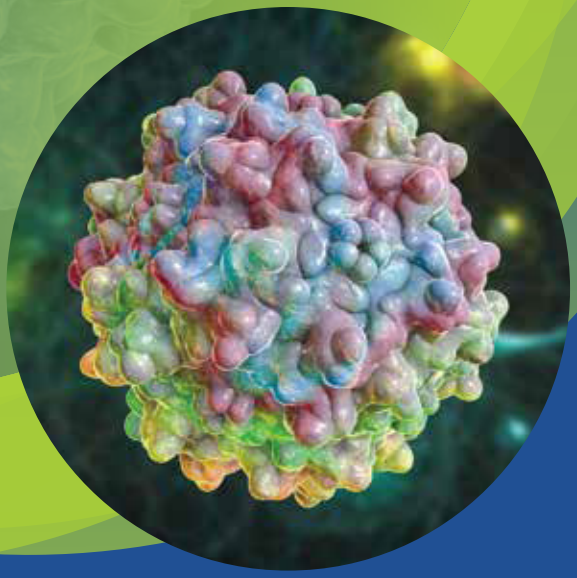
amsbio
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CUSTOM SERVICES

VIRAL DELIVERY SYSTEMS

Your One-Stop Solution for High-Quality Lentivirus, AAV and Custom Gene Delivery Services



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Introduction

Unlock the full potential of your research with our custom viral delivery services, designed to streamline and accelerate your gene therapy, cancer therapy and vaccine development. By choosing our tailored solutions, you gain access to precise, efficient, and reliable methods for delivery genetic material directly to your target cells, ensuring maximum expression and minimal off-target effects. Whether you are developing innovative treatments or unlocking new scientific discoveries, our viral vectors are engineered to meet your specific needs, providing the flexibility and control you require to achieve breakthrough results.

Virus-mediated transfection, known as transduction, has become an indispensable technique used for the introduction of foreign DNA into target cells. Viral vectors are suitable for hard-to-transfect cell types allowing protein overexpression or gene specific knockdown. One of the main advantages of viral delivery is the process can be performed *in vivo* and *in vitro* with efficiency approaching >90%.

AMSBIO offers a wide range of viral particles for successful gene delivery. Utilizing our ***lentivirus***, ***adenovirus***, or ***adeno-associated viruses (AAV)*** , you can efficiently introduce specific ORF, shRNA and miRNA to your cells. AMSBIO also offers ***MMLV Retrovirus***, ***MSCV Retrovirus*** , ***Vesicular Stomatitis Virus (VSV)*** , ***Herpes Simplex Virus*** and ***Vaccinia Virus***. If you are unsure which viral system is right for your experiment, our experts can guide you in choosing the ideal vector.

Our services include the custom design and construction of vectors, delivering high quality viral particles that you can trust to advance your research.

Key Benefits of AMSBIO's Viral Vectors

High Efficiency

Our viral vectors can ensure robust gene expression across a variety of cell types.

Safety

Engineered for safety, our viral vectors eliminate the risk of pathogenicity, ensuring your experiments are both effective and secure.

Scalability and Flexibility

Whether you're conducting a small-scale experiment or a large-scale production, our viral vectors can be tailored to meet your specific requirements.



Selecting a Viral Vector Delivery System

Selecting the best viral vector system for your experiment can be challenging. We have provided a table below to compare the key features of Lentivirus, adenovirus and AAV to help you select the best transduction system for your workflow.

Feature	Lentivirus	Adenovirus	AAV
Transfection efficiency	~ 30%	>90%	30-40%
Host genome integration	Integrating	Non-integrating (episomal)	Non- integrating (episomal)
Expression	Stable	Transient	Transient
Packaging capacity	8.5 kb	Up to 34 kb	4 kb
Maximum titer	High	Very high	High
Primary use	In vivo and in vitro	In vivo	In vivo
Immune response in vivo	Moderate	High	Low
Tropism	Broad	Ineffective is some cell types	Dependent on serotype

Lentivirus

What is a Lentivirus?

