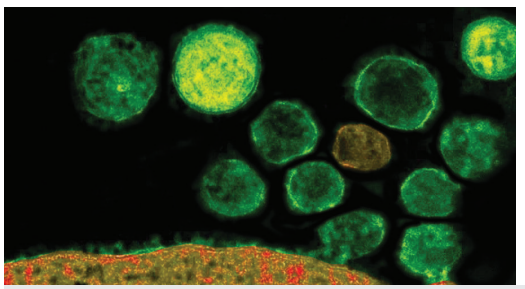
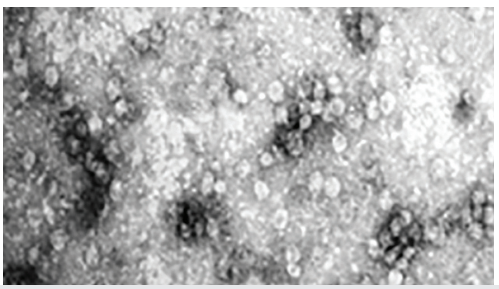
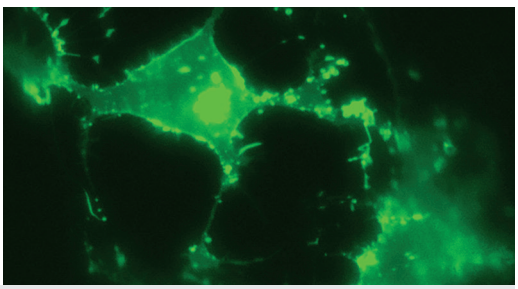
EXOSOMES

EXOSOMES

DRIVING RESEARCH, USE, AND ENGINEERING OF EXOSOMES

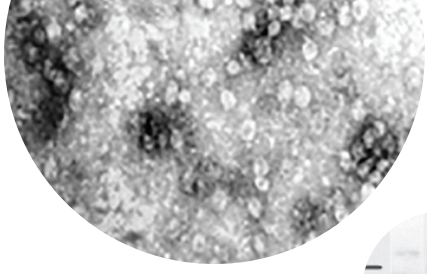




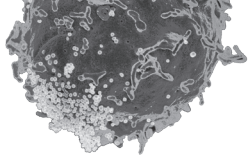
SYSTEMBIO.COM

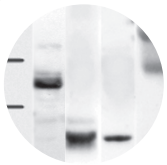
SBI
System Biosciences
Harnessing innovation to drive discoveries

PUTTING THE POWER OF EXOSOMES INTO YOUR HANDS

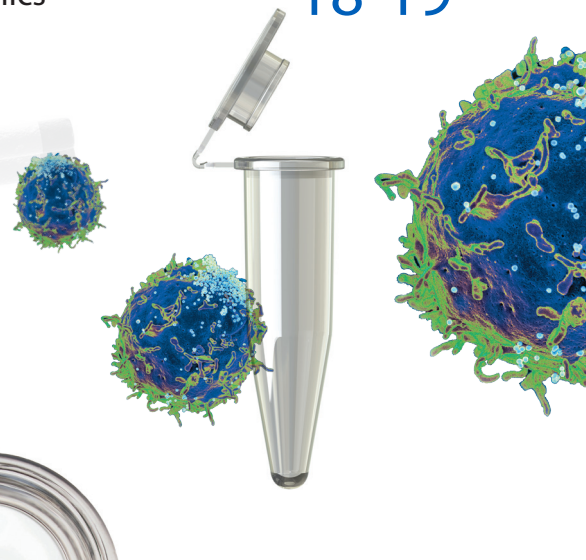
In 2009, the team at System Biosciences (SBI) recognized the great potential of exosomes and developed the first commercial exosome isolation kit. In the intervening years, we've worked with the growing exosome community to refine and enhance our products and expand our offerings. We are proud to support the life science community through an extensive portfolio of exosome research and engineering tools, backed by the largest number of peer-reviewed publications of any exosome reagent supplier in the world. With our ever-growing family of high-quality exosome products and services, SBI is harnessing the latest technological innovations and transforming them into powerful tools that accelerate your exosome-based discoveries.







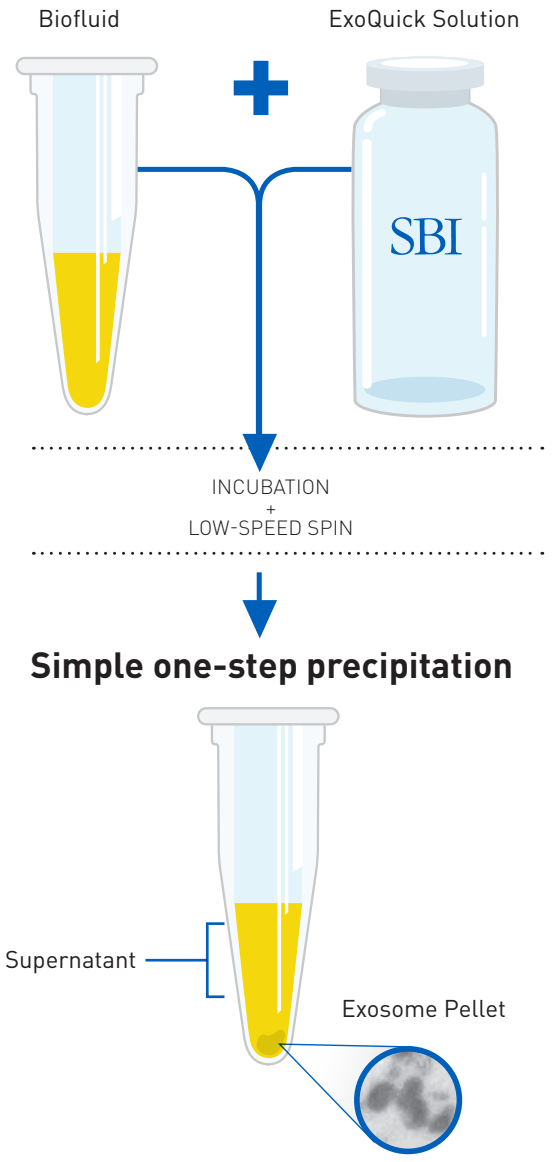
CUSTOM SERVICES AVAILABLE FOR MOST PRODUCTS.



Standardization of sample collection, isolation and analysis methods in extracellular vesicle research
Kenneth W. Witwer, et al. J Extracell Vesicles. 2013; 2: 10.3402/jev.v2i0.20360. PMCID: PMC3760646

With a variety of options to choose from, **SBI accelerates exosome isolation** with products that enable fast, multiplexed exosome enrichment from a wide range of biofluids.

SALIVA[1] / URINE[2] / FOLLICULAR FLUID[3] / PLASMA[4] / SERUM[5] / TISSUE CULTURE MEDIA[6] / BREAST MILK[7] / ASCITES FLUID[8] / MORE



ExoQuick Family

The ExoQuick portolio of products originated with the ExoQuick® and ExoQuick-TC® isolation kits that enable high-throughput, high-yield exosome isolation. Using these unique, polymer-based reagents, exosomal vesicles are gently and reliably precipitated from solution. Compatible with virtually any biofluid (such as serum, plasma, tissue culture media, etc) and a wide variety of downstream applications, ExoQuick and ExoQuick-TC are effective and proven[3,4,9] alternatives to ultracentrifugation.

