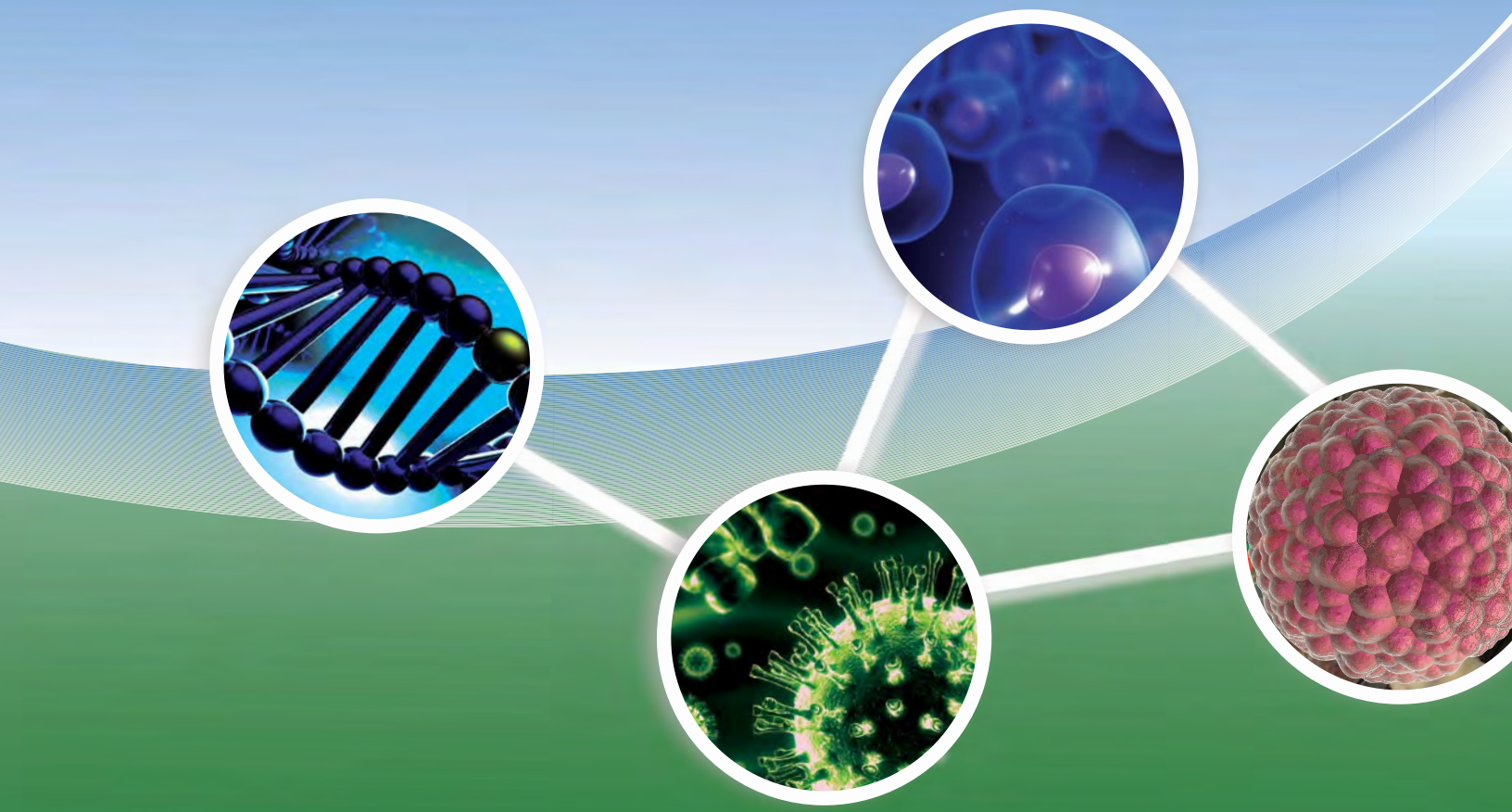
bioNova científica, s.l.

SBI System Biosciences
Accelerating discoveries through innovations

PRODUCT BROCHURE

Vector Technologies • MicroRNA • Exosomes • Stem Cells • Libraries



Spend less time making tools, and more time making discoveries

bioNova científica, s.l. · Tel.: 915 515 403 · Fax: 914 334 545 · e-mail: info@bionova.es · www.bionova.es

Efficient Delivery & Stable Expression

The human (HIV) and feline (FIV) Lentiviral Vector Systems provide exceptional tools to express any sequence in virtually all mammalian cells and *in vivo* models. The lentiviral system consists of three main components:
(1) the lentiviral expression plasmids (also known as "transfer vector")
(2) the lentiviral packaging plasmid mix
(3) a producer cell line for packaging

Lentivector formats

- **Stably Overexpress cDNAs and MicroRNAs**
  Choose from single or double promoter formats featuring CMV, EF1, PGK, UbC or MSCV promoter options with fluorescent proteins and/or antibiotic markers.

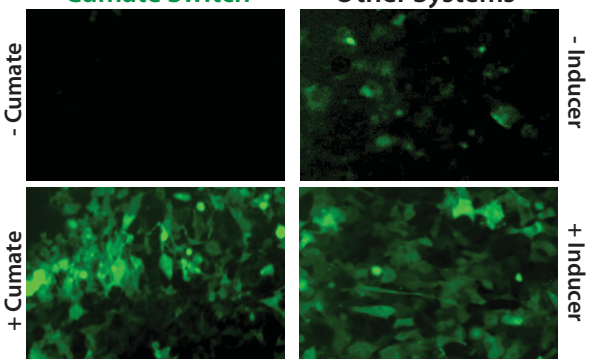
- **Permanent Gene Knockdown with shRNA Overexpression**
  These vectors use a robust H1 promoter to drive shRNA expression, with different maker combinations including the popular pGreenPuro dual marker shRNA vector.

PROMOTER OPTIONS	MARKER OPTIONS
CMV	GFP
EF1 alpha	RFP
MSCV	PURO
PGK	ZEO
UBC	HYGRO
Tissue-specific	NEO
Cumate Switch Inducible	THYMIDINE KINASE (TK)
VECTOR FORMATS	LUCIFERASE (LUC)
cDNA	GFP-T2A-PURO
shRNA	RFP-T2A-PURO
microRNA or anti-microRNA	GFP-T2A-LUC
Promoter Reporters	RFP-T2A-LUC
Transcription Response Reporters	GFP-T2A-Zeo

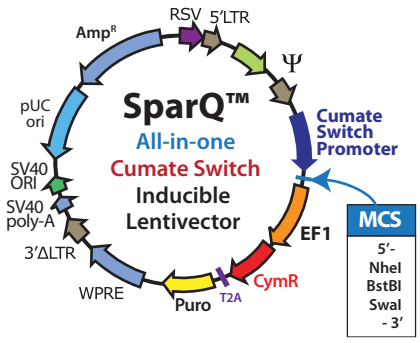
Inducible Cumate Switch Vectors

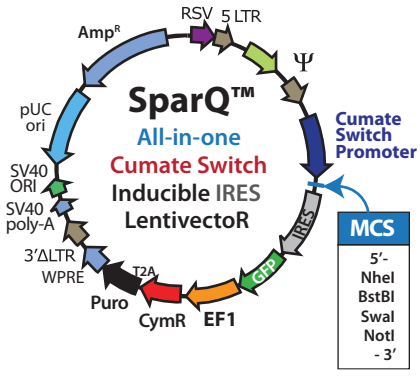
The Cumate Switch SparQ™ system delivers extremely tight control, robust induction and a highly titratable expression switch for inducible gene and microRNA expression studies. The system works through the CymR repressor that binds the cumate operator sequences (CuO) with high affinity. The repression is alleviated through the addition of Cumate, a non-toxic small molecule inducer that binds to CymR. This system has a dynamic inducibility, can be finely tuned and is reversible and inducible over and over for timed expression studies.

Lower Background than Other Systems

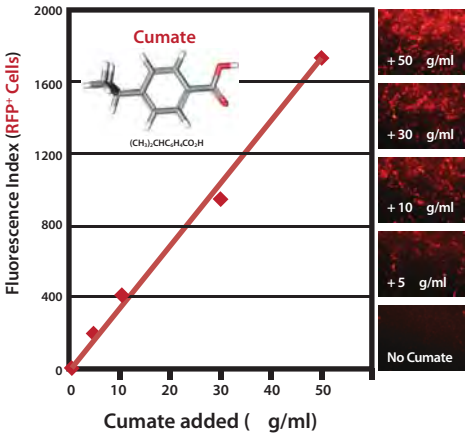


All-in-one Lentivector Formats





Fully Titratable

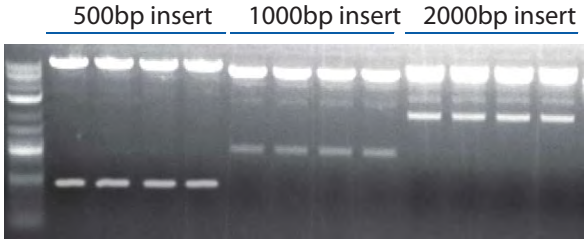


The Cold Fusion Cloning Kit

Next Generation Cloning Technology

The Cold Fusion technology allows you to directly clone any PCR product(s) into any linearized expression vector, at any site without the use of restriction enzymes and ligase. Simply design primers with at least 15 bases of homology at the ends to direct the fusion location of the desired DNA fragment. Convenient one tube reaction, with a 5 minute incubation at room temperature followed by 10 minutes on ice. The Cold Fusion master mix prepares the DNA ends for sequence-directed alignment. The PCR product(s) rapidly and accurately fuse into the linearized vector in the desired location and orientation. Cold Fusion is so robust that multiple DNA fragments can be assembled simultanously and cloned into one construct in a single step. The system is highly efficient, with more than 95% positive cloning rates.