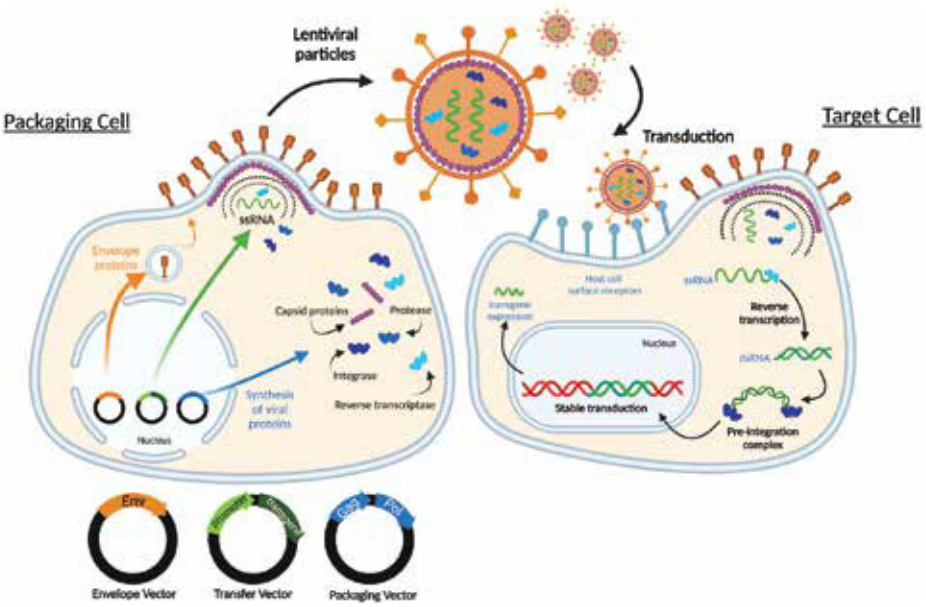
Lentivirus is a versatile subgroup of the retrovirus family allowing delivery of genetic information into host cells by integrating into the cellular genome. Unlike other retroviruses, lentiviruses can transduce non-dividing cells by utilizing an active nuclear import pathway. This unique capability makes lentivirus an effective tool for targeting dividing and non-dividing cell types, including neuronal and hematopoietic cells, as well as other terminally differentiated cells.



Simple, ready-to-use particles that can be directly added to cells.

Why Use Lentivirus?

- **Ready to use:** Save 4 weeks of work.
- **High true titer:** 1x 10^7 IFU/ ml or higher.
- **No transfection reagent needed:** Simplifies the transduction process.
- **Stable gene integration:** Ensures long-term expression.
- **Broad range of targets:** Effectively transduce a wide range of mammalian cell lines (including primary cells and stem cells).
- **Non-dividing cells:** Capable of integrating into non-dividing cells.
- **Stable cell lines:** Able to generate stable cell lines for long term high expression.
- **Low immunogenicity:** Concentrated in PBS for *in vivo* applications.



Safety

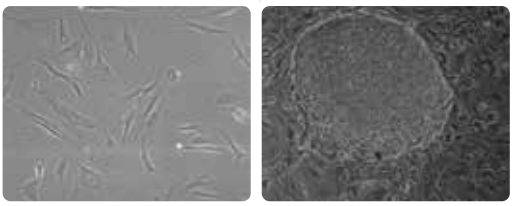
3rd Generation lentivirus is self-inactivating which boosts biosafety: The genes encoding structural and other components required for packing the viral genome are separated onto several different plasmids to minimize the risk of recombinant, replication-competent, virus production. A deletion in the U3 portion of the 3' LTR eliminates the promotor-enhancer region, further negating the possibility of viral replication.

Why Choose AMSBIO's Custom Lentivirus Services?

At AMSBIO, we offer comprehensive solutions for your lentiviral needs, from shRNA design or gene template acquisition to the generation of high quality lentiviral particles.

Our Services Include

- shRNA, overexpression
- miRNA expression
- Anti-miRNA expression
- Generation of stable cell lines
- Integrase-deficient Lentivirus

