

# Product Guide

Vector  
Cloning

Virus  
Packaging

Library  
Screening

Therapeutic  
IVT RNA

Stable Cell  
Line Engineering

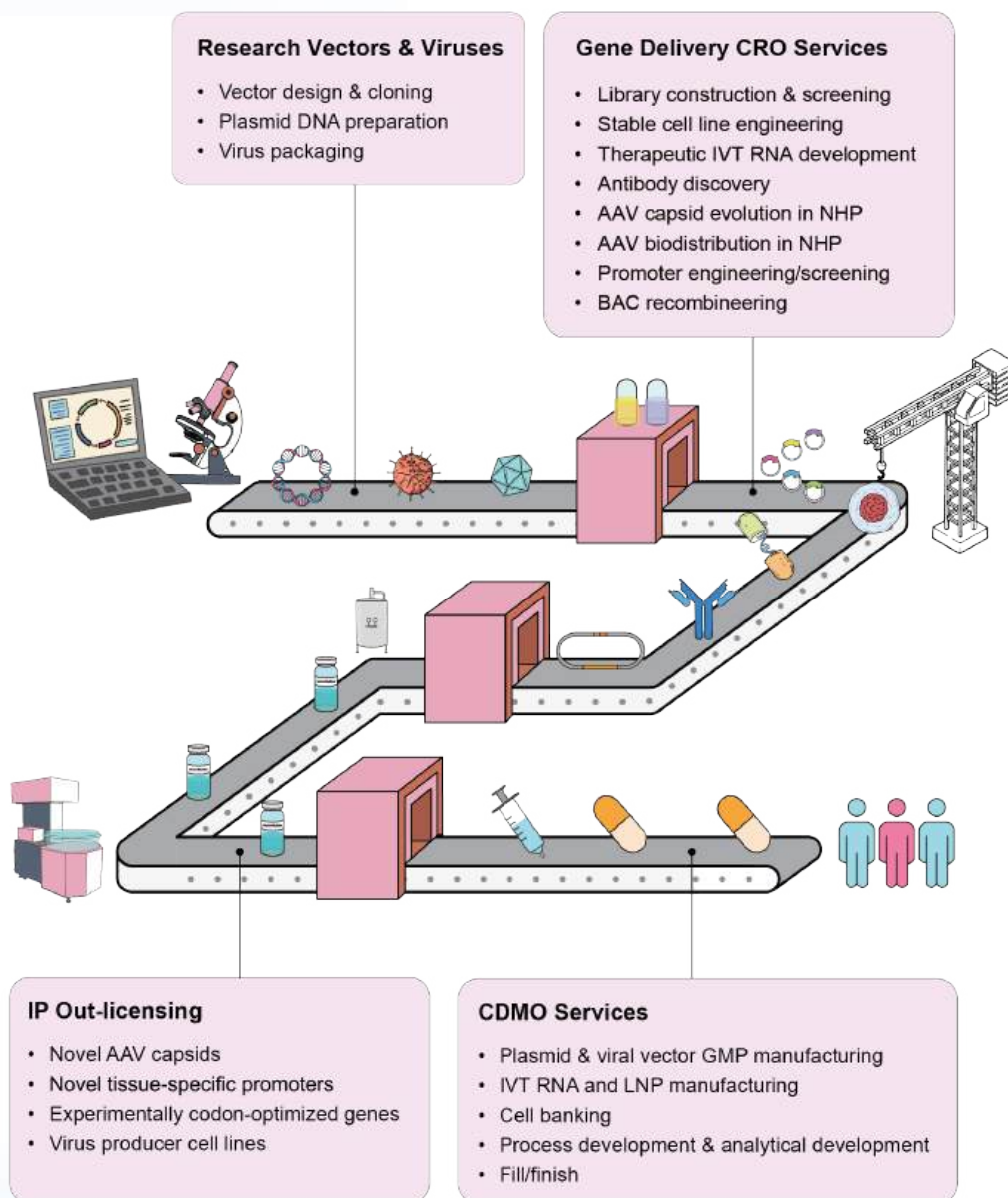
GMP  
Manufacturing





## About VectorBuilder

As a global leader in gene delivery technologies, VectorBuilder offers a full spectrum of solutions covering virtually all research and clinical needs from basic research to therapy. We have supported thousands of laboratories and biotech/pharma companies across the globe along their entire drug-discovery pipelines, going from research-grade vectors for early discovery, to GMP-like vectors for preclinical testing, to full GMP-grade vectors for clinical trials. Our four major business segments include research vectors & viruses, gene delivery CRO services, CDMO services, and IP out-licensing.