Broad PCR product size range with high cloning efficiency

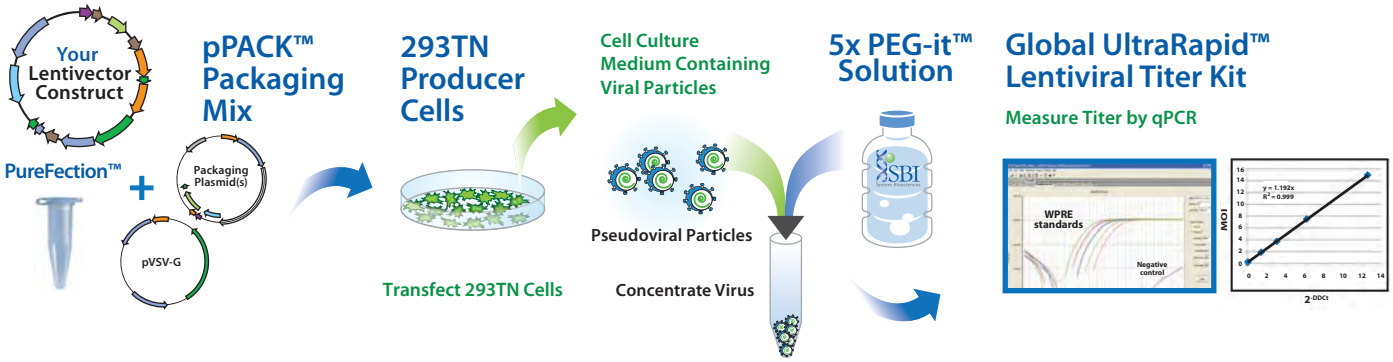


COLD Fusion
Cloning technology

Easily Produce High Titer Lentivirus with SBI's Tools

System Biosciences (SBI) offers an extended set of cloning and expression lentivectors for efficient delivery of expression constructs in mammalian systems. To achieve highly efficient delivery and stable expression, the lentiviral constructs can be packaged in VSV-G pseudoviral particles and transduced into a wide range of cell lines or model organisms (mouse, rat, etc.). SBI has all the vectors and reagents you need to package, concentrate, titer and transduce lentiviruses into target cells efficiently. Once you have determined the titer of your virus, combine the appropriate amount of virus with TransDux and infect your target cells.

How to make high-titer virus

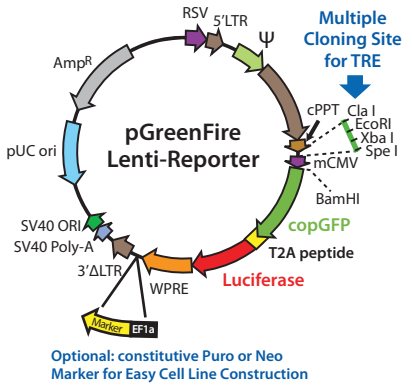


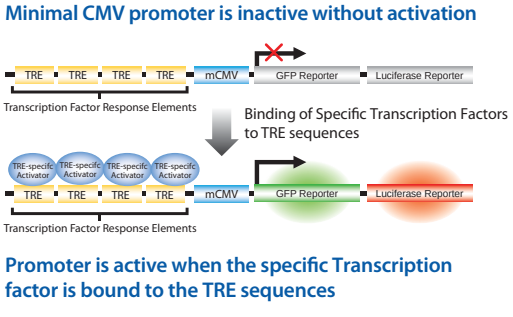
Accurately Monitor Transcription Networks

SBI's lentiviral-based reporter system is a novel approach to study transcriptional regulation and offers many advantages over current transcription reporter systems. The activation of a signal transduction pathway (e.g. by growth factors, drugs, etc.) can be monitored by the expression level of the reporter gene controlled by a promoter containing the corresponding signal response elements. The number of reporter integrations can be controlled by varying the multiplicity of infection (MOI). Commonly used plasmid-based transcriptional reporter vectors often skew transcriptional network reporting due to their episomal nature. SBI's lentivector-based transcription reporters integrate into the host's genome and enable proper chromatinization to produce more faithful transcriptional activity reporting.

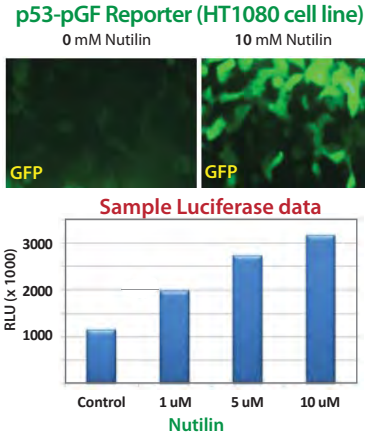
pGreenFire™

pGreenFire1 (pGF1) is a versatile HIV-based transcription reporter that co-expresses destabilized GFP and Firefly Luciferase enabling the simultaneous detection of GFP and Luciferase signals for quantitation of transcription activation. pGreenFire can be used with transcription response element repeats to monitor the activity of a particular transcription factor.





Dual reporter system

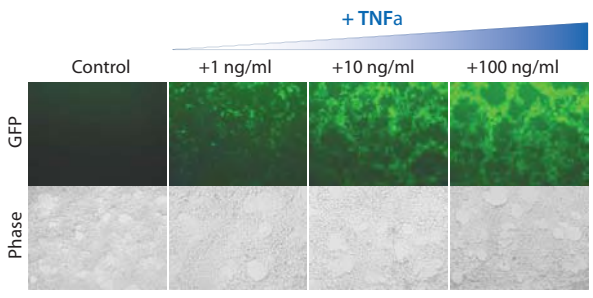


Available as ready-to-transduce virus or plasmid DNA

Pathway	Transcription Factor
Hypoxia	HIF-1
Cancer	p53
Cancer	AP1
Cancer	CREB
Cancer	SMAD2/3/4
Cancer	EGR1
Inflammation	NFkB
Inflammation	STAT1
Inflammation	GAS

Pathway	Transcription Factor
Wnt	TCF/LEF1
Wnt	cJun
Hedgehog	GLI
Cholesterol	ApoA1
Cholesterol	Cyp7A1
Cholesterol	ABCA1
Cholesterol	ABCG1
Cholesterol	ApoE
Cholesterol	CETP

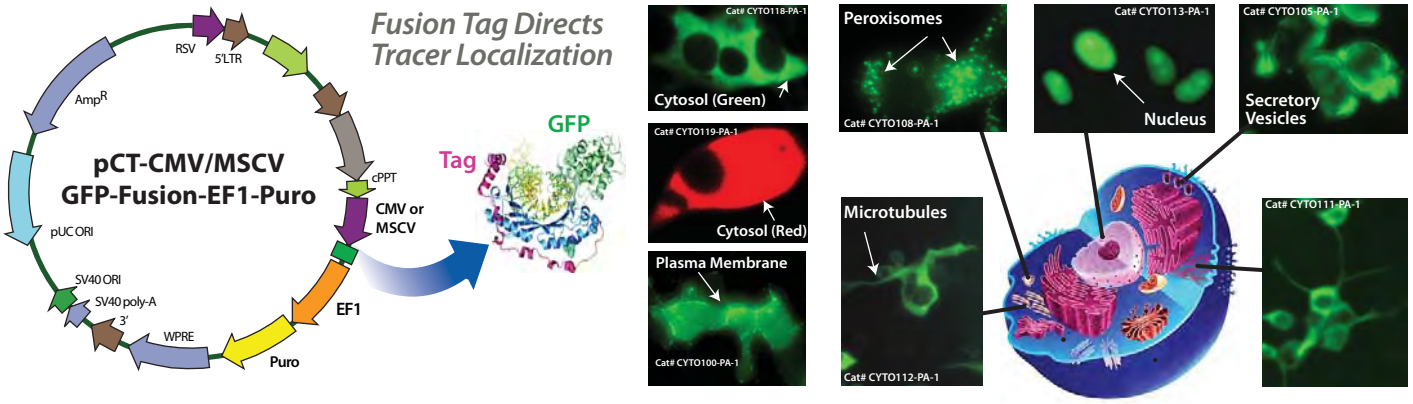
NFkB-pGF Reporter (293 cell line)



Vivid Tracking of Subcellular and Cellular Activities

Cyto-Tracers™ for Subcellular Tracking

Molecular trafficking is a dynamic process in eukaryotic cells and the Cyto-Tracers provide the ability to light up cell compartments to monitor movement and localization of organelles and to trace endocytosis and exocytosis. SBI has created a line of lentivector-based Cyto-Tracers that utilize GFP-fusion proteins to mark cellular compartments, organelles, vesicles and structures to enable more long-term and more in-depth experimentation. Apoptosis induction can be monitored with the Caspase 3/7 activation Cyto-Tracer. All of the Cyto-Tracers can be used in transfections as well as packaged into virus to create stable GFP tracer cell lines in primary cells, tumor cell lines and stem cells.