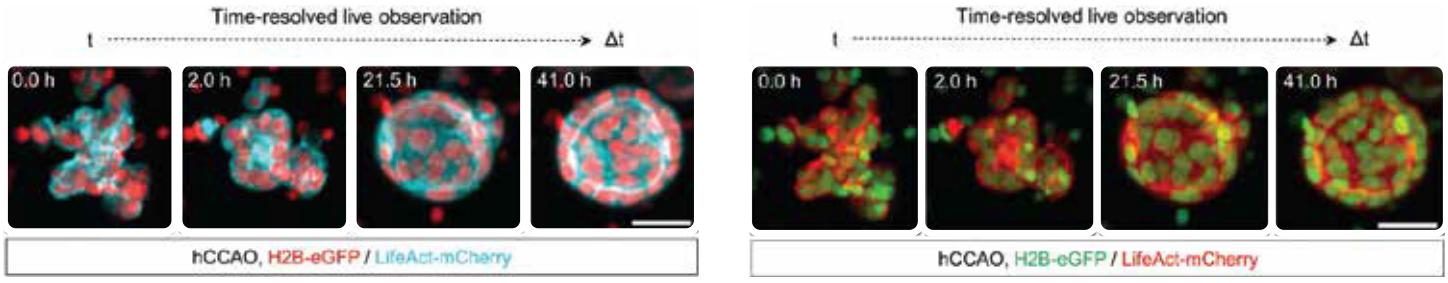


Human iPS clone (right) successfully generated from human patient fibroblast cells (left) in 14 days using human iPS lentivirus.

Key Features and Benefits

- **Safe and efficient delivery:** Safe-to-use (self-inactivating) lentiviral particles provide effective gene delivery into a wide range of cell lines, including non-dividing, primary or stem cells.
- **Optimized vectors:** Our in-house engineered lentiviral vectors ensure highly efficient gene integration into the cell genome.
- **Customizable expression options:** Choose between inducible or constitutive gene expression to suit your research needs.
- **High titer lentivirus:** Monitored by a separate fluorescent protein (not fused with your target) for precise tracking and analysis.
- **Proven expertise:** Benefit from our years of experience in lentiviral cloning and expression.
- **Fast turnaround and competitive pricing:** Get quick delivery and competitive pricing without compromising on quality.

We also offer a selection of control lentivirus for testing lentiviral transduction, specifically designed to match the biological application of your custom virus. For detailed information on these control viruses, please visit our website.



Time-resolved long-term live light sheet microscopy (LSFM) recordings of cholangiocarcinoma organoids (hCCAOs) labelled with H2B-eGFP and LifeAct-mCherry allow detailed inspections of dynamic morphologi-cal processes in organoid development. hCCAOs were stably transduced using AMSBIO custom lentivirus particles to visualize cell nuclei (magenta or green) and the F-actin cytoskeleton (cyan or red). A novel mounting technique for light sheet microscopy (Z1-FEP-cuvettes) developed at the BMLS, enabled imaging of over 120 organoids simultaneously for up to 7 days). Microscope: Zeiss Lightsheet.Z1. Scale bar: 10 µm. Images taken by Michael Koch.

Adenovirus

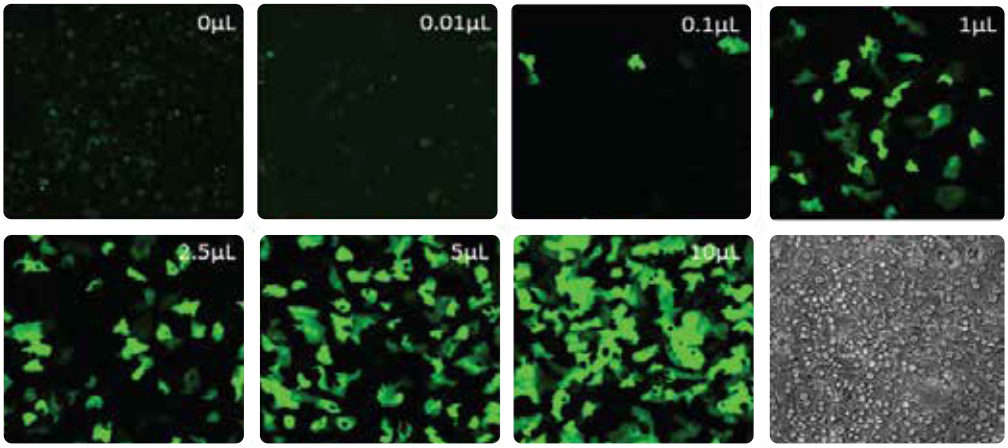


What is an Adenovirus?

Adenoviruses are double-stranded DNA viruses capable of transiently transducing nearly any mammalian cell type with very high efficiency, often reaching up to 100%. This makes them ideal for applications requiring high efficiency transduction rates. Their ability to achieve both high transduction efficiency and high levels of short-term gene expression makes adenoviral vectors a preferred tool for ***in vivo*** gene delivery and are commonly used in gene therapy and vaccination.