VectorBuilder has developed extensive in-house capabilities in method development and analytical testing to ensure the highest quality of in vitro transcription (IVT) RNA, which allows us to consistently exceed customer expectations. Our rigorous documentation practices empower the production of RNA drugs that align with regulatory standards. By partnering with our GMP experts, you can seamlessly transition from discovery and development to clinical RNA drug manufacturing.

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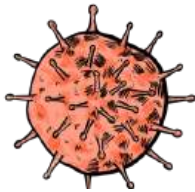
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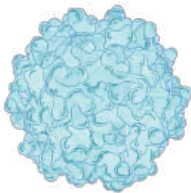
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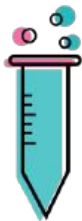
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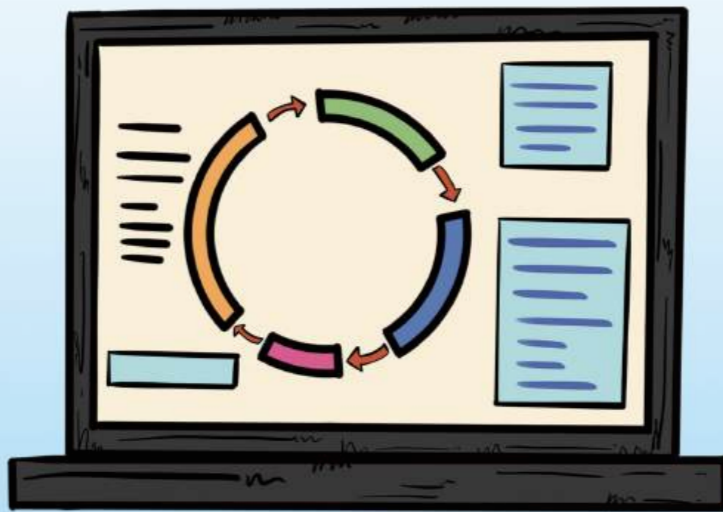


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# VectorBuilder's Revolutionary Online Platform



## What Can You Do with VectorBuilder?



Design vectors using our intuitive online design platform



Order and receive your vectors and viruses in as few as 5 days



Manage your vectors and orders in your VectorBuilder account



Send design requests for complex vector designs or service needs



Order downstream services (e.g. library construction, BAC recombineering, stable cell line generation, etc.)



Learn to become a vector expert with free and unlimited access to our rich educational content

### Highlights



**Diverse vector systems:** 1,100+ vector backbones for various applications in multiple model organisms



**Streamlined online shopping experience:** fast checkout, easy order tracking, versatile payment options, and dedicated customer service



**Comprehensive collections of vector components:** 400,000+ promoters, ORFs, epitope tags, markers, linkers, peptide signals, and whole-genome shRNA and gRNA databases



**Highly affordable prices and rapid turnaround**



**Bioinformatics tools:** codon optimization, sequence alignment, shRNA and CRISPR target design, primer design, and many more