Bioluminescent Imaging vectors (BLIV) for Cell Tracking

Molecular imaging techniques to visualize cell kinetics in small animals have resulted in an explosion in the knowledge of tumors, infectious diseases, and stem cell biology. The sensitivity and accuracy of *in vitro* and *in vivo* cell monitoring offers several advantages over traditional methods which involve animal sacrificing and histological analysis. Molecular imaging, for example, is normally non-invasive and allows for quantitatively assessing tumor growth and the effects of therapy over time. Molecular imaging technologies include bioluminescence imaging (BLI) and fluorescence imaging (FLI). BLI uses light generated from a luciferase enzyme-substrate and FLI uses red/green fluorescent protein (RFP or GFP) as a signal. SBI has created BLI and FLI dual reporter lentivectors and minicircle DNA constructs to perform molecular imaging *in vivo*.

Promoter choices

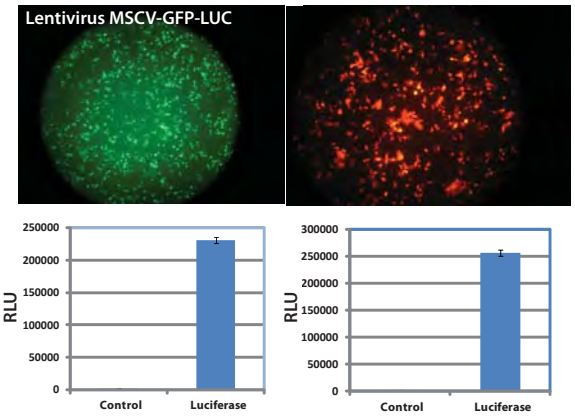
- EF1 alpha
- CMV
- UbC
- MSCV

Reporter choices

- GFP-T2A-Luciferase
- RFP-T2A-Luciferase

D-Luciferin reagent

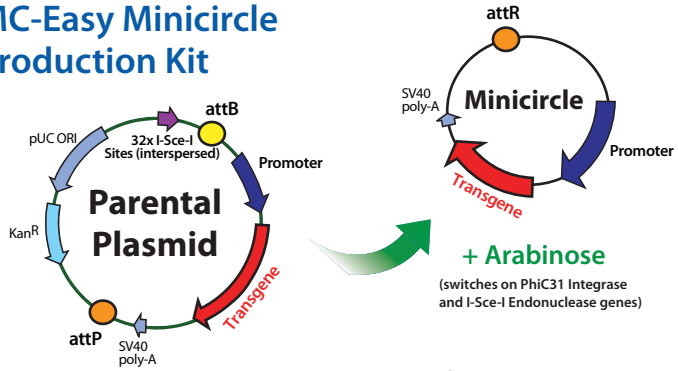
Lentivector and Minicircle Reporter Options



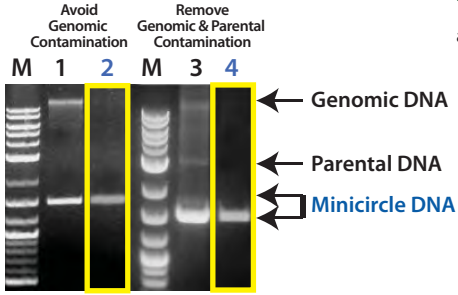
Sustained Expression without Integration

Minicircles are episomal DNA vectors that are produced as circular expression cassettes devoid of any bacterial plasmid DNA backbone. Their smaller molecular size enables more efficient transfections and offers sustained expression over a period of weeks as compared to standard plasmid vectors that only work for a few days. The Minicircle DNA elements are generated by an intramolecular (cis-) recombination from a parental plasmid (PP) mediated by PhiC31 integrase. The full-size MC-DNA construct is grown in a special host *E. coli* bacterial strain ZYCY10P3S2T. This highly engineered strain harbors an Arabinose-inducible system to express the PhiC31 integrase and the I-SceI endonuclease simultaneously. The ZYCY10P3S2T strain also contains a robust arabinose transporter LacY A177C gene. Adding arabinose to the media turns on the integrase and endonuclease genes. The PhiC31 integrase produces the MC-DNA molecules as well as PP-DNA from the full-size MC-DNA construct. The Sce-I endonuclease then degrades the PP-DNA backbone. Producing high quality minicircle DNA is made reliable with SBI's MC-Easy™ Minicircle DNA production kit. The MC-Easy system enables the simple, reproducible and efficient way to produce high quality Minicircle DNA for your experiments. The finely tuned growth and induction media produce minicircle DNA that is free of parental and genomic DNA contamination. Minicircle expression lasts for weeks *in vitro* and *in vivo*.

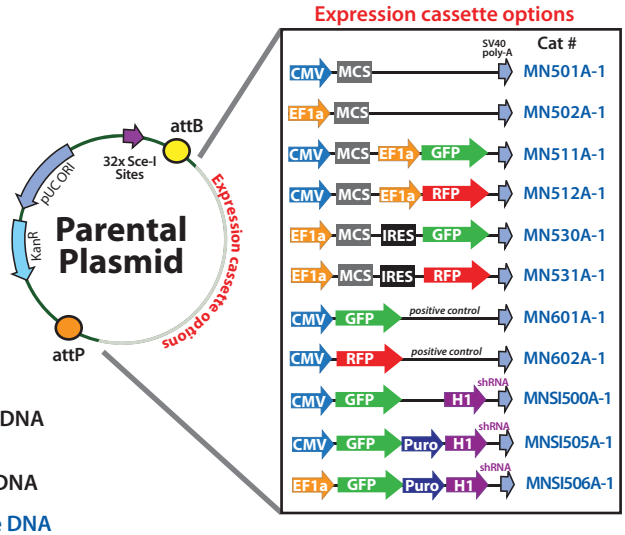
MC-Easy Minicircle Production Kit



Lane	Sample
1	Genomic DNA Contamination
2	MC-Easy Prep A
3	Genomic & Parental DNA Contamination
4	MC-Easy Prep B

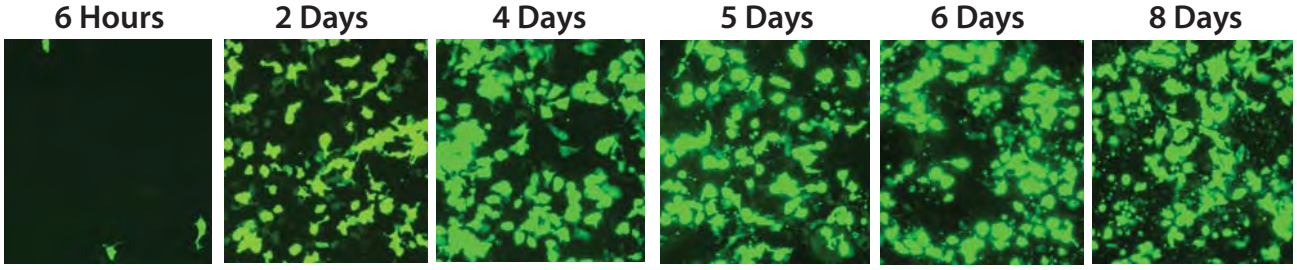


Variety of Promoter and Marker Formats



Minicircle transfections last for weeks

Minicircles are easier to transfect into most cell types and expression can persist for weeks.