Key Features and Benefits

- Ready to use: Simply add the virus to your cell line for target expression.
- Safe: Non-integrating and transient expression.
- Efficient delivery: Achieves close to 100%.
- Supports large transgenes: Accommodates transgenes up to 34kb.
- High viral titer and transgene expression: Ensures robust gene delivery and expression.



42 hour post transfection with GFP adenovirus (6 x 109 VP/ml) on 12 well plate (0.75 x 106 cells/well) in hepatocytes cells.

Custom Adenovirus Services

AMSBIO provides a service to make ready-to-use adenovirus for any specific gene, shRNA or miRNA. We offer both vector cloning and virus packaging or will provide virus packaging for your own vector.

Control adenovirus vectors are available and designed to match the biological application of the custom virus and to be used for testing adenovirus transduction.

Adeno-Associated Virus (AAV)

What is an Adeno-Associated Virus?

Adeno-associated virus (AAV) is a non-enveloped, single-stranded DNA virus approximately 20 nm in size. It can infect both dividing and non-dividing cells. One of the standout benefits of AAV's is its ability to elicit a very mild immune response. AAV incorporates its genome into that of a host cell but requires a helper virus, most commonly adenovirus, for replication. AAV is versatile and can be used to express shRNA, miRNA or human ORF.

Key Features and Benefits

- Ready-to-use: For immediate application.
- High viral titer production: Easy to produce at high viral titer (helper free).
- Stable expression: No host-genome integration and stable expression.
- Non-pathogenic: Minimal immune response.
- Multiple serotypes: Various serotypes available to suit different applications.

Custom Adeno-Associated Virus (AAV) Services

We offer the highest quality recombinant AAV vectors and the most complete AAV expression systems that can be used to express shRNA, human ORF and more. We offer services in both AAV cloning and AAV packaging.

Promotors	ALB, aMHC, c-Fos, CAG, CaMKIIa, CK0.4, CK1.3, CMV, cTnT, EF1a, EFFS, GFAP, HCRApoE, MBP, MCK, MeCP2, NSE, PDX1, PGK, Rpe65, SST, Syn, TBG, UBC and more
Reporters	GFP, mCherry, RFP, LacZ, Luciferase
Inducible reporters	DIO-GFP, DIO-mCherry, DIO-RFP, DIO-LacZ
Inducible systems	Cre, DIO, tTA
CRISPR/Cas9	Cas9, gRNA scaffold
Serotypes	See full list below

Not Sure Which Serotype to Use?

Discover the for your application with our AAV GFP Testing Kit! This kit contains CMV-GFP in AAV1, AAV2, AAV5, AAV6, AAV8, AAv9 and AAV-DJ serotypes allowing you to test and compare the efficiency on different cell types. Find the ideal fit for your research with confidence!

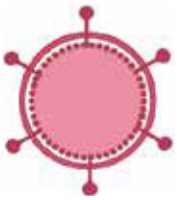
Description	Pack Size	Catalog No.
AAV GFP Testing Kit/ different serotypes	7 x 50 µl	CT0002

Serotype Packaging Services

We offer a comprehensive platform to suit all your needs when it comes to combining scientific development and processing technologies in the field of gene therapy. With our robust AAV production system, using AAV as a therapeutic vehicle for a broad range of diseases is now a simple task. The Inverted Terminal Repeats (ITRs) carrying your gene of interest are from the AAV2 genome, while different Serotypes are distinguished by their unique capsid proteins.

AAV Serotype	Muscle	Liver	Lung	CNS	Retina	Pancreas	Kidney	Heart	Brain	Adipose	Inner ear	Testicles	Spleen	PNS	Spinal nerves	Endothelial
AAV1																
AAV2																
AAAV2.7m8					X						X					
AAV2-QuadYF					X											X
AAV2-retro															X	
AAV3	X	X	X													
AAV4			X	X	X		X	X								
AAV5	X		X	X	X			X	X							
AAV6	X	X	X			X		X		X						
AAV6.2		X	X								X					
AAV7	X	X		X	X				X							
AAV8	X	X		X	X	X	X	X	X	X	X	X				
AAV9	X	X	X	X	X	X	X	X		X	X					
AAV-DJ		X					X	X					X			
AAV-DJ/8		X					X		X				X			
AAV-PHP.eB																
AAV-PHP.S				X										X		
AAVrh10	X	X	X	X	X	X	X	X								

Other Viral Vectors on Offer

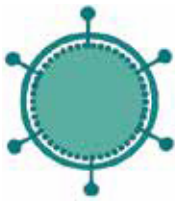


MMLV Retrovirus Packaging

Recombinant Moloney Murine Leukemia virus (MMLV) retroviral vectors serve as efficient viral vector tools for introducing genes permanently into a wide variety of dividing cells. This retroviral system came into prominence as a gene delivery method for generating iPS cells.