Quick and easy—simple protocol isolates exosomes in as little as 30 minutes

Universal—enables exosome isolation from all biofluids tested to-date

Broadly usable—isolated exosomes perform well in a variety of downstream applications, including miRNA profiling, NGS, and mass spec analysis

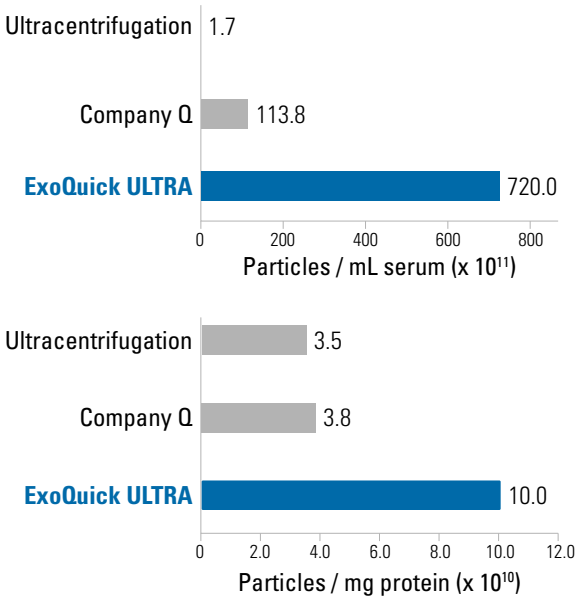
Functional—isolated exosomes are intact and bioactive for functional studies and engineering

[3] Exosomal and Non-Exosomal Transport of Extra-Cellular microRNAs in Follicular Fluid: Implications for Bovine Oocyte Developmental Competence. Sohel, M. M. H. et al. PLoS ONE 8, (2013). PMCID: PMC3817212

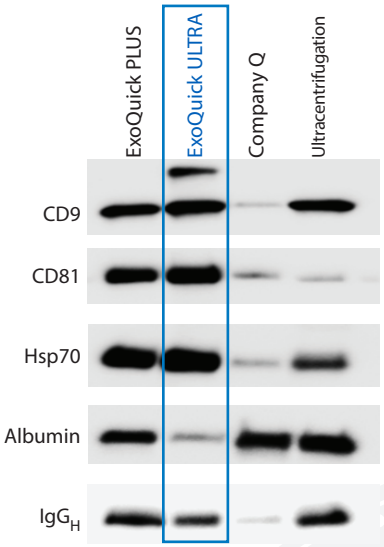
ExoQuick ULTRA

Drawing upon years of exosome experience, the SBI team has pushed ExoQuick extracellular vesicle isolation technology to new peaks of performance with ExoQuick ULTRA for Serum and Plasma and ExoQuick-TC ULTRA for Tissue Culture Media and other biofluids. While many EV isolation methods require a choice between high yields, easy protocols, clean preps, and low costs, ExoQuick ULTRA is able to deliver on all fronts for trade-off free EV preparation.

- Even cleaner—reduces carry-over of albumins and immunoglobulins compared to ultracentrifugation
- Higher yields—isolate more EVs per normalized input volume than UC and other kits
- Better biomarker detection—see what you've been missing when you increase the sensitivity of EV biomarker detection
- Fast—requires < 20-minutes of hands-on time
- Cost-effective—save money with each reaction compared to using competitor kits



Fluorescent nanoparticle tracking analysis demonstrates the high EV yields delivered by ExoQuick ULTRA compared to UC. Comparison of different isolation methods on EV yields by both volume of input serum (per mL, top panel) and amount of isolated protein (per mg as measured by fluorometric Qubit protein assay, bottom panel).



ExoQuick ULTRA delivers high yields of clean exosomes from serum. Western blot shows that the ExoQuick ULTRA prep contains the highest levels of exosome-specific markers CD9, CD81, and Hsp70 and the lowest level of total carryover protein.

VALIDATION DATA

Find additional validation data and references using ExoQuick ULTRA—visit systembio.com/exoquick-ultra

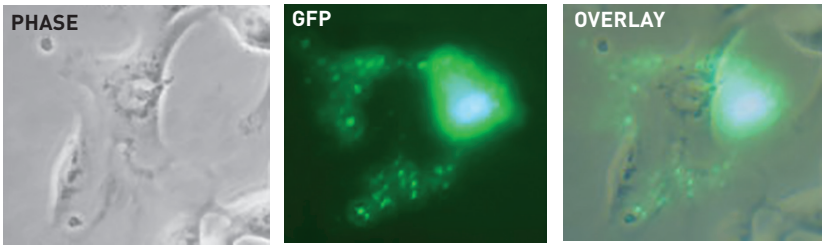
Biochemical and biologic characterization of exosomes and microvesicles as facilitators of HIV-1 infection in macrophages. Kadiu, I. et al. J Immunol. 2012 Jul 15; 189(2):744-54. PMCID: PMC3786185

CONSIDER THIS

With just 100 µl plasma, ascites fluid, or serum, you can isolate exosomes from small animal models for biomarker analysis.

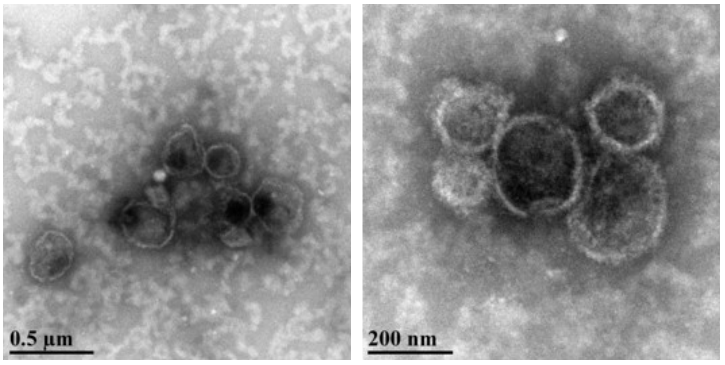
ExoQuick Portfolio Validation

Exosomes isolated with ExoQuick appear similar to exosomes isolated using ultracentrifugation in electron microscopy studies,[4,9] and are active in numerous functional assays.[3,4] Backed by over 600 publications, ExoQuick is often the best option for researchers working with low sample volumes, such as clinical samples or small animal models.



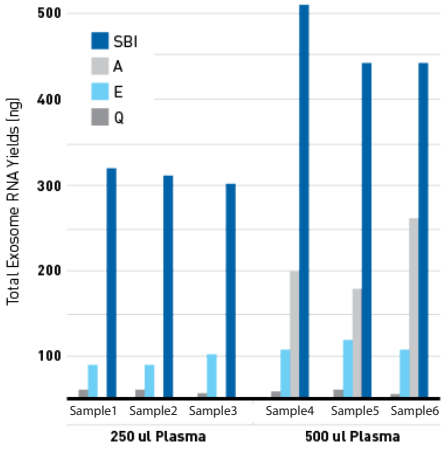
Exosomes isolated with ExoQuick-TC can be transferred between cells. HT1080 cells were cultured for 48 hours, media was collected, and exosomes were isolated with ExoQuick-TC. The exosome pellet was resuspended in 30 µl PBS, and 10 µl of this solution was added to newly plated HT1080 cells. These cells were initially visualized, replated after 72 hours, and visualized for GFP fluorescence and imaged at 96 hours. Exosomes appear to dock with the HT-1080 cells within 72 hours and are internalized at 96 hours.

"We therefore pursued the ExoQuick method for further study, as these samples required much less sample input, a key benefit when working with clinical samples and mouse models." [4]



Transmission Electron Micrographs (TEMs) of EVs isolated from human serum using ExoQuick ULTRA display typical EV morphology. The same sample is shown at two different magnifications. Multiple vesicles with typical EV morphology can be seen in each image.

Find additional data and references—visit systembio.com/exoquick



ExoQuick Isolation & RNA Purification Kits

The ExoQuick Isolation & RNA Purification Kits provide everything you need—ExoQuick for exosome isolation, lysis buffer, and rapid spin columns to extract the RNA—for optimized isolation of exosomal RNAs from serum, plasma, or tissue culture media.

RNA recovery with the ExoQuick Isolation & RNA Purification Kits is higher and more consistent across samples and is more easily scalable when compared to other RNA isolation kits.

Learn more at systembio.com/exoquick-rna

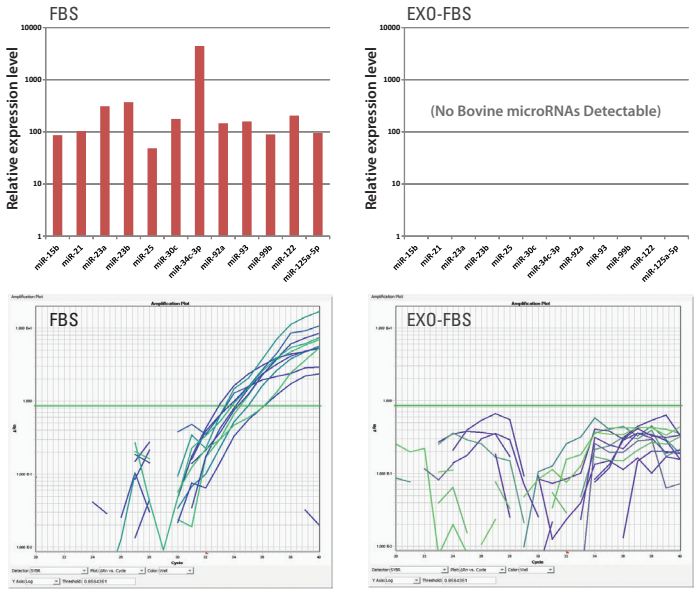
Exo-FBS

Ensure that exosomes isolated from tissue culture media do not contain bovine exosome contaminants with Exo-FBS™ reagent—fetal bovine serum (FBS) that has been depleted of exosomes.