**Robust production and comprehensive QC for release**

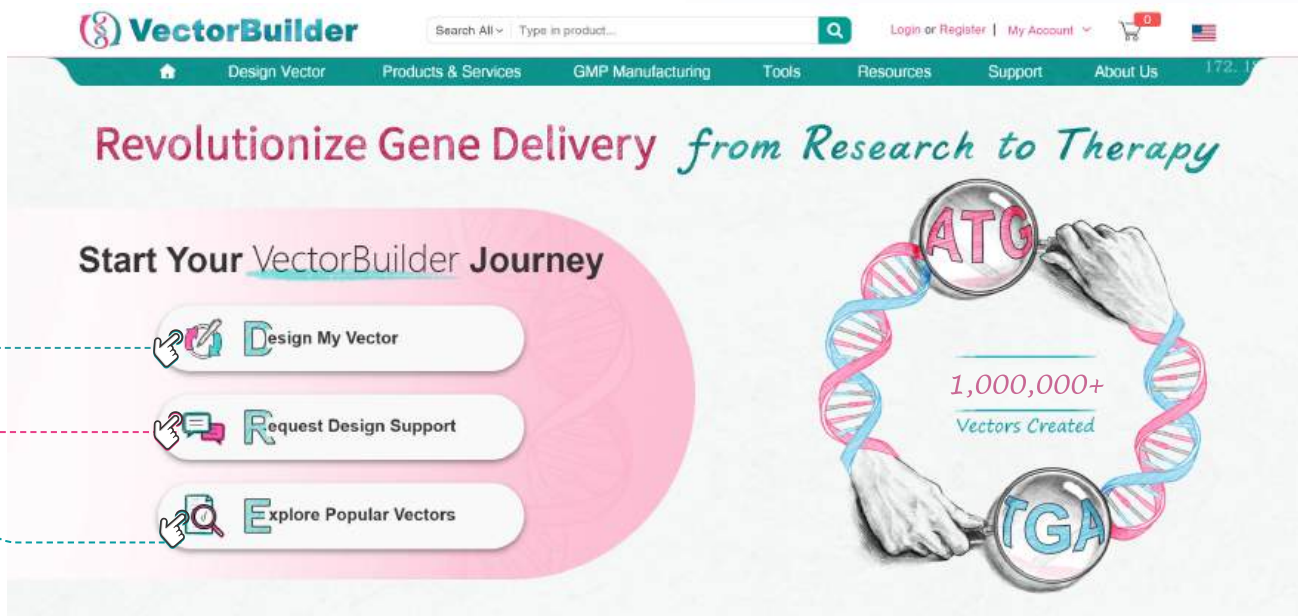


# How to Design a Vector on VectorBuilder

To design a vector, follow the simple steps below.

**1** Go to the **VectorBuilder.com** homepage:

- Click **Design My Vector** to start designing your vector.
- If you can't design your desired vector, click **Request Design Support** to let our scientists create your vector for you.
- Click **Explore Popular Vectors** to search for pre-designed and premade vectors for your genes of interest (GOIs).



**2** Next, on the **Choose Vector System for Vector Design** page:

Choose from 1,100+ vector systems for a wide range of applications in multiple model organisms.

- Overexpression, shRNA, CRISPR, enhancer/promoter testing, in vitro transcription, recombinant protein expression, homologous recombination, etc.
- Mammalian, zebrafish, drosophila, worm, plant, yeast, bacteria, etc.

**Choose Vector System**

Vector System	Guide	Price	Star	Action
Regular plasmid	Guide	From \$199	☆	Go to Design
Lentivirus	Guide	From \$199	☆	Go to Design
AAV	Guide	From \$199	☆	Go to Design
Adenovirus	Guide	From \$199	☆	Go to Design
PB transposon	Guide	From \$199	☆	Go to Design
Sleeping Beauty	Guide	From \$199	☆	Go to Design
MMLV retrovirus	Guide	From \$199	☆	Go to Design
MSCV retrovirus	Guide	From \$199	☆	Go to Design
Tet2	Guide	From \$199	☆	Go to Design
VSV	Guide	From \$199	☆	Go to Design
RCAS	Guide	From \$199	☆	Go to Design