Instant and Reversible Transgenesis

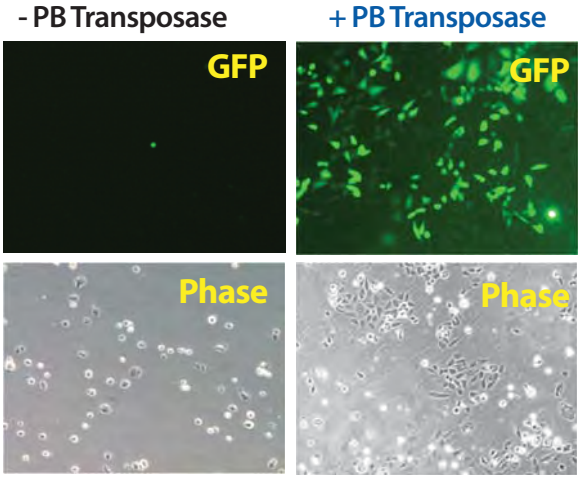
The PiggyBac (PB) transposon is a mobile genetic element that efficiently transposes between vectors and chromosomes via a "cut and paste" mechanism. During transposition, the PB transposase recognizes transposon-specific inverted terminal repeat sequences (ITRs) located on both ends of the transposon vector and efficiently moves the contents from the original sites and efficiently integrates them into TTAA chromosomal sites. The powerful activity of the PiggyBac transposon system enables genes of interest between the two ITRs in the PB vector to be easily mobilized into target genomes. SBI is a fully licensed provider of PiggyBac technologies from Transposagen, Inc.

PiggyBac Benefits

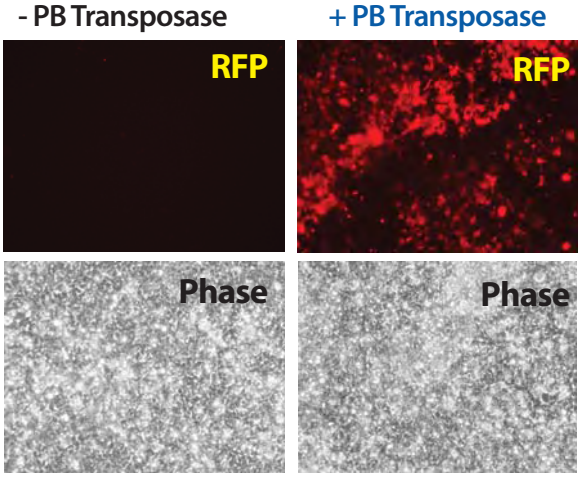
- One transfection makes transgenic cell lines
- Stable, heritable expression that is reversible
- No cargo limit — integrate 10-100kb
- Multiple integrations simultaneously
- Effective in Human, Mouse and Rat cells

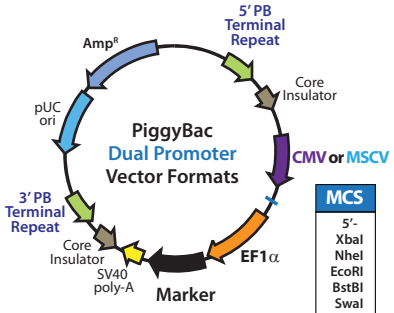
Transposagen
Better Models. Better Results.™

Cut and Paste Integrations



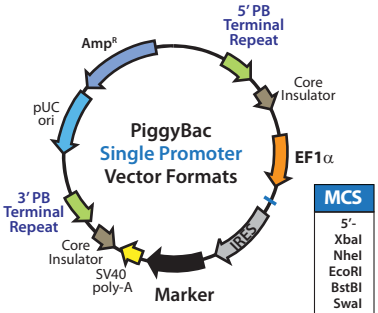
Puromycin selection (10μg/ml) 3 days





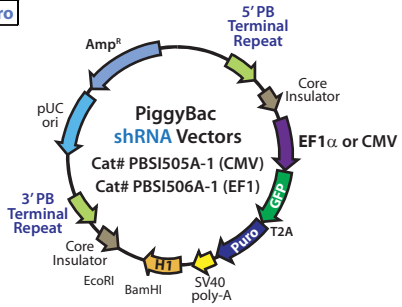
MCS
5′-
XbaI
NheI
EcoRI
BstBI
SwaI
BamHI
NotI
HindIII
- 3′

Promoter	Catalog #	Marker
CMV	PB510B-1	Puro
CMV	PB511B-1	GFP
CMV	PB512B-1	RFP
CMV	PB513B-1	GFP+Puro
CMV	PB514B-1	RFP+Puro
MSCV	PB713B-1	GFP+Puro



MCS
5′-
XbaI
NheI
EcoRI
BstBI
SwaI
BamHI
NotI
HindIII
- 3′

Catalog #	Marker
PB530A-1	GFP
PB531A-1	RFP
PB533A-1	Neo

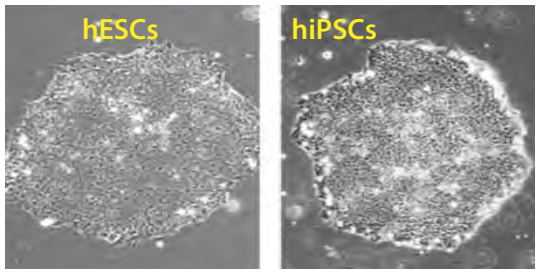


Xeno-free Culture Media & Potent Growth Factors

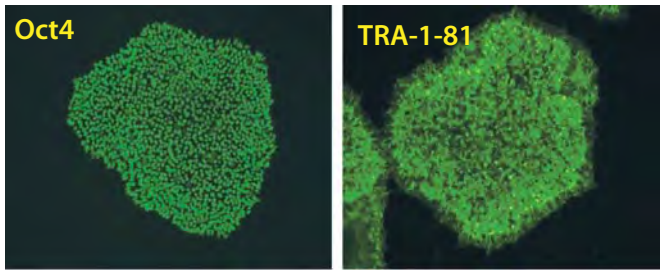
PSGro® hESC/iPSC & MesenGro® Mesenchymal Stem Cell Growth Media

PSGro is a fully defined xeno-free, human embryonic stem (ES) and induced plutipotent stem (iPS) cell culture medium that does not require feeder layers. PSGro enables the proper maintenance and expansion of pluripotent stem cells that sustain the correct morphology and expression of pluripotency markers. The medium supports robust proliferation with retention of a normal karyotype and differentation potential into multiple lineages across ectoderm, mesoderm and endoderm germ layers. MesenGro is a chemically-defined, serum-free and xeno-free medium to grow human mesenchymal stem cells (hMSCs).

Maintain Stem Cell Morphology



Retain Stem Cell Marker Expression

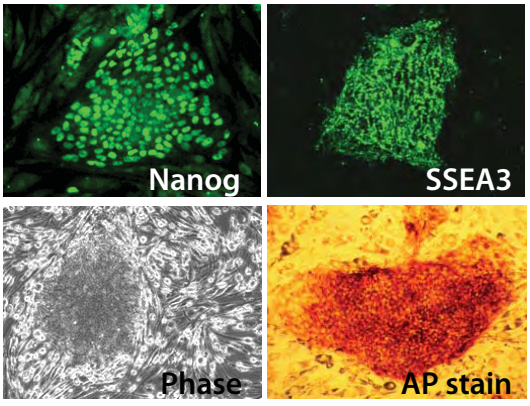


Highly Potent Growth Factors

SBI and StemRD have partnered to provide researchers access to new highly purified, bioactive growth and differentiation factors and stem cell growth media. All Growth Factors and media supplements are purified using novel and proprietary expression systems (Human and E. coli). This results in highly pure protein factors that are more active than other commercial products. Q/C bioassays are used to assess stem cell signaling pathways for activity.

Pre-made Viral and Nonviral iPS Cell Lines

ALS iPS cell line



SBI offers Human and Mouse Induced Pluripotent Stem (iPS) Cell Lines with matched source fibroblasts, which were reprogrammed using standard retrovirus techniques and validated for pluripotency markers. SBI also offers two non-viral iPS Cell Lines: Protein-derived (piPSCs) – available exclusively from SBI – and Minicircle-derived (mciPSCs), both of which are fully characterized, karyotyped and differentiation-enabled iPSCs - without virus integration or genetic modifications. These pre-made iPS cells can be used to study differentiation, allowing research into the pathways and factors involved in fate specification.

Human Disease Model iPS Cell Lines Available

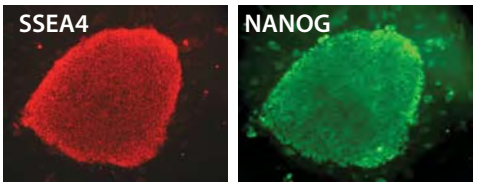
- **Type I Diabetes** Autoimmune Model
- **Type II Diabetes** Metabolic Model
- **Amyotrophic Lateral Sclerosis (ALS)** Neurodegeneration Model
- **Metachromatic Leukodystrophy (MLD)** Polyneuropathy Model
- **Muscular Dystrophy** Muscle Development Model
- **Glioblastoma** Tumorigenic Model

Efficiently Reprogram and Transdifferentiate Cells

Reprogram adult cells into a pluripotent state using SBI's iPSC factor expression systems. SBI offers retroviral, lentiviral, PiggyBac transposon and non-integrating Minicircle factors for reprogramming. SBI's pre-mixed pool of retroviral particles provides the easiest method for reprogramming, and each ready-to-use lot is validated for high reprogramming efficiency. The 4-in-1 PiggyBac and Minicircle DNA systems offer cutting edge techniques for nonviral reprogramming of source cells. SBI's reprogramming technologies enable you to efficiently derive novel patient-specific iPSCs, including cells which are free of chemical and transgenic elements for greater clinical relevance.