FBS is an important component of tissue culture media for a variety of systems. However, serum is a rich source of exosomes, FBS included. To support researchers who purify exosomes from tissue culture media, SBI offers the convenient, time-saving Exo-FBS media supplement.

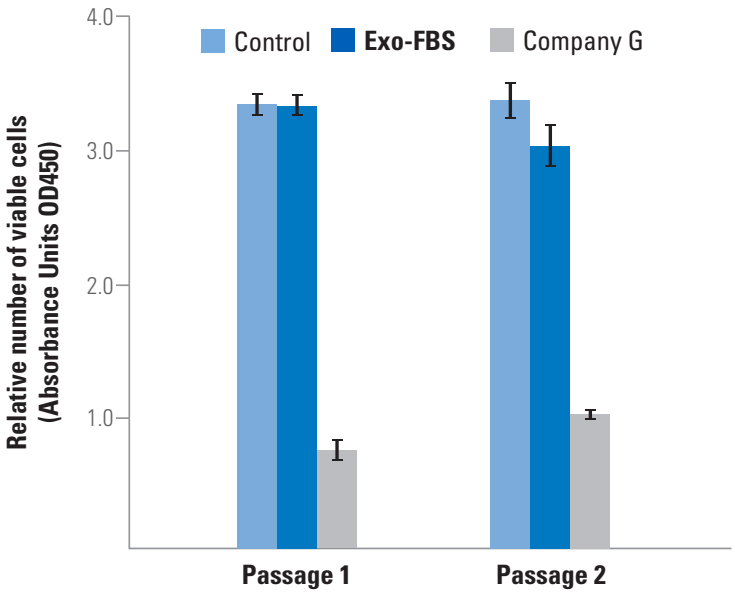
- Exosome-sized vesicles greatly reduced
- Very low levels of CD63-positive bovine exosomes
- Undetectable levels of bovine miRNAs
- Comparable growth rates as standard FBS
- Interchangable with standard FBS

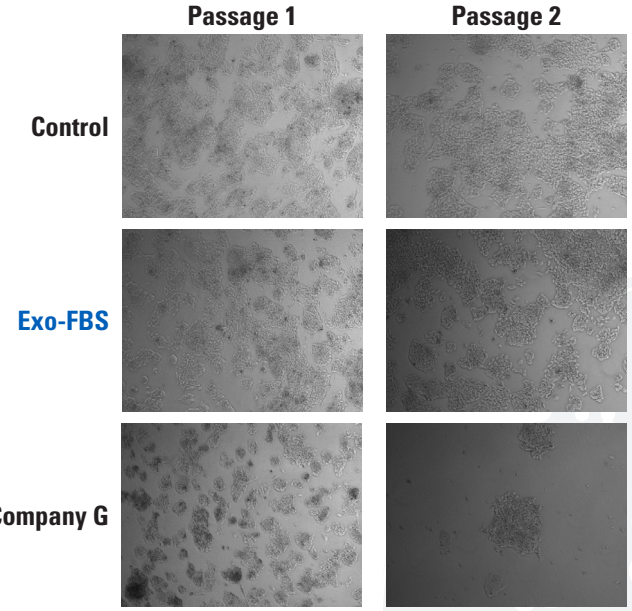
Learn more at systembio.com/exo-fbs



qPCR amplification curves

qPCR assays show undetectable levels of bovine exosomal miRNAs in Exo-FBS. Standard FBS and Exo-FBS media supplements were treated with Trizol and the recovered RNA was converted to cDNA; 72 individual bovine microRNAs were measured by qPCR. Standard FBS contains amplifiable miRNAs (12 of 72 individual miRNAs tested, left panels), while Exo-FBS shows no amplifiable miRNAs (right panels).





Exo-FBS supports more robust cell growth than Company G's exosome-depleted FBS. HepG2 cells were grown in media containing standard FBS (control), Exo-FBS, or Company G's exosome-depleted FBS. Data after one and two passages shows that Exo-FBS provides a higher number of viable cells (left panel) and a healthier cell morphology (right panel) than Company G's product.

Cardiac progenitor-derived exosomes protect ischemic myocardium from acute ischemia/reperfusion injury. Chen, L, et al. Biochem Biophys Res Commun. 2013 Feb 15; 431(3): 566–571. PMCID: PMC3732190

CONSIDER THIS

Exo-FBS is ready-to-use. Removing exosomes from FBS in your lab requires an 18-hour ultracentrifugation run.

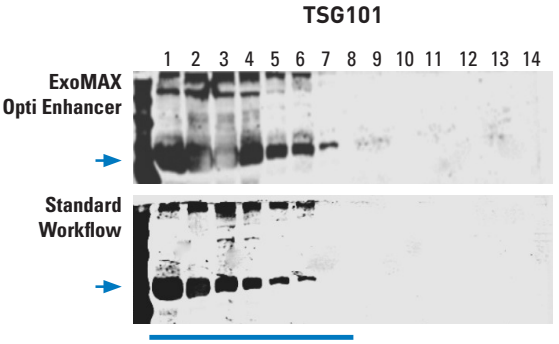
ExoMAX Opti Enhancer

Streamline exosome sample prep for density gradient ultracentrifugation with ExoMAX™ Opti Enhancer, an easy-to-use reagent that can move samples to the density gradient in three easy steps.

Centrifuge cell culture medium or body fluid to pellet cellular debris, incubate with ExoMAX Opti Enhancer, centrifuge again, and load the resuspended pellet onto the density gradient. Exosomes harvested from the density gradient are present in higher amounts than when the standard prep is used and are easily separated from viruses.

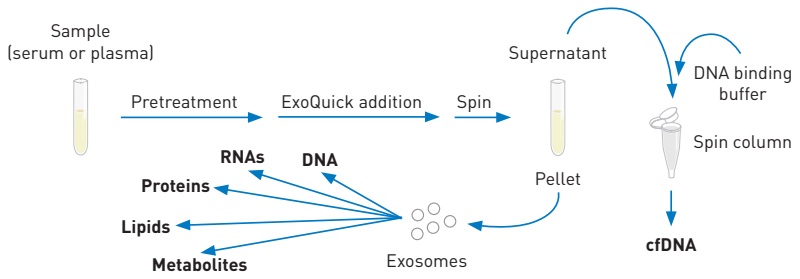
- Supports separation of exosomes from viruses and protein aggregates
- Delivers more exosomes than traditional protocol

Learn more at systembio.com/exo-max



Density gradient fractions probed with exosome-specific anti-Tsg101 antibody show higher exosome yields from the ExoMAX workflow (5 mL media sample) than from the standard workflow (10 mL media sample).

XCF COMPLETE Exosome & cfDNA Isolation Kit



Learn more at systembio.com/xcf-liquid-biopsy-kits

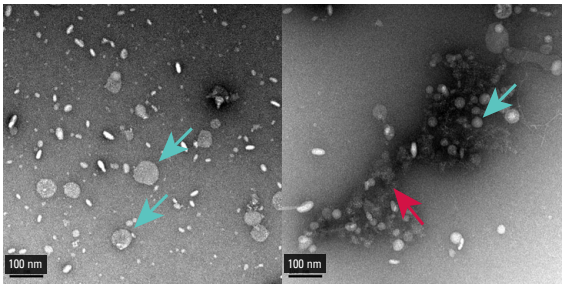
Accelerate and enhance your biomarker discovery and characterization studies with the XCF COMPLETE Exosome & cfDNA Isolation Kit. This unique, two-in-one product delivers simultaneous isolation of cell free DNA and exosomal DNA from the same sample.