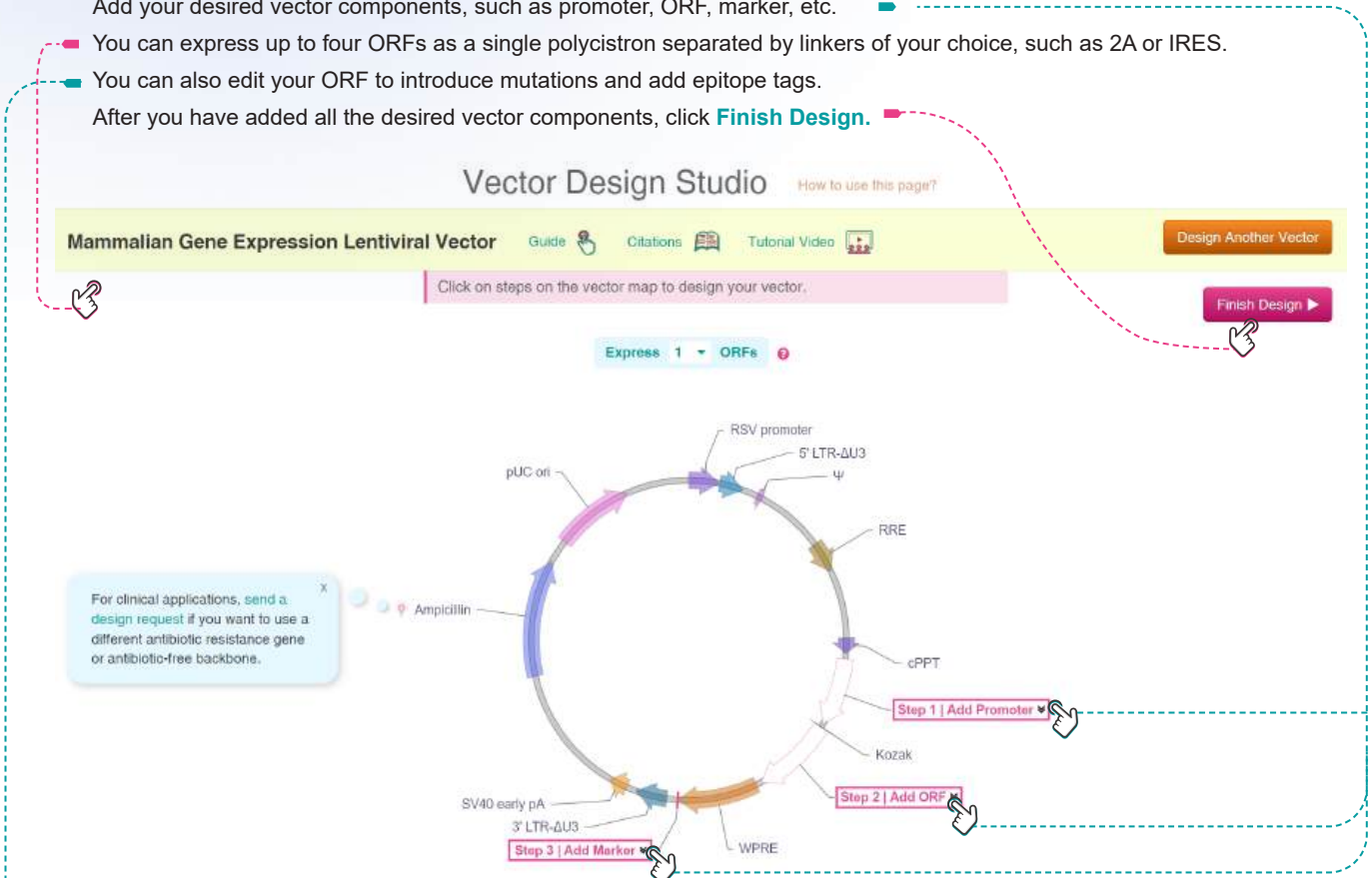
### 3 Next, on the **Vector Design Studio** page:

Add your desired vector components, such as promoter, ORF, marker, etc.

You can express up to four ORFs as a single polycistron separated by linkers of your choice, such as 2A or IRES.

You can also edit your ORF to introduce mutations and add epitope tags.

After you have added all the desired vector components, click **Finish Design**.



ORF Sequence Editor

ORF Name ? [Edit]  
hrGFP<sup>1</sup>

ORF Sequence Full length: 710  
Residue: 11-20 (length: 10)

1	ATGGTGAGC	NGCAGATCCT	GAAGAACACC	GSGCTGCAGG	AGATCATGAG	CTTCAAGGTG	AACCTGGAGG	GCGTGGTGAA
81	CAACCACC	AGGGCTGCGG	CAAGGGCAAC	ATCCTGTTCG	GCAACCAGCT	GGTGCAATC	CGCGTGACCA	AGGCGCCCC
161	CCTGCCCTTC	GCCTTEGACA	TECTGAGCCC	CGCCTTECAG	TACGGCAACC	GCACCTTAC	CAAGTACCCC	GAGGACATCA
241	GCGACTTCTT	CATCCAGAGC	TTCCCCGCCG	GCTTCGTGTA	CGAGCGCACC	CTGCGCTACG	AGGACGGCGG	CCTGGTGGAG
321	ATCCGCAGCG	ACATCAACCT	GATCGAGGAG	ATGTTCTGTG	ACCGCGTGGA	GTACAAGGGC	CGCAACTTCC	CCAACGACGG
401	CCCCGTGATG	AAGAAGACCA	TCACCGGECT	GCAGCCCAGC	TTCGAGGTGG	TGTACATGAA	CGACGGCGTG	CTGGTGGGCC
481	AGGTGATCCT	GGTGTACC	CTGAACAGCG	GCAAGTTCTA	CAGCTGCCAC	ATGCGCACCC	TGATGAAGAG	CAAGGGCGTG
561	GTGAAGGACT	TCCCCGAGTA	CCACTTCATC	CAGCACCGCC	TGGAGAAGAC	CTACGTGGAG	GACGGCGGCT	TCGTGGAGCA
641	GCACGAGACC	GCCATCGCC	AGCTGACCAG	CCTGGGCAAG	CCCCTGGGCA	GCCTGCACGA	GTGGGTGTA	