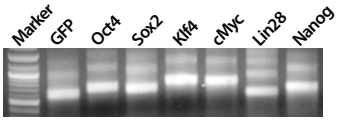
iPSC Technology Options

- **Classic pooled OSKM packaged Retroviruses**
- **Nonviral, non-integrating Minicircle DNA LNSO and OSKM vectors**
- **Nonviral PiggyBac OSKM transposons for footprint-free iPSCs**
- **Minicircle, PiggyBac and Lentiviral miR-302bcad/367 constructs**
- **Nonviral, non-integrating iPSC factor mRNA transcripts**

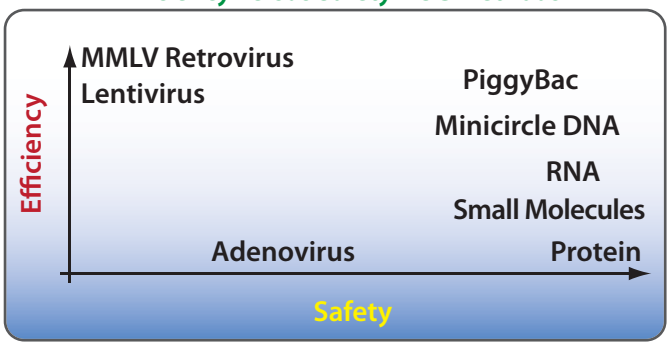


Minicircles

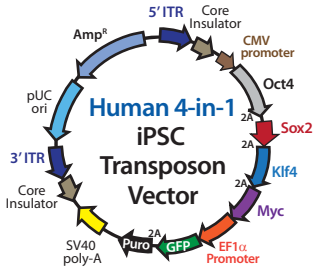
mRNAExpress™ Transcripts



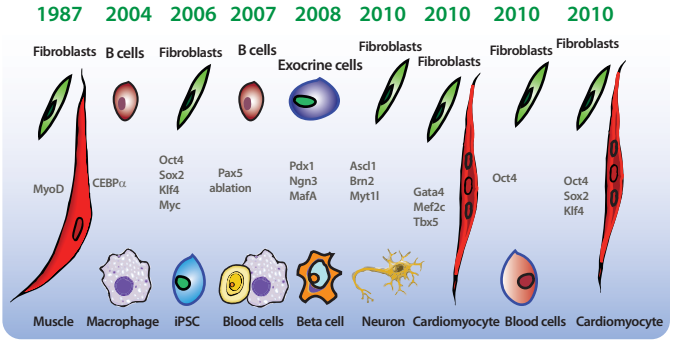
Generate iPS Cells



PiggyBac



Direct Reprogramming



Transdifferentiation

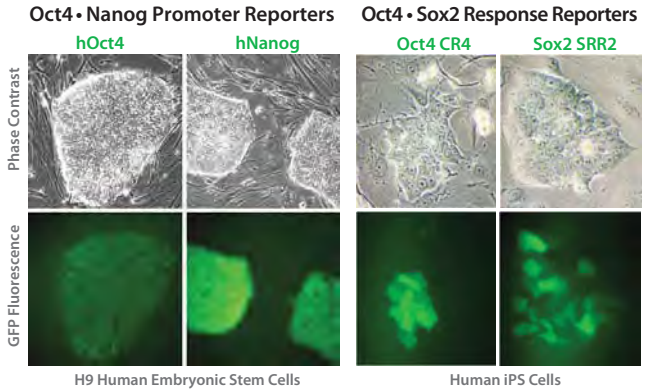
Transdifferentiation (TD) is the direct conversion of one cell type to another. This reprogramming method provides a fast route for creating novel cell types and manufacturing functional tissues. The mRNAExpress™ transcript system can produce mRNAs synthesized in vitro. The mRNAs have enhanced stability by incorporating modified nucleobases and offer increased translatability with 5' cap analogs and 3' polyA tails. The mRNAs can be delivered through transfection into a broad range of cell types, including fibroblasts and lymphocytes. This system enables a titratable, reproducible and non-integrating method for directly expressing key cellular factors involved in generating iPS cells as well as direct differentiation factors. SBI's TD-Consortium includes collections of transcription factors and microRNA precursors built in constitutive or inducible lentivector and minicircle formats to allow you to harness TD technology and advance regenerative medicine research.

bioNova científica, s.l. · Tel.: 915 515 403 · Fax: 914 334 545 · e-mail: info@bionova.es · www.bionova.es

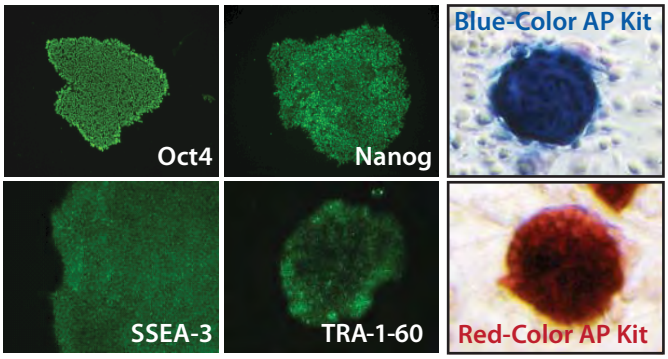
Characterize and Monitor Pluripotency

The pluripotent status of stem cells can be characterized by a high level of Alkaline Phosphatase (AP) activity, along with the expression of multiple pluripotency markers including the transcription factors Nanog, Oct4, Sox2, stage-specific embryonic antigens, SSEA-1, -3, -4, and tumor related antigens, TRA-1-60, TRA-1-81. SBI provides affinity purified and validated antibodies to detect the human pluripotent stem cell markers Oct4, Nanog, SSEA-3 and TRA-1-60. The antibodies are available individually, or can be purchased as a complete iPS verification kit that comes with all four antibodies plus an alkaline phosphatase staining kit. Alkaline phosphatase (AP) is a universal pluripotent marker for all types of pluripotent stem cells including embryonic stem cells, embryonic germ cells, and induced pluripotent stem cells. SBI offers AP staining kits, pluripotency antibody kits and pluripotency monitoring Promoter and Response element reporters to facilitate tracking stem cells.

Promoter and Response Reporters

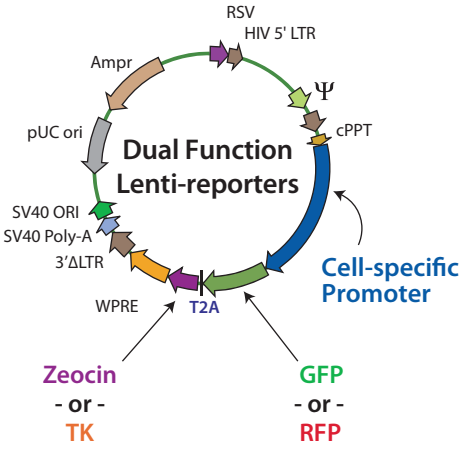


Pluripotency Marker Antibody and AP Kits



Track Differentiation with Lineage Reporters

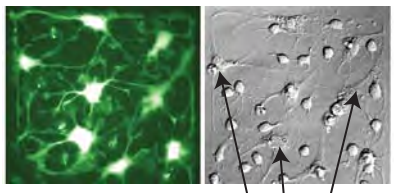
Cell-specific promoters drive GFP/RFP and Zeocin/TK markers in differentiating cells to allow monitoring of specification in real time. Trace differentiation across Neural, Hematopoietic, Myogenic, Structural and Endocrine lineages. These lentiviral reporters can be used to develop new directed differentiation protocols and to study cell fate specification. The dual function lenti-reporters are conveniently available as lentivector plasmids or ready-to-transduce lentiviral particles.



Differentiation Reporter Data

Mouse Glial Fbrillary Acidic Protein Reporter

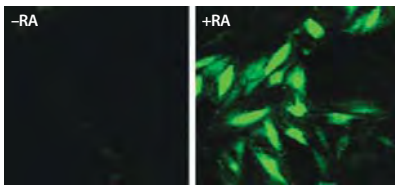
Differentiation to Astrocytes from Stem Cells



Astrocyte-specific GFAP promoter reporter data is shown above. Clearly identify specific cells within a mixed population. Only the astrocytes are GFP positive in a neural network including mature neurons and oligodendrocytes.