Once exosomes have been isolated, they can also be analyzed for protein, lipid, miRNA, and metabolite content, efficiently broadening your biomarker discovery capabilities and enabling correlation and co-analysis of cfDNA biomarkers with a complete range of exosomal biomarkers.

ExoBacteria OMV Isolation Kit

Streamline isolation of bacterial outer membrane vesicles (OMVs) with the ExoBacteria™ OMV Isolation Kit, an innovative, precipitation-free gravity column system to harvest OMVs from bacterial culture medium. Putting isolated OMVs into your hands in <1-hour and delivering a purity and yield superior to UC, the ExoBacteria OMV Isolation Kit is a great way to accelerate your studies on bacterial communication and pathogenesis, cancer therapy, bacterial modulation of the host immune response, and bacterial OMV engineering for use as vaccines.

- Go from cultured bacterial media to purified OMVs in < 1 hr
- Obtain high yields & high purity of OMVs



ExoBacteria OMV Isolation Kit | Ultracentrifugation

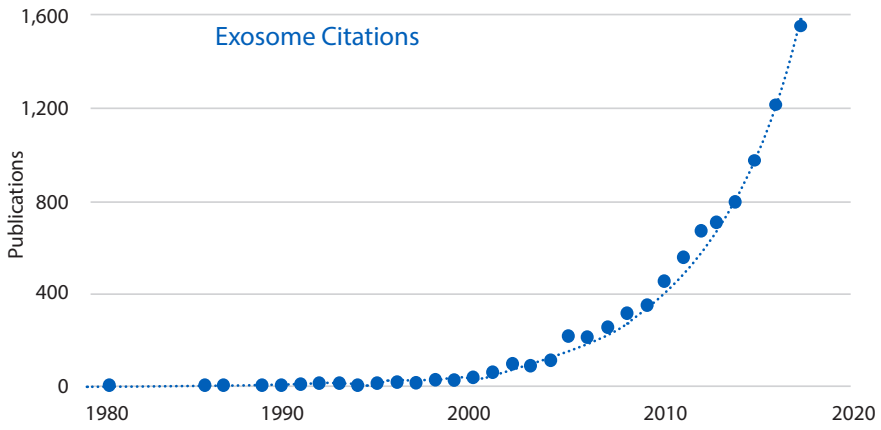
OMVs (blue arrows) are indicated in both samples via TEM, but note the unwanted protein aggregate (red arrow) in the UC sample.

Learn more at systembio.com/exobacteria

NAMES

What's in a name? Some of the many (perhaps controversial) names of exosomes: epididimosomes, argosomes, exosome-like vesicles, apoptotic blebs, microparticles, promininosomes, prostasomes, dexosomes, texosomes, dex, tex, exosomes, nanoparticles, microvesicles, shedding microvesicles, ectosomes, archeosomes, oncosomes,[15] nano-structures, nanoshuttles[16]

A RAPIDLY GROWING FIELD



HARNESSING INNOVATION TO DRIVE DISCOVERIES

EXOSOME WEB RESOURCES

ExoCarta exocarta.org
A manually curated database of exosome proteins, RNA, and lipids

Vesiclepedia microvesicles.org
A manually curated database of proteins, RNA, and lipids found in extracellular vesicles

ExosomeRNA exosome-rna.com
A site for exosome RNA research and news

exRNA exrna.org
A research portal for the NIH Extracellular RNA Communication Program

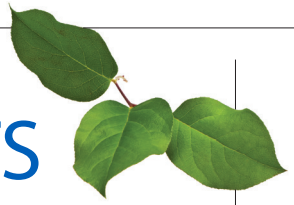
Exosome University linkedin.com/groups/Exosome-University-6781295
A LinkedIn group for discussing all things exosome

630

Number of citations using ExoQuick family products

DID YOU KNOW?

PLANTS



have been found to generate exosome-like vesicles that can interact with mammalian cells[13, 14]

EXOSOME-RELATED NOBEL IN

2013

James E. Rothman, Randy W. Schekman, and Thomas C. Sudhof for their "discovery of machinery regulating vesicle traffic, a major transport system in our cells."

NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE 2013

TEN

Number of exosome-related clinical trials currently recruiting or enrolling[11]

FOLLOW SBI
linkedin.com/company/292541

4,408

Number of published exosome papers in 2017[10]

FOLLOW SBI
systembio.com

DEDICATED
EXOSOME CONFERENCES

ISEV—International Society for Extracellular Vesicles

ASEMV—American Society for Exosomes and Microvesicles

HSPA8

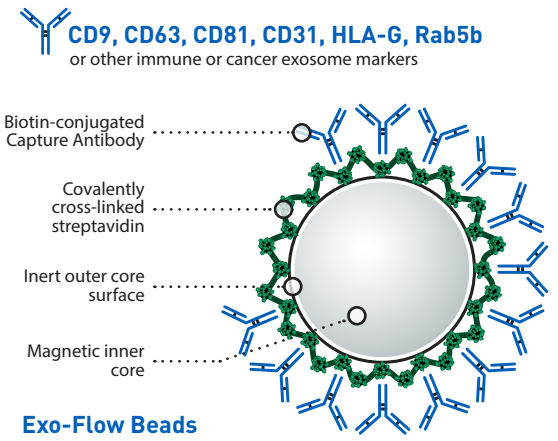
Found in the most studies of exosomal proteins. Identified in 52 studies from 27 tissue sources.[12]

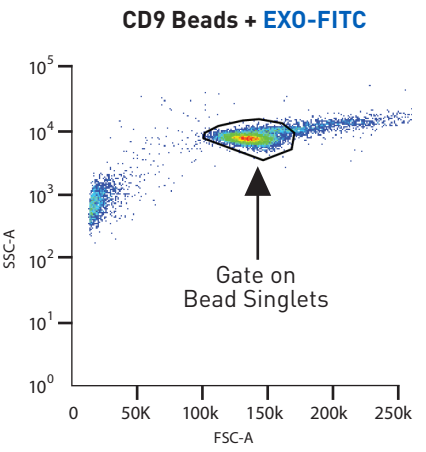
Exo-Flow

With modular kits and validated antibodies, the Exo-Flow™ family of reagents enables reliable, selective capture and purification of exosomes by FACS or immunoprecipitation (IP). Exo-Flow magnetic beads are coated with streptavidin and can be purchased pre-coupled to one of our exosome-specific antibodies, or uncoupled, enabling attachment of your own biotinylated capture antibodies. Our newest generation of Exo-Flow kits contain enhanced components to further prevent non-specific binding of EVs and enable highly specific capture of EV subpopulations.
Find validation data and more at systembio.com/exo-flow

BUY KITS FOR **FACS** OR **IP**

- CD9
- CD63
- CD81
- CD14
- CD68
- CD31
- CD44
- A2M
- HLA-G
- PSMA
- RAB5B

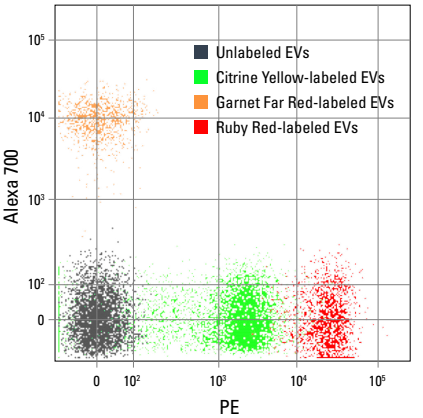




ExoFlow-ONE EV Labeling Kits for Flow Cytometry

Finally, you can take full advantage of the power of flow-based methods for direct analysis of extracellular vesicles with ExoFlow-ONE EV Labeling Kits for Flow Cytometry. By specifically labeling internal EV components with one of the proprietary, high quantum efficiency ExoFlow-ONE Gemstone dyes, you can achieve near single-vesicle resolution for more powerful flow cytometry and FACS studies and greater insights into EV biology.
Learn more at systembio.com/exoflow-one

Cat. #	ExoFlow-ONE Dye	Excitation/Emission (nm)	Laser Line (nm)
EXOF100A-1	Ruby Red	573/588	561
EXOF200A-1	Garnet Far Red	628/643	633
EXOF300A-1	Emerald Green	511/525	488
EXOF400A-1	Topaz Blue	403/454	405
EXOF500A-1	Citrine Yellow	542/556	532

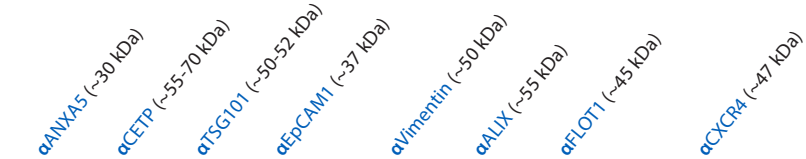


The excellent spectral separation of ExoFlow-ONE dyes supports greater flexibility and enables more powerful multi-parametric flow experiments with EVs.