Deleted from original sequence:  
▼ 91-100  
TTCACCATGG

Add Tag   Codon Optimization   Clear Edits   Translate   Find ORF   View Opposite Strand

Guide to protein tags

Epitope tags  
FLAG 3xFLAG HA Myc V5 OVA(267-264) OVA(323-339) 10xGCN4\_v1 Rho1D4 ALFA-tag

Protease cleavage sites  
EK TEV Thrombin Factor-Xa HRV3C

4 Lastly, you arrive at the **Vector Information** page where you can:

- View complete vector map and sequence with full annotation.
- Order cloning service for the vector and downstream services, such as plasmid DNA preparation and virus packaging.
- Order related products, such as control vectors.
- Save the vector to your account and share it with colleagues.
- Download a vector report in several file formats.

## Vector Information

Share with my colleagues:

### Vector Summary

**Vector ID:** VB900125-3292kvv  
**Vector Name:** pLV[Exp]-Bsd-EFS>sfGFP  
**Vector Type:** Mammalian Gene Expression Lentiviral Vector [Guide](#)  
**Vector Size:** 8138 bp  
**Viral Genome Size:** 4663 bp  
**Promoter:** EFS  
**ORF:** sfGFP  
**Marker:** Bsd  
**Plasmid Copy Number:** High  
**Antibiotic Resistance:** Ampicillin  
**Vector Description:** [\[Edit\]](#)

[Open in VectorBee](#)  
**Download Vector File:** [VectorBee](#) [Additional Format](#)  
[Back to Edit](#) [Save This Vector](#)

Designed on VectorBuilder

### Order Information [How to order](#)

**Vector cloning service**  
 • Deliverable: **E. coli stock**  
 • Cloning Host Strain: **VB UltraStable (or alternative strain)**  
**Price: \$189.00** In Stock  
[Add to cart](#) [Contact us for bulk order discount](#)

**Downstream services**  
 • Plasmid DNA Preparation From \$29.00  
 • Lentivirus Packaging From \$449.00

**Related products**  
 • Control Vectors From \$159.00  
[View Details](#)

### Vector Map

Full Length: 8138 \_ Residue: J

### Vector Sequence

```

1  AATGTAGTCT  TATGCAATAC  TCTTGTAGTC  TTGCAACATG  GTAACGATGA
91  GTTAGCAACA  TGCCTTACAA  GGAGAGAAAA  AGCACCGTCC  ATGCCGATTG
181  GTGGAAGTAA  GGTGGTACGA  TCGTGCCTTA  TTAGGAGGCC  AACAGACGGG
151  TCTGACATGG  ATTGGACGAA  CCACCTGAAT  CCGCCATTGC  AGAGATATTC
201  TATTTAAGTG  CTTAGCTCGA  TACATAMCG  GGTCTCTCTG  GTTAGACCAG
251  ATCTGAGCCT  GGGAGCTCTC  TGGCTAACTA  GGGAAACCCAC  TCGTTAAGCC
381  TCAATAAMGC  TTGCCTTGAG  TGCTTCAAGT  AGTGTGTGCC  CGTCTGTGT
351  GTGACTCTGG  TAACTAGAGA  TCCCTCAGAC  CCTTTTAGTC  AGTGTGAAA
481  ATCTTAGCA  GTGGCGCCCG  AACAGGGACT  TGAAGCGAA  AGGGAACCA
451  GAGGAGCTCT  CTCGACGCA  GACTCGGCTT  GCTGAAGCCG  GCACGGCAAG
581  AGGCGAGGGG  CGGCGACTGG  TGAGTACGCC  AAAAATTTTG  ACTAGCGGAG
551  GCTAGAMGGA  GAGACATGGG  TCGGAGAGCG  TCAGATTAA  GCGGGGAGA
681  ATTAGATCSC  GATGGAAAA  AATTCGTTA  AGGCCAGGGG  GAAGAAAAA
651  ATATAATTA  AAACATATAG  TATGGSCAAG  CAGGGAGCTA  GAACGATTGG
781  CAGTTAATCC  TGGCCTGTTA  GAACATCAAG  AAGGCTGTAG  ACAAACTACTG
751  GGACAGCTAC  AACCATCCCT  TCAGACAGGA  TCAGAAAGAC  TTAGATCATT
881  ATATAATACA  GTAGCAACCC  TCTATTGTGT  GCATCAAGG  ATAGAGATAA
851  AAGACACCAA  GGAAGCTTTA  GACAAGATAG  AGGAAGAGCA  AAACAAAGT
981  AAGACACCCG  CACAGCAAGC  GCGCCTGAT  CTTACAGACT  GGAGGAGGAG
951  ATATGAGGSA  CAATTGGAGA  AGTGAATTAT  ATAAATATAA  AGTAGTAAAA
1081  ATTGAAACAT  TAGSAGTASC  ACCCAACAG  GCAAAGAGAA  GAGTGTGCA
1051  GAGAGAAAAA  AGAGCAGTGG  GAATAGGAGC  TTTGTTCCTT  GGGTCTCTGG
1181  GAGCAGAGG  AAGCACTATG  GCGCGAGCGT  CAATGACGCT  GACGGTACAG
            
```