Mouse Troponin Reporter

Differentiation with Retinoic Acid

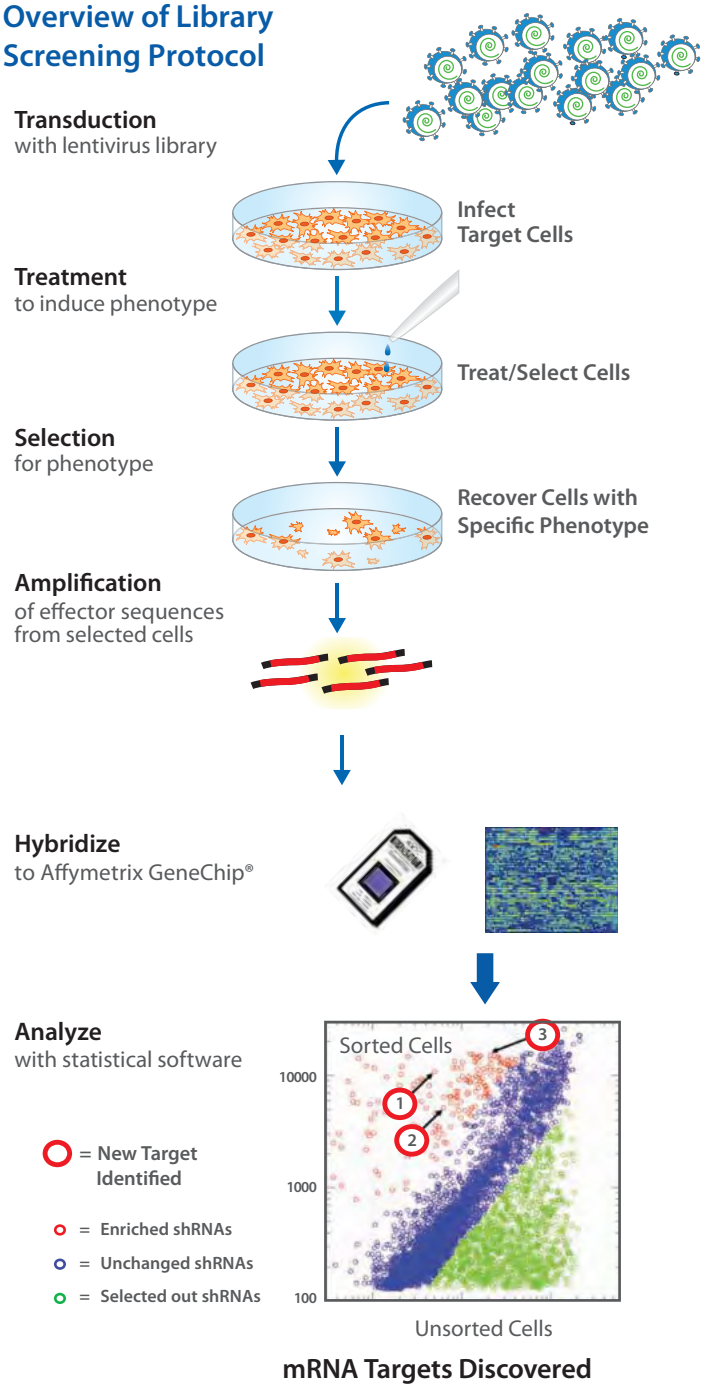


h9c2 rat cardiac myoblasts stably transduced with pGZ-mTnnt2 differentiation reporter and incubated in the presence or absence of retinoic acid for 2 days.

GeneNet™ shRNA Pooled Lentiviral Libraries

SBI's pooled lentiviral libraries allow you to perform high-throughput screening studies on a genome-wide or pathway-focused basis. Pooled lentiviral libraries enable simultaneous identification of multiple genes or microRNAs that alter a specific cellular phenotype in a single experiment. Lentiviral libraries are available as prepackaged virus, so you can begin transducing cells the day you receive the library. System Biosciences GeneNet™ shRNA Libraries allow you to perform high-throughput gene knockdown studies on a genome-wide or pathway-focused basis. GeneNet Libraries are proven, high performance screening tools for gene knockdown studies. Three to four shRNA sequences target each mRNA transcript and are synthesized and cloned into SBI's shRNA lentivectors that provide superior infection efficiciency across numerous cell types and models. Highly-specific and unique shRNA sequences are designed to be compatible with Affymetrix® GeneChips. This design feature provides the ability to hybridize the shRNA effectors recovered after screens to GeneChips for easy identification of the exact shRNA producing the experimental phenotype. Cost-effective RNAi screens can be performed by any research group.

Overview of Library Screening Protocol



Available GeneNet™ Libraries

GeneNet: Genome-Wide shRNA Libraries

HIV-based Libraries	Transcripts Targeted	No. of shRNAs
Human 50K	47,400	200,000
Mouse 40K	39,000	150,000

FIV-based Libraries	Transcripts Targeted	No. of shRNAs
Human 50K	47,400	200,000
Mouse 40K	39,000	150,000

GeneNet: Pathway Focused shRNA Libraries

HIV-based Libraries	Targeted Genes	No. of shRNAs
Human Apoptosis	597	6,876
Human Kinase	897	10,453
Human Phosphatase	244	2,719

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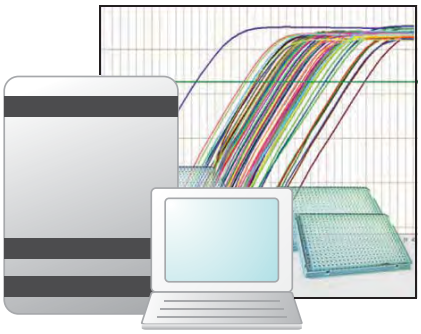
Profile MicroRNAs & LncRNAs by qPCR

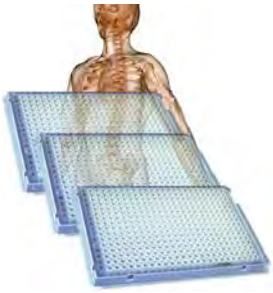
Measure microRNAs by qPCR with QuantiMir™ & miRNome Profilers

MicroRNA and siRNA expression analysis is made easy with the QuantiMir™ small RNA quantitation system. Generate qPCR-ready cDNA from total RNA for accurate and sensitive expression measurements. QuantiMir rapidly tags and converts all small RNAs into detectable cDNAs for qPCR —one cDNA synthesis required to quantitate any microRNA. Complete Human, Mouse and Rat qPCR Arrays - 100% miRBase compatible. Characterize microRNA signatures in stem cells, cancer cell lines and FFPE samples. Custom qPCR arrays are also available.

Capture More Expression Data with Genome-wide miRNome qPCR Profiler Arrays

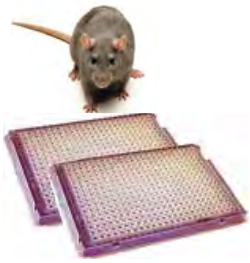


Human complete set



Mouse complete set

Rat complete set



www.systembio.com/mirnome

Quantitate Long Non-coding RNAs by qPCR

Long non-coding RNAs (LncRNAs) and large intergenic non-coding RNAs (lincRNAs) are emerging as master regulators of embryonic pluripotency, differentiation, patterning of the body axis and promoting developmental transitions. LncRNAs are larger than 200 nucleotides in length and are pervasively expressed across the genome. LncRNAs maintain the commitment to specific cellular fates through modification and remodeling of chromatin at the epigenetic level. Dysregulated expression of lncRNAs has been shown to be associated with a broad range of diseases such as Alzheimer's, psoriasis and many cancers. Studying the expression patterns of lncRNAs will be a crucial method to understanding the roles they play in many model systems. SBI has built a sensitive, accurate and robust qPCR array that is strand-specific to enable researchers to closely profile the expression changes in the top lncRNAs known to date. All of the lncRNAs on the qPCR array have validated primer sets for well-annotated lncRNAs that are registered in the lncRNA database created by Dr. John Mattick (www.lncrnadb.org).