Whether you just need to know if you have exosomes present or want to identify specific EV subpopulations, SBI offers products and services that can help. With a range of antibody- and dye-based options, and expert technical support, we drive your exploration of this exciting field.

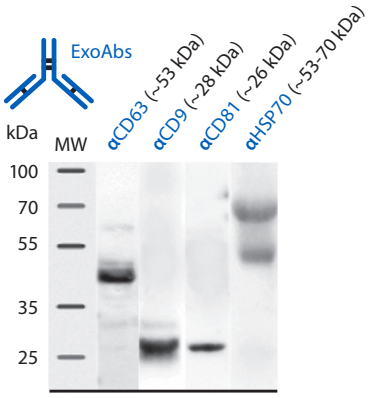
Antibodies

For affinity-based exosome detection, SBI offers validated rabbit anti-human primary antibodies (several with mouse cross-reactivity), available individually and in kits.



HEK293 Exosomes | Serum Exosomes | Jurkat, BC-3 Exosomes

Additional validated exosome marker antibodies:
ANXA5 / CETP / TSG101 / EpCAM1 / Vimentin / ALIX / FLOT1 / CXCR4



ExoQuick Serum Exosome Western Analysis

General exosome marker antibodies:
CD63 / CD9 / CD81 / HSP70

Exo-Check Antibody Array

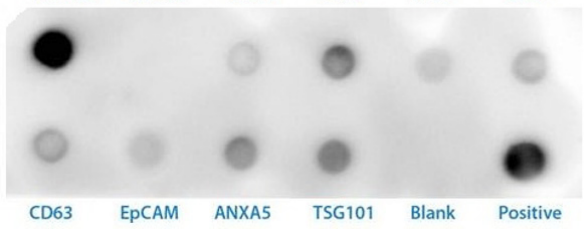
Our Exo-Check™ antibody array offers detection of eight known exosome markers—CD63, CD81, ALIX, FLOT1, ICAM1, EpCam1, ANXA5, and TSG101—and GM130, a cis-Golgi marker to monitor for cellular contamination. The array also includes one blank spot and two positive controls.

Exo-Check Antibody Array (Neuro)

Our Exo-Check Antibody Array (Neuro) offers characterization of neural EVs. The pre-printed array features antibodies for five known EV markers (CD63, CD9, CD81, TSG101, and ICAM1), six common neural markers (L1CAM, NCAM1, ENO2, MAPT, GRIA1, and PLP1), and one for cellular contamination (CANX).

Serum Exosomes

	1	2	3	4	5	6
A	Positive	GM130	FLOT-1	ICAM	ALIX	CD81
B	CD63	EpCAM	ANXA5	TSG101	Blank	Positive



Exo-Check Antibody Array was exposed to 50 µg of exosomal proteins isolated from pooled, normal human serum using ExoQuick. The antibody spots will provide varying levels of signal, depending upon the source of the isolated exosomes.

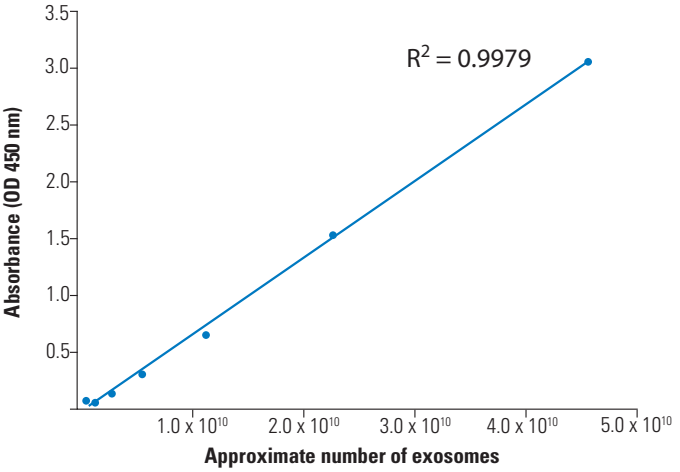
ExoELISA and ExoELISA-ULTRA Kits

Our standard ExoELISA™ kits—available for detection of either CD63, CD9, or CD81—are for conducting direct Enzyme-Linked ImmunoSorbent Assays (ELISA). All kits come with the standards needed for calculating exosome concentration.

Improving on our popular ExoELISA Kits, the ExoELISA-ULTRA kits increase the sensitivity of exosome detection—as low as 1 µg protein equivalent—while shortening the total assay time to only 4 hours.

Currently offered in two formats, one for detection of CD63 and one for CD81, ExoELISA-ULTRA kits are based on an ultra-sensitive, direct capture, colorimetric ELISA assay that is compatible with exosomes derived from most biofluids.

Learn more at systembio.com/exo-elisa-ultra



Calibration curve for the number of exosomes detected using the ExoELISA-ULTRA Complete Kit (CD63 Detection) shows that ExoELISA-ULTRA is quantitative down to low amounts of exosomes.

	ExoELISA-ULTRA	ExoELISA	EXOCET	FluoroCet
Use	Fast and sensitive antibody-based quantitation	Sensitive quantitation when time and sample are not limiting	Fast quantitation with moderate sample input	The most sensitive quantitation with very low sample input
Detection Method	Antibody	Antibody	Enzymatic	Enzymatic
Quantiation chemistry	Enzymatic (HRP)	Enzymatic (HRP)	Colorimetric	Fluorescence
Protocol time	4 hours	24 hours	20 min	60 min
Input sample amount	1-200 µg	>500 µg	50 µg	<1 µg

EXOCET Rapid Exosome Quantitation Assay

Achieve exosome quantitation in as little as twenty minutes with EXOCET. The EXOCET assay directly measures Acetyl-CoA Acetylcholinesterase (AChE) activity, known to be enriched within exosomes.[17] The EXOCET assay is an enzymatic, colorimetric assay read at OD405, and each kit includes a standard curve, enabling quantitation of the exosomes present.

Learn more at systembio.com/exocet

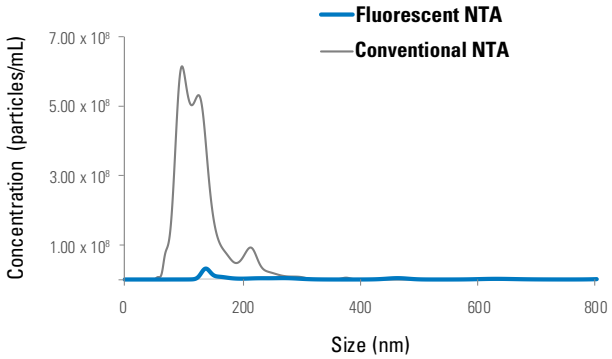
FluoroCet Exosome Quantitation Assay

Enabling highly sensitive quantitation of exosomes in only 60 minutes, the FluoroCet Kit takes our popular EXOCET assay and increases the sensitivity over 30-fold. Fully compatible with a variety of exosome isolation methods (ExoQuick family, UC, ultrafiltration, and immunoaffinity capture), FluoroCet is great for quantifying exosomes when samples are limiting.

Learn more at systembio.com/fluorocet

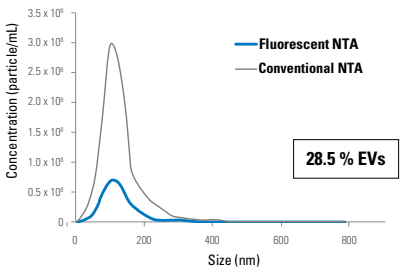
ExoGlow-NTA Fluorescent Labeling Kits

Gain more accurate insight into your exosome sample with ExoGlow™-NTA Fluorescent Labeling Kits that detect only intact extracellular vesicles. The ExoGlow-NTA Fluorescent Labeling Kits utilize the fluorescence capabilities of Nanoparticle Tracking Analysis (NTA) instrumentation with a proprietary fluorescent dye that works by reacting specifically and efficiently to the surface of intact vesicles. Membrane fragments, protein aggregates, and other background particles do not activate the ExoGlow-NTA dye, resulting in exclusion of these species from fluorescent NTA (fNTA). Thus, with the ExoGlow-NTA Kits, the data delivered by NTA more accurately represents the EV populations in your sample rather than all particles, as is typically reported by conventional (nonfluorescent) NTA.