### Vector Components

Name	Position	Size (bp)	Type	Description	Application notes	View
RSV promoter	1-229	229	Promoter	Rous sarcoma virus enhancer/promoter	Strong promoter; drives transcription of viral RNA in packaging cells.	<a href="#">View Details</a>
5' LTR-ΔU3	230-410	181	LTR	Truncated HIV-1 5' long terminal repeat	Allows transcription of viral RNA and its packaging into virus.	<a href="#">View Details</a>
Ψ	521-565	45	Miscellaneous	HIV-1 packaging signal	Allows packaging of viral RNA into virus.	<a href="#">View Details</a>
RRE	1075-1308	234	Miscellaneous	HIV-1 Rev response element	Rev protein binding site that allows Rev-dependent nuclear export of viral RNA during viral packaging.	<a href="#">View Details</a>
cPPT	1803-1920	118	Miscellaneous	Central polypurine tract	Facilitates the nuclear import of HIV-1 cDNA through a central DNA flap.	<a href="#">View Details</a>
EFS	1959-2190	232	Promoter	Human eukaryotic translation elongation factor 1 α1 short form	Medium-strength promoter.	<a href="#">View Details</a>
Kozak	2215-2220	6	Miscellaneous	Kozak translation initiation sequence	Facilitates translation initiation of ATG start codon downstream of the Kozak sequence.	<a href="#">View Details</a>
				Supertfolder green		

# How to Order on VectorBuilder



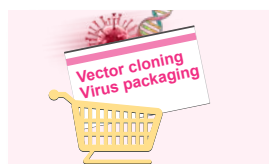
**Design your vector on [VectorBuilder.com](https://vectorbuilder.com).**

- Design a vector from scratch.  
OR
- Send a design request to our experts.



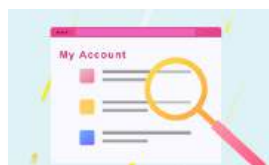
**View your final vector design on the [Vector Information](#) page.**

- View price and turnaround.
- Add the vector to your shopping cart.
- Add downstream services, such as plasmid DNA preparation and virus packaging.



**Open the [Shopping Cart](#) page and place your order.**

- Get an official quote and use it to place your order by PO.  
OR
- Purchase directly with a credit card or use store credit.



**Track your order online.**

- Monitor the production status and get the estimated completion date for your order.  
OR
- Contact our project managers to get detailed updates on your project.



**Receive your vector shipment.**

- Your vector is sequence verified.
- Your virus titer is fully validated.

## Account Management and Online Tracking

[Home](#) > [My Account](#) > [My Business](#) > [Orders](#)

**My Saved Designs**

- Vectors
- Service Proposals
- Binders *New*

**My Inquiries**

- Price Inquiries
- Design Requests
- Other Inquiries

**My Business**

- Orders
- Quotes
- Invoices
- Order Requests
- Materials Submission
- Store Credit