Human Stem Cell and Cancer LncProfiler qPCR Array

	1	2	3	4	5	6	7	8	9	10	11	12
A	21A	7SK	7SL	Air	AK023948	Alpha 280	Alpha 250	ANRIL	anti-NOS2A	antiPeg11	BACE1AS	BC200
B	CAR Intergenic	DHFR upstream	Dio3os	DISC2	DLG2AS	E2F4 antisense	EgoA	EGOB	Emx2os	Evf1 and EVF2	GAS5	Gomafu
C	H19	H19 antisense	H19 upstream	HAR1A	HAR1B	HOTAIR	HOTAIRM1	HOTTIP	Hoxa11as	HOXA3as	HOXA6as	HULC
D	IGF2AS	IPW	Jpx	Kcnq1ot1	KRASP1	L1PA16	p21	RoR	SFMBT2	VLDLR	LOC 285194	LUST
E	Malat1	mascRNA	MEG3	MEG9	MER11C	ncR-uPAR	NDM29	NEAT1	Nespas	NRON	NTT	p53 mRNA
F	PCGEM1	PR antisense	PRINS	PSF inhibiting	PTENP1	RNCR3	SAF	SCA8	snaR	SNHG1	SNHG3	SNHG4
G	SNHG5	SNHG6	Sox2ot	SRA	ST7OT	TEA ncRNAs	Tmevpg1	TncRNA	Tsix	TUG1	UCA1	UMI-5
H	WT1-AS	Xist	Y RNA-1	Zeb2NAT	Zfas1	Zfhx2as	18S rRNA	RNU43	GAPDH	LAMIN A/C	U6	No assay control

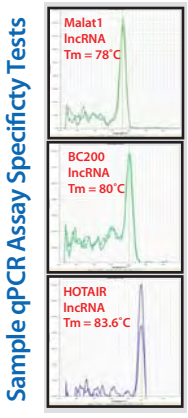
Mouse LncProfiler qPCR Array

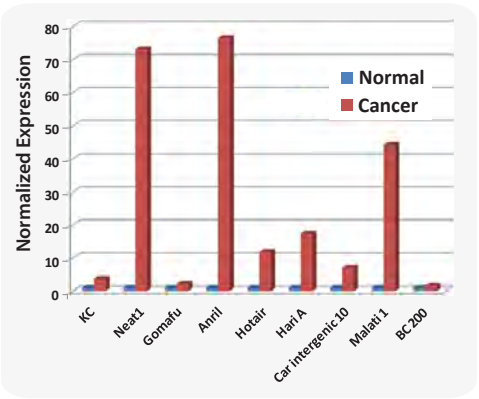
	1	2	3	4	5	6	7	8	9	10	11	12
A	Adapt33	Air	AK007836	AK141205	AK028326 Oct4	AK082072	ATIA	antiPeg11	B2 SINE RNA	BACE1AS	BC1	BGn-As
B	BORG	CDR1-antisense	Dio3os	Dlx1as	Emx2os	Evf2	Foxn2-as	GAS5	Gomafu	Gtl2-as	H19	H19 antisense
C	mHOTAIR	HOTTIP	Hoxa11as	IGF2AS	Jpx	Kcnq1ot1	linc1242 LINC-Enah	LINC1331	linc1368	Linc1612	linc1547	linc1582
D	linc1609-long	linc1609-short	linc1610-long	linc1610-medium	linc1610-short	Linc 1623	Linc1633	lincENC1	lincRNA-Cox2	lincRNA-p21	lincRNA-Sox2	LINC -MD1
E	Isoform LXRBSV	Malat1	mascRNA	MEG3	MEG9	MSUR1	Msx1as	Neat1 v1/ MEN	Neat1 v2/ Men beta	Nespas	Nkx2.2AS	NRON
F	Otx2os	PINC	PINC 1Kb isoform	Pldi	Recomb. hot spot	RepA transcript	Rian	Rmst	RNCR3	SCA8 (KLHL1-AS)	Six3os	Six3os-clone9
G	SNHG1	SNHG3	SNHG4	SNHG5	SNHG6	Sox2ot	SRA	Tsix	TUG1	Vax2os1	VL30 RNAs	WT1-AS
H	Xist	Y RNAs	Zeb2NAT	Zfas1	Zfhx2as	Mistral	18S rRNA	RNU43 (snoRNA)	GAPDH	Beta Actin	U6 snRNA	No assay control

Human Disease-related qPCR Array

	1	2	3	4	5	6	7	8	9	10	11	12
A	21A	AAA1	aHIF	AK023948	ANRIL	anti-NOS2A	BACE1AS	BC017743	BC043430	BC200	BCMS	BIC
B	CCND1 ANCR	CMPD	DD3	DGCR5	DISC2	DLG2AS	EGO	GAS5	GOMAFU	H19	H19-AS	HAR1A
C	HAR1B	HOTAIR	HOTAIRM1	HOTTIP	HOXA1AS AA489505	HOXA3AS BI823151	HOXA3AS BE873349	HOXA6AS AK092154	HOXA11AS	HULC	IPW	IGF2AS
D	KRASP1	L1PA16	LIT	LOC285194	LUST	LincRNA VLDLR	LincRNA SFMBT2	MALAT1	MEG3	MER11C	NEAT1	NCRMS
E	NDM29	PANDA	PARS	PCAT1	PCAT14	PCAT29	PCAT32	PCAT43	PCGEM1	PR-AT2	PRINS	PSF inhibiting RNA
F	PTENP1	RMRP	ROR	SAF	SCA8	Sox2OT	SRA	ST7OT1	ST7OT2	ST7OT3	ST7OT4	Telomerase RNA
G	TMEVPG1	TU_0017629	TUG1	UCA1	WT1-AS	Y1	Y3	Y4	Y5	ZEB2NAT	7SK	Negative control
H	7SLncRNA	5.8SrRNA	U87 scaRNA	U6 smRNA	ACTB	B2M	PGK1	GAPDH	HPRT1	RPL1A	RPL13A	GDC

Profile LncRNAs in Skin Cancer



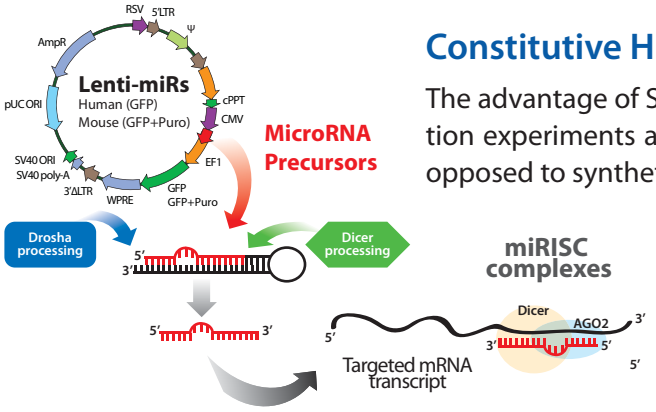


www.systembio.com/LncRNA

Overexpress Human and Mouse MicroRNAs

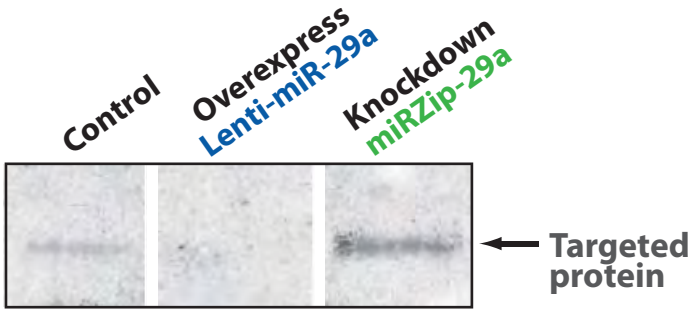
There are expected to be over 2,000 different microRNAs encoded in the human and mouse genomes and they function by either blocking translation of, or degrading, mRNA species corresponding to specific genes. While the number of verified human and mouse microRNAs are expanding, there is an increasing need for effective functional testing. SBI offers an extensive collection of microRNA precursors in lentiviral vectors that can be used to modulate the expression of their targeted mRNAs to study microRNA function. The lentiviral vector constructs can be packaged into pseudoviral particles and delivered to primary cells, stem cells, or other hard-to-transfect cell lines and can be used *in vivo*. SBI can package any construct into high titer lentivirus as a custom service for your studies.

Each construct in SBI's collection consists of the native stem loop structure and 200-400 base pairs of upstream and downstream flanking genomic sequence. This unique feature ensures that the microRNAs expressed from SBI's constructs will be correctly processed in the cell into mature microRNA.



Constitutive Human and Mouse Lenti-miRs

The advantage of SBI's constructs is that they can be used in transient transfection experiments as well as stably expressed in a wide variety of cell types, as opposed to synthetic microRNAs that can only be transiently expressed in cells.

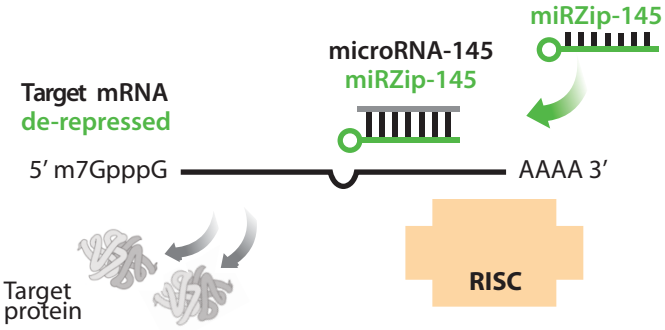


Western blot probed with anti-Target protein antibodies

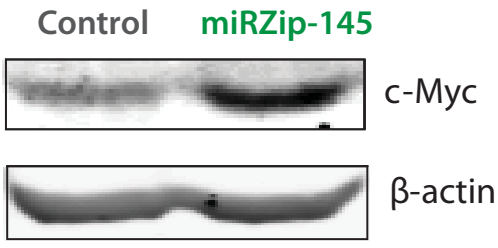
Permanent MicroRNA Inhibition with miRZips™

miRZip anti-sense microRNAs are stably expressed RNAi hairpins that have anti-microRNA activity. These miRZip shRNAs produce short, single-stranded anti-microRNAs that competitively bind their endogenous microRNA target and inhibit its function. The result is the derepression and elevation of the protein levels of the transcripts targeted by the microRNA being "zipped".

