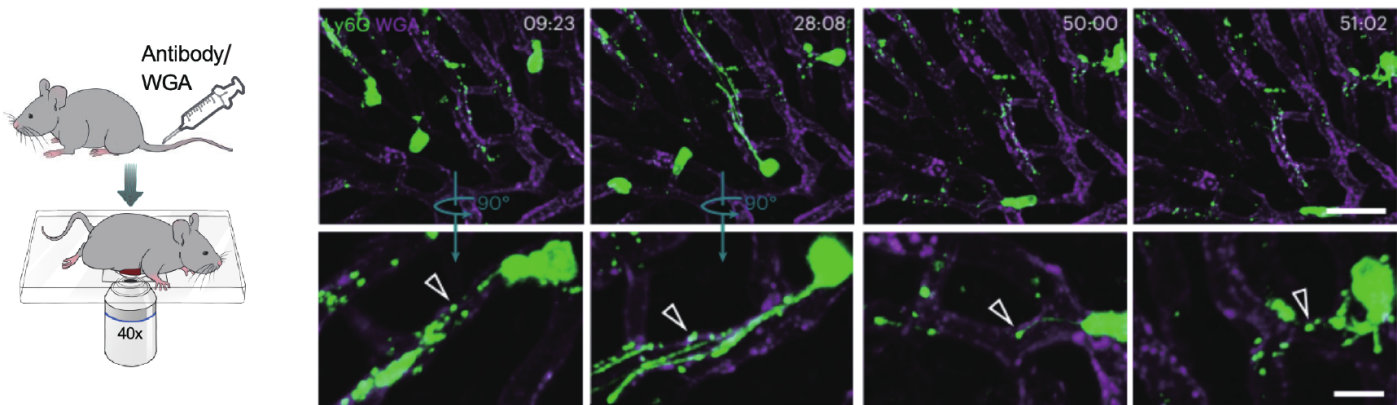
Product	Catalog no.	Pack size
MigraECM™ Cultured-Cell ECM Matrix	EL001 EL001S	50 tests 10 tests
10× Plasma Diluent	SE002 SE002S	100 mL 20 mL
MigraSee® Blood Microvesicle Fixative	SE003 SE003S	500 µL / 250 tests 100 µL / 50 tests
Migrasome Dye - Wheat Germ Agglutinin (WGA)	EL002-488 EL002-555 EL002-647	100 µL 100 µL 100 µL
pBase plasmid	PL001	4 µg
pB-mTspan4-GFP plasmid	PLM001	4 µg
pLVX-mTspan4-GFP plasmid	PLM002	4 µg
pB-hTSPAN4-GFP plasmid	PLH001	4 µg
pLVX-hTSPAN4-GFP plasmid	PLH002	4 µg

In situ observation

Migrasomes from cultured cells

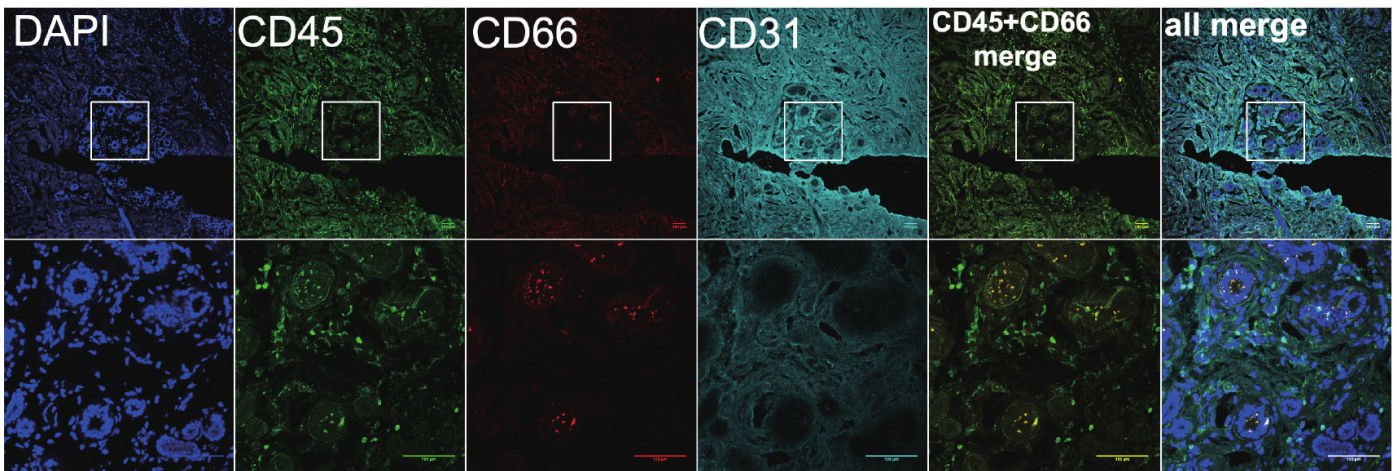


Migrasomes within blood vessels



Jiang et al., Nat. Cell Biol. (2024).