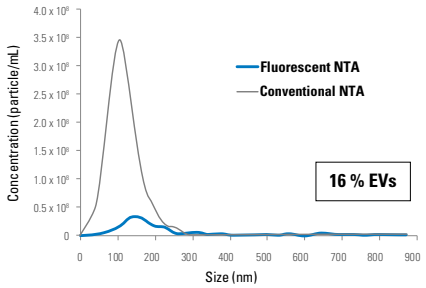


ExoGlow-NTA exhibits undetectable background signal. Conventional NTA and Fluorescent NTA of ExoGlow-NTA dye in the absence of EVs shows bias-free undetectable autofluorescence, based on particle counts.

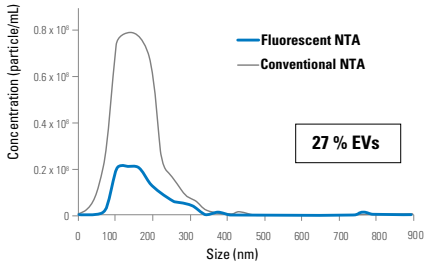
ExoQuick



Ultracentrifugation + Wash



Column-based



ExoGlow-NTA demonstrates that conventional NTA overestimates EV concentration in samples irrespective of EV isolation method. Representative data comparing conventional and fluorescent NTA for EVs isolated using ExoQuick (10 µg serum protein), Top left; UC and wash (1 µg serum protein), Top Right; or column-based (1 µg serum protein), Bottom Right, shows how much of the conventional NTA signal is due to non-EV particles.

- Only commercially available kit that labels EVs for fluorescent NTA quantitation
- Delivers high signal-to-noise ratio with a proprietary dye that specifically binds EVs
- Validated using common EV isolation methods including ExoQuick, UC, and column-based methods
- Optimized for speed—only 20 minutes from sample isolation to analysis
- Compatible with Malvern Panalytical NanoSight and Particle Metrix ZetaView®

Learn more at systembio.com/exoglow-nta

NTA Exosome Analysis Service

No access to NTA? Obtain highly quantitative measurements of your exosome preparation with SBI's NTA Service. Starting from biofluid samples or purified exosomes, SBI will provide mean and mode diameter measurements and exosome concentrations using either NanoSight or ZetaView instumentation for both conventional and fluorescent NTA. Take advantage of accurate and precise exosome characterization without needing to invest in your own instrument.

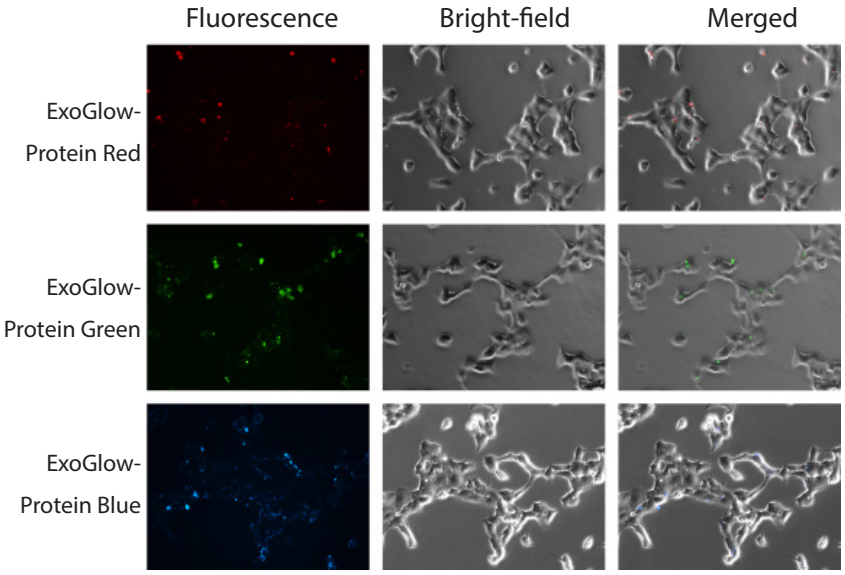
Learn more at systembio.com/services/exosomes/overview

Once thought to be little more than a way for cells to offload waste, exosomes are a rapidly expanding area of study in basic research, biomarker discovery, and even engineered tools for therapeutic delivery. They function as signal carriers and tissue reshapers through their cargo of RNA, proteins, and lipids, and are involved in a wide range of healthy and pathogenic processes including cancer, inflammation, immunity, CNS function, and cardiac cell function.

ExoGlow EV Labeling Kits

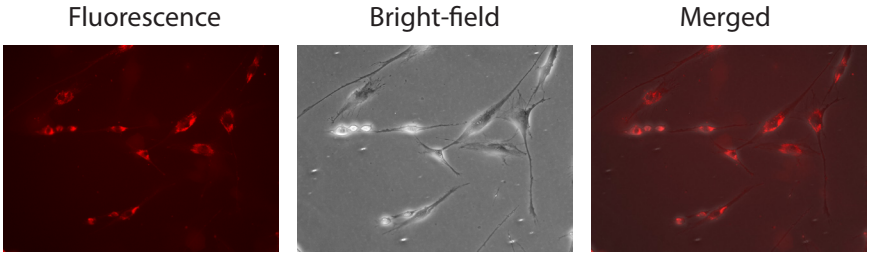
Take your exosome visualization to new levels of clarity, low background, and high selectivity with the next generation of ExoGlow kits. Unlike general-purpose labeling reagents that are not optimized for EVs and suffer from high levels of background signal, our ExoGlow reagents—ExoGlow-Protein, ExoGlow-RNA, and ExoGlow-Membrane—improve your ability to track and localize EVs through specific labeling and low levels of background signal. The result is unmatched EV imaging for more accurate exosome studies.

Learn more at systembio.com/exoglow-next-gen



HEK293T EVs were labeled with ExoGlow-Protein (Red, Green and Blue) and uptake by HEK293T cells was assessed. The punctate fluorescence signal shows internalization of labeled EVs by the target cells.

- Specific—carefully developed to generate a robust signal specific for EV components, leading to very low levels of background
- Compatible—delivers robust performance on EVs isolated using all methods tested—including ExoQuick, UC and column-based workflows
- Easy-to-use—protocol is quick and straightforward
- Powerful—can be used with as little as 1 µg (Membrane), 50 µg (RNA) and 200 µg (Protein) of EVs

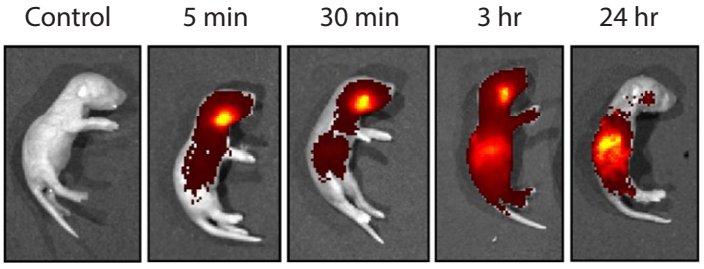


ExoGlow-Membrane enables clear visualization of labeled EVs being taken up by target cells. HEK293T EVs were labeled with ExoGlow-Membrane and uptake by HEK293T was assessed. The evenly distributed fluorescence signal shows internalization of labeled EVs by the target cells and the distribution of EV membranes to cellular membranes.