Permanent MicroRNA Interference



miRZip-145 induces cMyc protein upregulation



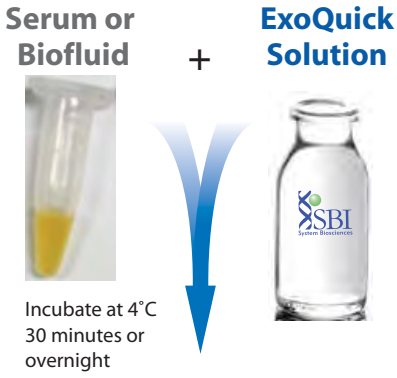
www.systembio.com/mirzips

One-step Exosome Isolation and Detection

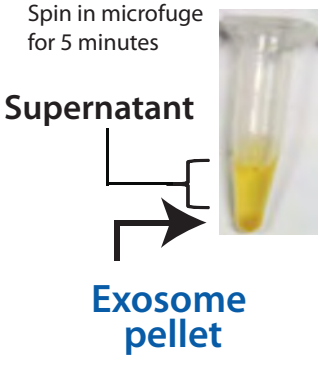
SBI developed two effective polymer-based methods to precipitate exosome microvesicles from serum, tumor ascites fluids, breast milk, cerebral spinal fluid, urine and tissue culture media samples. The polymer works by forming a mesh like network that captures microvesicles that range in size from 60 - 180 nm in diameter. SBI's ExoQuick is optimized for serum and ascites fluids and ExoQuick-TC™ exosome precipitation reagent is a distinct polymer formulation that has been engineered for exosome isolation from media and urine samples. This technology makes microRNA and protein biomarker discoveries simple, reliable and quantitative.

ExoQuick Benefits

- No time-consuming ultracentrifugation
- Less expensive than costly antibody beads
- Compatible with biofluids from any species
- Isolated exosomes are intact and bio-active
- Recovers more exosomes than any other method
- Procedure takes less than an hour



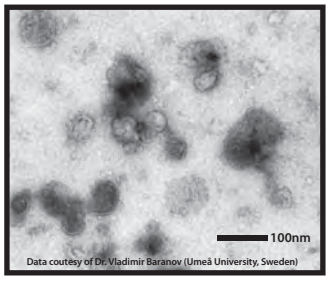
Simple one-step precipitation

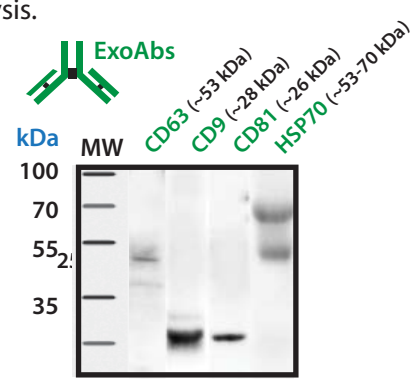


Exosome Antibody ExoAb Kits

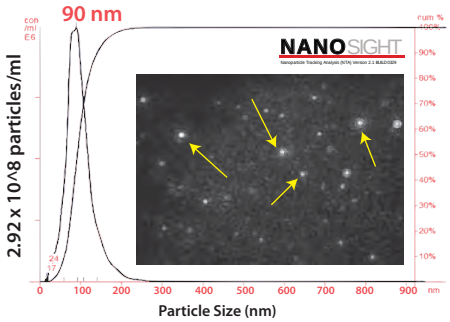
SBI offers individual antibodies for CD63, CD9, CD81 and Hsp70 as well as a Western blot sampler kit (Catalog# EXOAB-KIT-1) which includes four exosomal marker antibodies: CD63, CD9, CD81, HSP70 (rabbit anti-human) and also includes a goat anti-Rabbit IgG HRP conjugated secondary antibody specifically tested for use in exosomal protein analysis.

Exosome EM Analysis

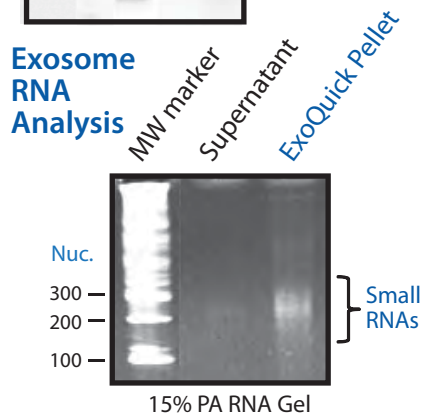




NanoSight Particle Analysis



Exosome RNA Analysis



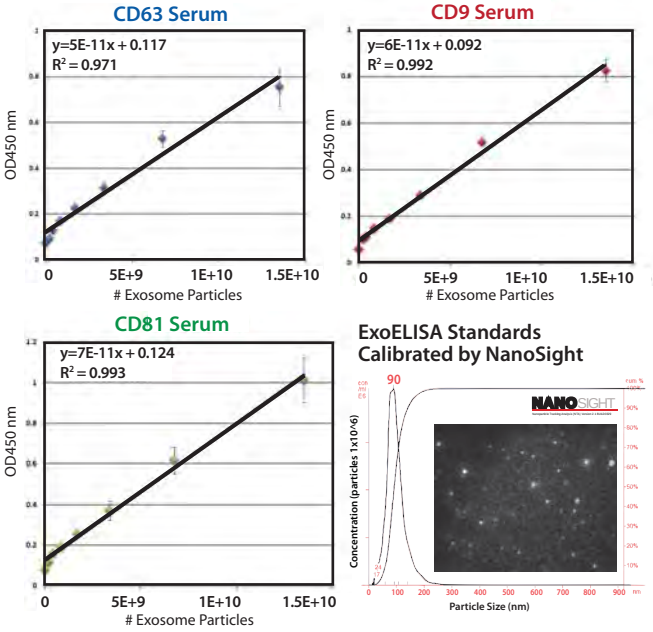
Measure Exosome Particles by ELISA Assays

SBI's ExoELISA™ kits are designed as a direct Enzyme-Linked ImmunoSorbent Assay (ELISA). The exosome particles and their proteins are directly immobilized onto the wells of the microtiter plate. After binding, wells are coated with a block agent to prevent non-specific binding of the detection antibody. The detection (primary) antibody is added to the wells for binding to a specific antigen (e.g. CD63) protein on the exosomes. ExoELISA kits come with exosome standards to make calibration curves.

Highly Sensitive and Quantitative ELISAs

A Horseradish Peroxidase enzyme (HRP) linked secondary antibody (goat anti-rabbit) is used for signal amplification and to increase assay sensitivity. A colorimetric substrate (Extra-sensitive TMB) is used for the assay read-out. The accumulation of the colored product is proportional to the specific antigen present in each well. The results are quantitated by a microtiter plate reader at 450 nm absorbance and calibrated by the exosome standards provided in the kit. The exosome standards are provided in number of exosome particles as determined by NanoSight particle analysis measurements.

Three primary antibody detection formats

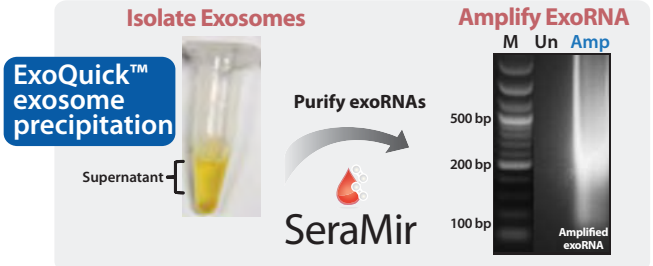


Purify and Amplify Exosomal RNAs

RNAs present in patient body fluids are a rich and untapped source of disease-related biomarkers. The RNAs are stable in serum because they are encapsulated in circulating exosomes. The SeraMir kit includes everything needed to accurately and sensitively measure RNAs from serum samples. Exosomes are efficiently isolated using SBI's ExoQuick solution, and the exoRNAs are purified using a phenol-free lysis buffer and rapid spin columns. The SeraMir kit enables the 3′ tailing and simultaneous tagging of both 5′ and 3′ ends during cDNA synthesis—ready for qPCR. Primers for PCR amplification are included to make double-stranded cDNA that is ready to generate sense-strand exoRNAs using T7 IVT. Use the amplified exoRNAs for microarrays and NextGen sequencing applications.

How the SeraMir Kit Works

- Precipitate exosomes from patient biofluids with ExoQuick
- Purify exoRNAs with SeraMir columns - bind, wash, elute
- Tail and tag exoRNAs for qPCR with SBI's microRNA qPCR arrays
- Generate cDNA to make sense-strand T7 IVT RNA transcripts
- Amplify exoRNAs for Microarrays and NextGen Sequencing



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