Types of MMLV Retrovirus Offered

- VSV-G pseudotyped wildtype MMLV retrovirus
- VSV-G pseudotyped self-inactivating MMLV retrovirus



MSCV Retrovirus Packaging

Recombinant Murine Stem Cell Virus (MSCV) vectors serve as efficient viral vector tools for achieving robust expression of genes of interest in embryonic stem (ES) cells, embryonal carcinoma (EC) cells and hematopoietic stem (HS) cells, along with several other mammalian cell lines.
In this retroviral vector system, the presence of a strategically designed 5'LTR derived from the murine stem cell PCMV virus in the MSCV retroviral vector contributes to the transcriptional activation of target genes in pluripotent cell lines. This helps to overcome the restricted expression of target genes in ES and EC cells, typically observed with MMLV retroviral vectors.

Types of MSCV Retrovirus Offered

- VSV-G pseudotyped MSCV retrovirus



Herpes Simplex Virus (HSV) Cloning and Packaging

Recombinant herpes simplex virus (HSV) has recently emerged as a promising viral vector in gene therapy and cancer therapy, with a variety of applications including gene delivery into the nervous system, as oncolytic agents, and for the development of vaccines against cancer, HSV and other infectious diseases.
HSV vectors offer several advantages such as natural neurotropism, the ability to persist in a latent, episomal state throughout the lifetime of host cells, and their large cargo carrying capacity. These features make them the ideal viral vehicles for a range of in vitro and in vivo gene delivery needs.

Types of HSV Services Offered

- HSV vector cloning in BAC or BACYAC backbone
- HSV-1 virus packaging
- HSV-1 amplicon vector cloning

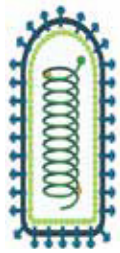


Vaccinia Virus (VACV)

Recombinant VACV has several advantages including large carrying capacity (25-30 kb), wide tropism, and ability to replicate without host machinery. It has recently shown great promise in a broad range of clinical applications, including vaccine development and oncolytic therapy. AMSBIO offers both cloning and packaging services of VACV vectors, suitable for either in vitro or in vivo studies.

Types of VACV Services Offered

- VACV vector cloning in BACYAC backbone for both attenuated Western Reserve (WR) and Modified Vaccinia virus Ankara (MVA) strains
- VACV virus packaging



Vesicular Stomatitis Virus (VSV) Packaging

What Are Recombinant VSV Vectors?

Recombinant vesicular stomatitis virus (VSV) vectors are widely used for a variety of applications including studying mechanisms of viral entry into host cells, identification of cellular receptors utilized by viruses for cell entry, screening of viral entry inhibitors, and vaccine development research. VSV vectors can be efficiently pseudotyped with envelope glycoproteins derived from heterologous viruses, such as envelope proteins of viruses requiring high-level containment, thereby making them highly suitable for studying the entry mechanisms of such high -risk viruses.

Types of VSV Offered

- VSV pseudotyped with VSV G protein
- VSV pseudotyped with coronavirus S protein and its variants
- VSV pseudotyped with any other envelope proteins as requested
- Bald VSV lacking viral envelope protein (can be used as negative control)



Reagents and Consumables

Control Viral Particles

We provide a wide range of lentiviral, AAV, and adenoviral particles controls expressing GFP, RFP, luciferase and more. A wide range of ORF expressing particles are also available. See the table below for a small selection of examples, enquire to see our full range.