ExoGlow-Vivo EV Labeling Kit

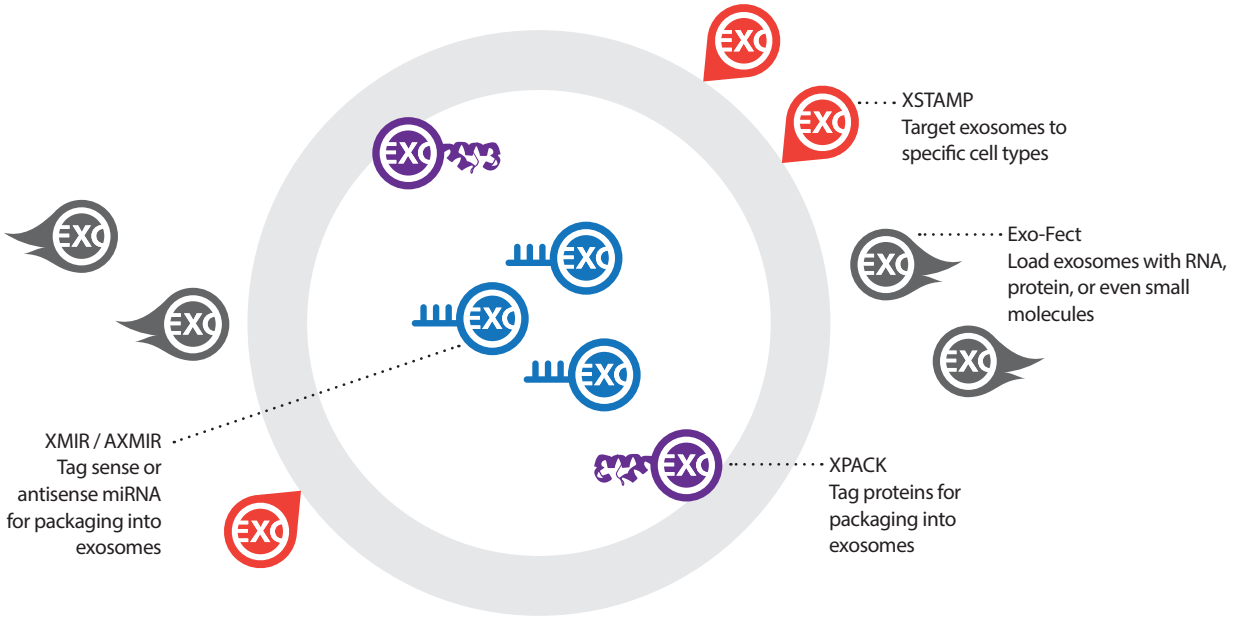
Visualize and track EV movement *in vivo* with the new ExoGlow-Vivo EV Labeling Kit (Near IR). This kit contains a non-lipophilic dye that emits in the near infrared (NIR) range. Delivering a high level of specificity and sensitivity, ExoGlow-Vivo is ideal for EV biodistribution and kinetic studies.

Learn more at systembio.com/exoglow-vivo



Mesenchymal stem cell-derived exosomes were labeled with ExoGlow-Vivo and administered intravenously via the superficial temporal vein into day-4 FVB mice. Animals were imaged at various time points, as indicated.

Complete Suite of Tools to Engineer Exosomes



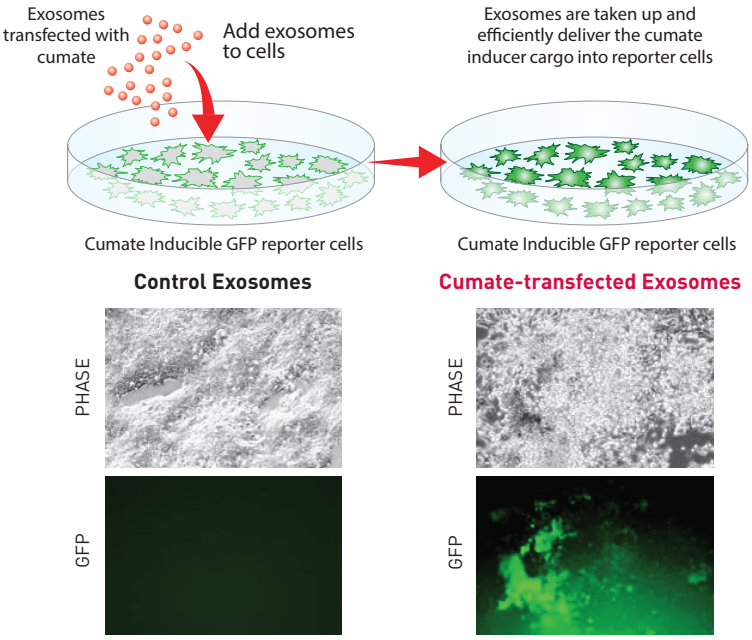
SBI PRODUCT KEY

Used by cells to transport cargoes of active biomolecules, exosomes are emerging as a powerful way for scientists to deliver specific proteins and miRNAs to target cells. As the field transitions from observation and analysis of exosomes to custom exosome design for therapeutic and other uses, SBI is already offering the necessary tools to push exosome engineering to the next level. With today's family of products, you can deliver miRNA for knockdown studies, plasmid DNA for expression studies, even small molecules for biochemical or therapeutic studies…imagine the possibilities. Find the latest exosome engineering products at systembio.com/exosome-engineering

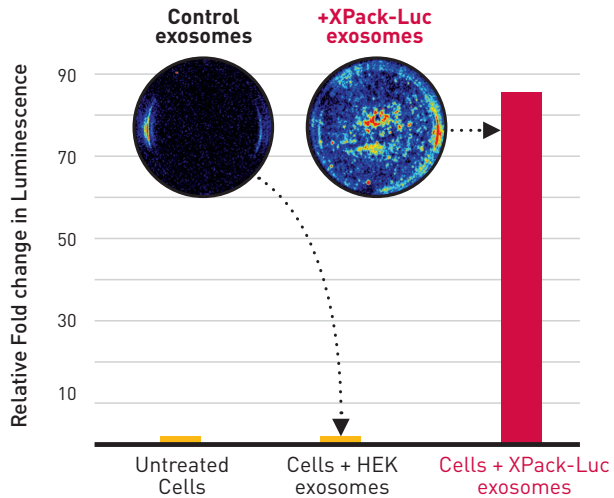
Purified exosomes ready for engineering, protein or nucleic acid cargo studies, experimental controls and standards, and more. Jump start your studies with ready-to-use exosomes from biofluids, such as human pooled serum, saliva, urine, and CSF (all from healthy donors). Visit systembio.com/purified-exosomes for a complete listing of all available purified exosomes.

Biofluid Exosomes	
EXOP-500-A1	Human pooled serum (healthy donors)
EXOP-510-A1	Human pooled saliva (healthy donors)
EXOP-520-A1	Human pooled urine (healthy donors)
EXOP-530-A1	Human pooled CSF (healthy donors)

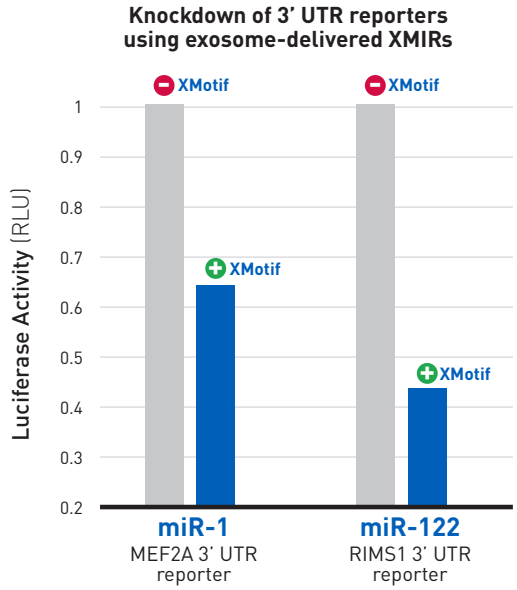
Exo-Fect™ reagent for loading, or "transfecting," exosomes with cargoes of siRNA, microRNA, mRNA, plasmid DNA, or even small molecules. Create your own "FedExosome"[18] to deliver specific cargo into targeted cells. Visit systembio.com/exo-fect



XPack™ products are the protein equivalents of XMIR/AXMIR, and tag proteins for incorporation into exosomes. We've optimized a peptide sequence that targets a protein to the interior exosomal membrane, allowing the fusion protein to be packaged into exosomes for secretion. You can use our convenient, pre-made XPack-GFP and XPack-Luciferase reporters for tracking exosomes, or design your own exosome-targeted protein for custom exosomes.