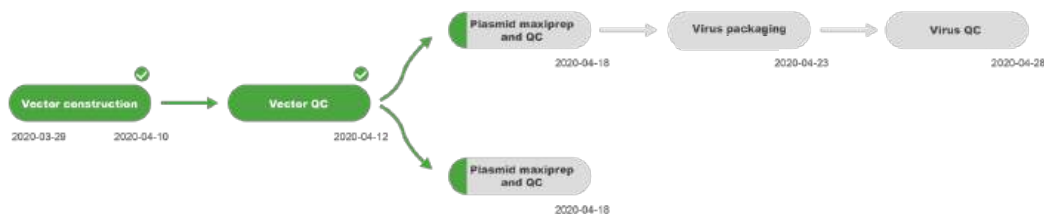
**My Information**

- Message Center
- Profile
- Address
- Credit Card

### Orders

	Sales Order #	Project Tracking #	Price (USD)	PO File	Payment	Date Last Updated	Status	Tracker	Monday Tracker
<input type="checkbox"/>	S200329-1012qgy	T200328-1017fcd	\$1,737.00			2020-03-29	In Production	<a href="#">Track</a>	
<input type="checkbox"/>	S200223-1002jes	T200218-1014jqp	\$1,973.00			2020-03-12	Completed	<a href="#">Track</a>	

### Project Timeline





Download VectorBee

# VectorBuilder Free DNA Software



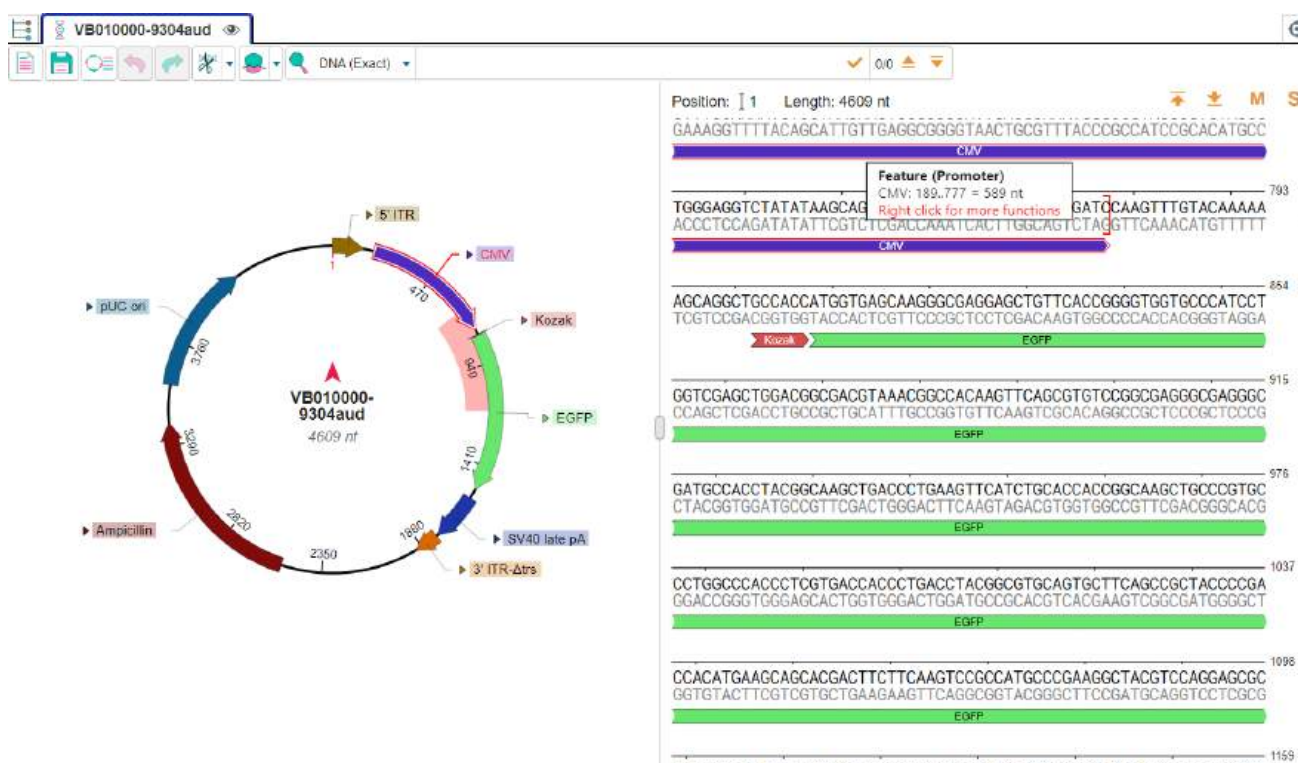
# VectorBee



## VectorBuilder Free DNA Software: VectorBee

VectorBuilder's talented team of biologists and IT specialists has developed a DNA software, VectorBee. The software's user-friendly interface enables easy design, editing, and analysis of DNA or RNA sequences. This allows quick and easy design and ordering of fully customized vectors for a variety of gene delivery needs.