Migrasomes in tissue sections



MigraSee® counting chip

Concentration measurements for particles spanning submicron to micron scales

Product	Catalog no.	Specification
MigraSee® Migrasome and Submicron-to-Micron Particle Observation Chip	SE001	42 tests; 20 µm channel height

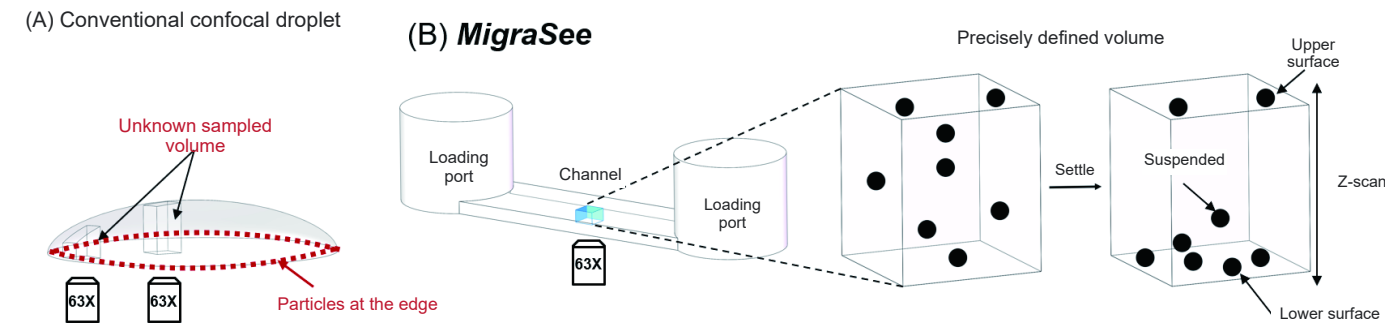
Visualize	Quantify	Discover
Observe migrasome dynamics and spatial localisation.	Measure migrasome and submicron-to-micron particle concentrations.	Support studies of migrasome functions and mechanisms.

- **Designed for migrasomes.** Optimised for the vesicular structure of migrasomes, typically 0.5-3 µm, to support efficient observation.
- **A broad concentration-measurement range.** Supports observation and concentration measurement of migrasomes and similar submicron-to-micron particles.
- **High-throughput quantitative counting.** A microscale channel matrix reduces counting error. Microscope-positioning marks support imaging, with 42 samples per chip.
- **Concentration and morphology.** The design distributes particles rapidly and evenly within the field of view for confocal imaging, morphology assessment and size-distribution analysis.

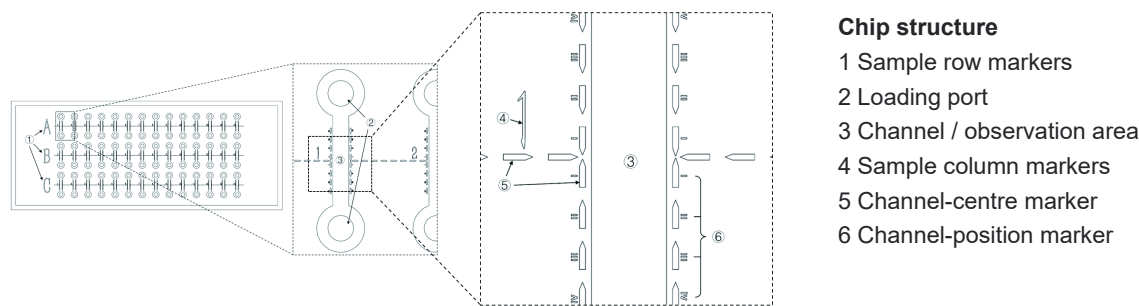
Migrasome identification: measurement technologies