XMIR and AXMIR kits enable packaging of specific sense or antisense miRNAs into exosomes. Simply transfect one of our XMotif-tagged miRNAs or lentivectors into the exosome-producing cells of your choice. The secreted exosomes will be enriched for your miRNA, which can then be delivered to target cells. Great for knocking down or up-regulating expression of a target in the recipient cells. Visit systembio.com/xmir



XStamp™ kits deliver exosomes where you need them to go. By placing tissue-specific ligands on the exosome surface, you can engineer exosomes to interact with specific target cells.

NCAM NEURAL CELL-SPECIFIC

EGFR CANCER-SPECIFIC

HOMING PEPTIDES BRAIN, BLOOD-BRAIN BARRIER-SPECIFIC

IL-2 IMMUNE CELL-SPECIFIC

HER2 BREAST CANCER-SPECIFIC

MOTILIN GI TRACT-SPECIFIC

SBI also offers exosome engineering services. To learn more - contact us at services@systembio.com

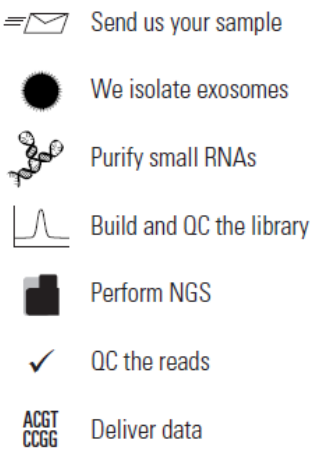
For both basic and translational researchers, exosomes represent a rich source of easily-isolated miRNA, protein, lipid, and metabolite biomarkers. Carrying molecules derived from their parent cell, exosomes can report on cellular physiology and play an important role in normal and disease processes. However, some labs might not have the time, resources, or in-house expertise needed to quickly capitalize on this growing field. For these labs, SBI offers a comprehensive set of end-to-end exosome research services—simply send us your biofluid and we'll take care of the rest.

Exosome NGS Service

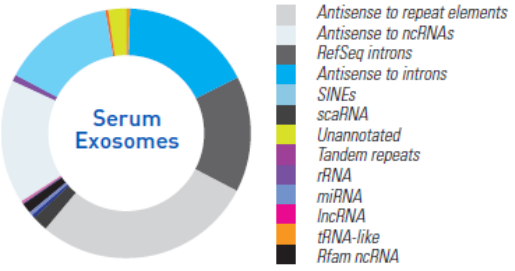
With low sample input requirements and competitive turn-around times of 6 - 8 weeks, SBI's ExoNGS Service simplifies your exosomal RNA profiling studies. Our service team has prepared thousands of high-quality small RNA libraries from sub-nanogram inputs of RNA and consistently provides 10-15 million raw reads/sample. In addition, this service includes an established exosomal RNA-seq data analysis pipeline to provide sequence QC, read mapping, and differential expression analysis. Our scientists are ready to answer your technical or project management questions, and can provide recommendations on protocols, additional data analysis, and more.

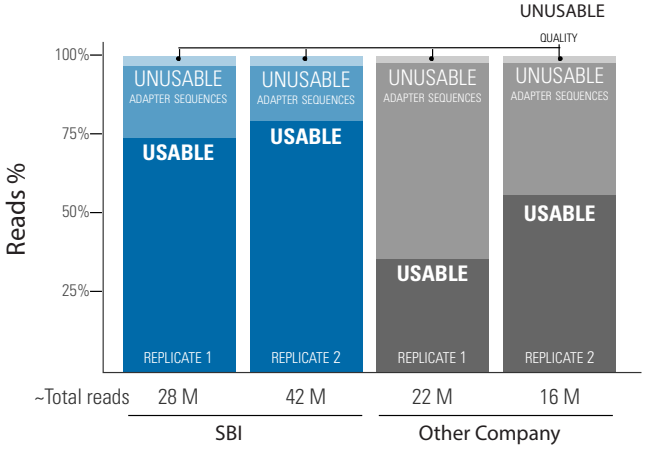
At SBI, we have been working with exosomes for over 9 years, so we can reliably and reproducibly isolate exosomes from almost any biofluid—from plasma and tissue culture media to CSF, synovial fluid, and even mouse bronchial alveolar fluid.

The ExoNGS Workflow



Sample data





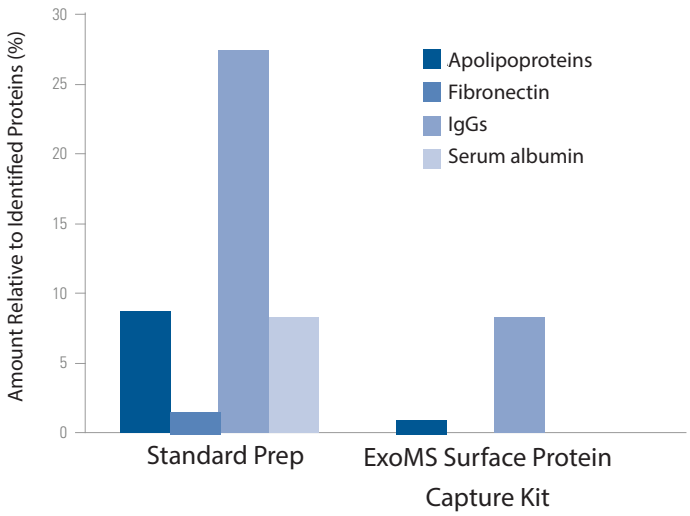
High quality exosomal RNA-seq data from as little as 1 ng of total exosomal RNA. SBI's exosomal RNA library preps result in a higher percentage of usable reads compared to other companies.

Learn more at systembio.com/exosome-ngs

ExoMS Protein Capture Kits

Take advantage of powerful LC/MS proteomics approaches for studying the biology of EV proteins and identifying EV biomarkers with SBI's ExoMS™ Protein Capture Kits. Selectively isolate only surface EV proteins or isolate all EV proteins. Each ExoMS Protein Capture Kit provides a fast, well-validated, and robust method for selectively capturing proteins from already-isolated EVs, enabling proteomics studies. Because of the low residual protein carryover delivered by our kits, you get increased detection of low-abundance biomarkers that are often missed using traditional approaches.

Learn more at systembio.com/exoms

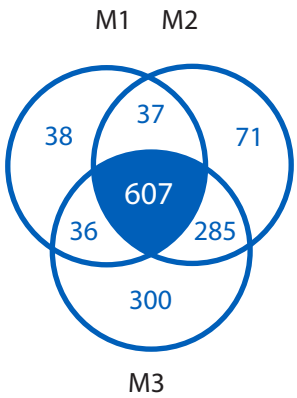


Common carryover proteins are reduced in human serum EV samples processed with the ExoMS Kit compared to samples processed using a standard protocol.

Exosome Proteomics Service

Easily expand your biomarker studies to profile exosomal proteins using Mass Spec with SBI's Exosome Proteomics Service. Just as with our ExoNGS service, our proteomics service is compatible with low input sample volumes. We can isolate exosomes from most biofluids, and can also work with your own exosome preparations. However, we recommend using our proven sample preparation approaches, which typically deliver cleaner peptide libraries with low amounts of carryover protein for more reliable exosome proteomics data. With fast turn-around times of ~4 weeks, our Exosome Proteomics Service is a great choice for biomarker studies.

Learn more at systembio.com/exosome-proteomics



Total MS profiling of EVs isolated from treated rat cell lines reveals 607 proteins common across different conditions. Unique proteins identified indicate changes to EV content.

Exosome Lipidomics Service

Better understand the importance of lipid-based biomarkers and the roles lipids play in vesicle biogenesis and function with SBI's Exosome Lipidomics Service. Exosomes were recently shown to have the highest lipid-to-protein ratio of all classes of extracellular vesicles. Simply send us your sample or purified exosomes and we'll send back a spreadsheet with putative identifications, mass/charge ratios, and differential analysis.

Learn more at systembio.com/exosome-lipidomics

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About System Biosciences

Seeking out novel technologies and tomorrow's hot new research areas, the team at SBI accelerates research by striving to be the first company to develop and commercialize new inventions. From best-in-class exosome research tools to powerful genome editing, lentiviral technology, gene expression & delivery vectors, and imaging & reporter vectors, SBI harnesses today's innovations to drive tomorrow's discoveries.

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