Description	Pack Size	Catalog No.
GFP (Bsd) lentiviral particles	1 x 10^7 IFU/ml x 200 µl	LVP001
GFP (EF1a)- Puro lentiviral particles	1 x 10^8 IFU/ml x 200 µl	LVP426
RFP (Bsd) Lentiviral particles	1 x 10^7 IFU/ml x 200 µl	LVP023
RFP (EF1a)- Bsd lentiviral particles	1 x 10^7 IFU/ml x 200 µl	LVP427
YFP (puro) lentiviral particles	1 x 10^7 IFU/ml x 200 µl	LVP471

AAV Reference Standards

A well characterized AAV standard with an accurate full/empty ratio is needed to distinguish the final vector production and accurately compare AAV success.

Description	Pack Size	Catalog No.
AAV1 Reference Standards (Full Capsids)	100 µl	RS-AAV1-FL
AAV1 Reference Standards (Empty Capsids)	100 µl	RS-AAV1-ET
AAV2 Reference Standards (Full Capsids)	100 µl	RS-AAV2-FL
AAV2 Reference Standards (Empty Capsids)	100 µl	RS-AAV2-ET
AAV5 Reference Standards (Full Capsids)	100 µl	RS-AAV5-FL
AAV5 Reference Standards (Empty Capsids)	100 µl	RS-AAV5-ET
AAV6 Reference Standards (Full Capsids)	100 µl	RS-AAV6-FL
AAV6 Reference Standards (Empty Capsids)	100 µl	RS-AAV6-ET
AAV8 Reference Standards (Full Capsids)	100 µl	RS-AAV8-FL
AAV8 Reference Standards (Empty Capsids)	100 µl	RS-AAV8-ET
AAV9 Reference Standards (Full Capsids)	100 µl	RS-AAV9-FL
AAV9 Reference Standards (Empty Capsids)	100 µl	RS-AAV9-ET

Lentivirus Consumables and Packaging Reagents

AMSBIO offers a wide range of lentiviral accessories to support production of lentivirus. These reagents will ensure high infectivity and maintain high transfection efficiency of your own lentiviral particles. With our easy-to-use lentivirus production kits and reagents, you can make high quality viral particles stress free.

- LP4K Transfection reagent – Lipid based transfection reagent for large plasmid and multiple plasmid transfection (e.g., lentivirus production) in both adherent and suspension cells.
- Lentivirus Transduction Enhancer – A nontoxic chemical-based enhancer that increase transduction efficiency by up to 8x depending on cell type and original lentivirus transduction efficiency
- Lentivirus Concentration Kit – Uses the non-cell toxic Poly-Ethylene Glycol (PEG) precipitation method to concentrate viruses without the tedious and time-consuming ultra-centrifugation process. The concentrated virus can be used directly for both in vitro and in vivo applications.

Description	Pack Size	Catalog No.
Lentivirus Packing Kit	10 reactions	TR30037
IDVL Lentivirus Packaging Kits	100 µl	TR30036
Lentivirus titer kit	96 reactions	TR30025
Lentivirus stabilizer	5 ml	TR30039
LP4K Transfection Reagent	1.0 ml/ vial	LP4K
Lentivirus Transduction Enhancer	1.0 ml (500x stock)	T-Up
Lentivirus Concentrator	1 Kit	LV-CONC

Our Viral Vectors at a Glance

Lentivirus

- 3rd gen VSV-G pseudotyped LV
- 2nd gen VSV-G pseudotyped LV
- Integrase-deficient lentivirus (IDLV)
- Various envelope proteins for pseudotyping
- Virus-like particles (VLPs)

Adenovirus

- Human Ad5 adenovirus
- Chimeric Ad5/F35 adenovirus
- Gutless adenovirus

Adeno-Associated Virus

- ssAAV with 18+ serotypes
- scAAV with 18+ serotypes
- Baculovirus-AAV with 6+ serotypes
- AAV virus-like particles (VLPs)

MMLV Retrovirus

- VSV-G pseudotyped MMLV
- Self-inactivating MMLV
- Various envelope proteins for pseudotyping

MSCV Retrovirus

- VSV-G pseudotyped MSCV

Herpes Simplex Virus

- HSV genome modification on BAC (or BACYAC)
- HSV-1 packaging from BAC (or BACYAC)
- HSV amplicon vectors

Vaccinia Virus

- Western Reserve (WR) strain
- Modified Vaccinia virus Ankara (MVA) strain
- Vaccinia genome modification on BACYAC
- Vaccinia virus packaging

Vesicular Stomatitis Virus

- VSV-G pseudotyped VSV
- Various envelope proteins for pseudotyping
- Bald VSV

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