Technology	Min. sample	Target in mixture?	Technical limitations
Nanoparticle tracking analysis (NTA)	2 mL	No	Difficult above 1 µm; strongly dependent on reference standards
Dynamic light scattering (DLS)	1 mL	No	Difficult above 1 µm; no absolute quantification; affected by size dispersity
Laser particle-size analyser	1-10 mL	No	No absolute quantification; cannot cover both sides of 1 µm simultaneously
Image particle-size analyser	500 µL	No	Difficult below 1 µm; limited accuracy for biological samples
Nano-flow cytometry	60 µL	Yes	Difficult above 200 nm; affected by size dispersity
Imaging flow cytometry	0.5 mL	Yes	Inaccurate size measurements; expensive; affected by size dispersity
Laser confocal microscopy	1 µL	Yes	Difficult absolute quantification; low throughput

Chip design and experimental validation



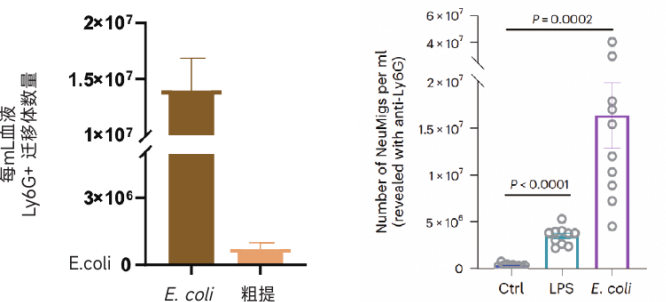
Conventional confocal droplet: unknown sampled volume and particle accumulation at the edge.
MigraSee: defined sampling volume; Z-layer scanning distinguishes suspended particles, sediment and material attached to upper/lower surfaces.



Experimental testing and data validation

Agreement in quantitative counts

Mouse blood neutrophil-derived migrasome counts agree with imaging-flow-cytometry results reported by Jiang et al., Nat. Cell Biol., 2024.

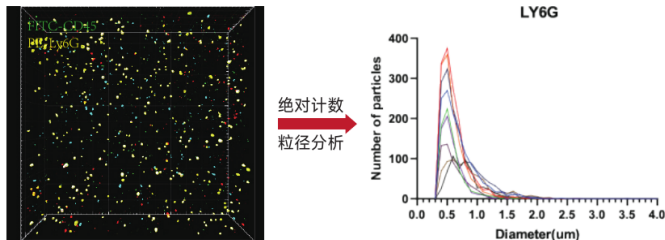


Mouse blood neutrophil migrasome counts with MigraSee® are broadly consistent with the published imaging-flow-cytometry results.

Original left-axis label: number of Ly6G+ migrasomes per mL blood. “Crude” identifies the crude preparation; E. coli labels are retained from the source data.

Particle size and absolute counts

Confocal microscopy supports multiple fluorescent markers, size-distribution analysis (0.3-10 μm), and absolute concentration calculations.



Size analysis of CD45+Ly6G+ neutrophil-derived migrasomes in mouse blood.

WHY MIGRASOME THERAPEUTICS?

A leader in global migrasome research



Supporting scientific discovery

An original migrasome technology platform

Discovery-led innovation. Built on the foundational discovery of migrasomes by Professor Li Yu's team at Tsinghua University, with independent intellectual property and core patents.

Specialised technology. Addresses technical limitations of conventional extracellular-vesicle research with tools designed for the characteristics of migrasomes.

Support across the research workflow

One-stop solutions. Sample isolation and purification → specific microscopic imaging → MigraSee® absolute counting → omics and functional analysis.

Multiple sample types. Supports adherent cells, tissue, and human or mouse blood.

High-quality, standardised products

High purity and low contamination. Distinctive separation technology reduces interference from exosomes and cell debris to support reliable experimental data.

Reproducibility. Strict quality-control standards maintain consistency between batches and reduce repeated trial-and-error work.

Tools for emerging discoveries in life science

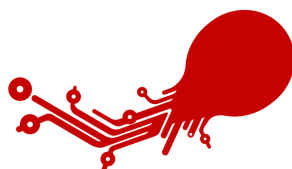
Helps research teams establish migrasome research capabilities and accelerate discovery.

Supports investigation of new mechanisms involving migrasomes in organ development, tumour metastasis, mitochondrial quality control, and disease diagnosis.

Serving 100+ research groups worldwide

Leading universities • Research institutions • Tertiary hospitals

Empowering migrasome research. Enabling scientific breakthroughs.



Migrasome Therapeutics

More precise, efficient and accessible migrasome research

JOIN THE FUTURE OF MIGRASOME BIOLOGY

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