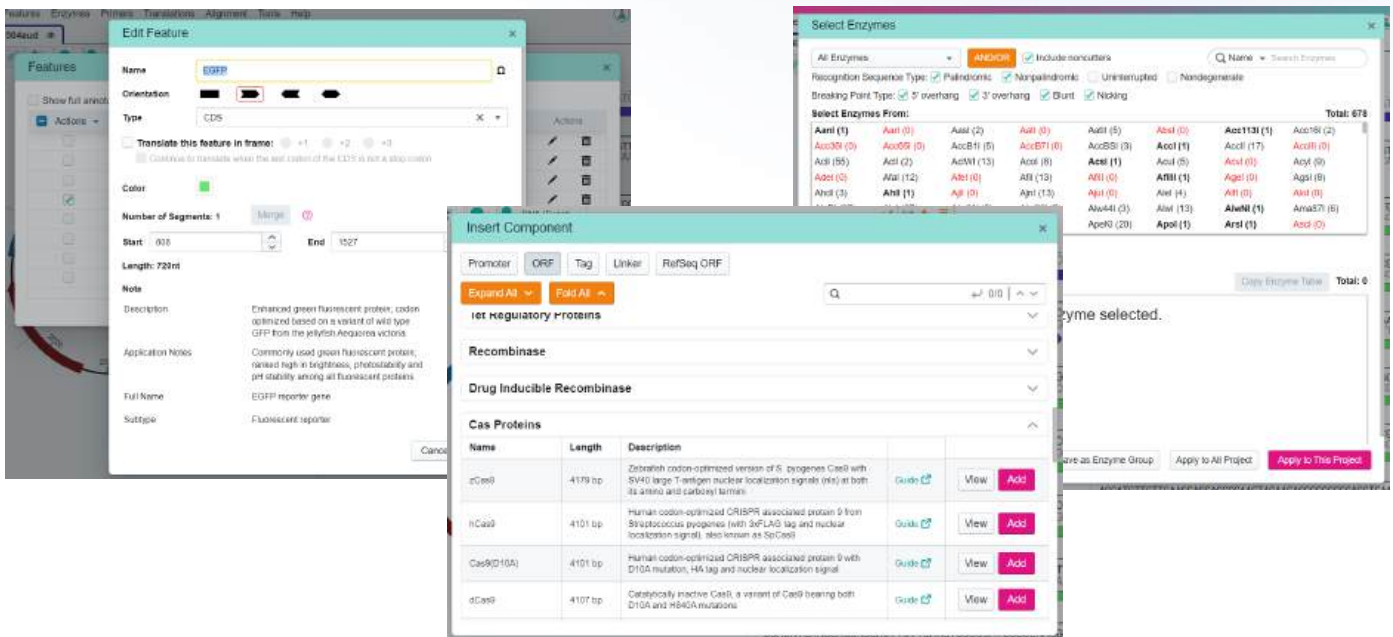
Available in both Windows and Mac versions, VectorBee offers key features for vector visualization, editing, and analysis, combined with the ease of design offered by VectorBuilder's Vector Design Studio. Users can recognize, add, and edit features as well as insert components like promoters, ORFs, and markers. VectorBee meets complex and customized vector design needs from design, through production, to analysis.



The screenshot displays the VectorBee software interface. On the left, a circular plasmid map for 'VB010000-9304aud' (4609 nt) is shown with various features: pUC ori (3760), Ampicillin (2920), 3' ITR-Δtrs (2350), SV40 late pA (1980), EGFP (3410), Kozak (490), and CMV (470). The main window shows a linear DNA sequence starting at position 1 with a length of 4609 nt. The sequence is annotated with features such as CMV promoters, Kozak sequences, and EGFP coding regions. A tooltip for a 'Feature (Promoter)' is visible, showing the CMV sequence: 'CMV: 189..777 = 589 nt' and 'GATCCAAGTTTGTACAAAAA'.



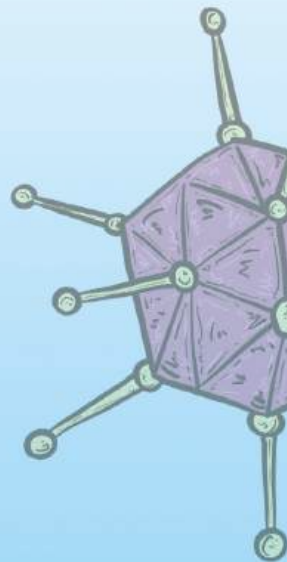
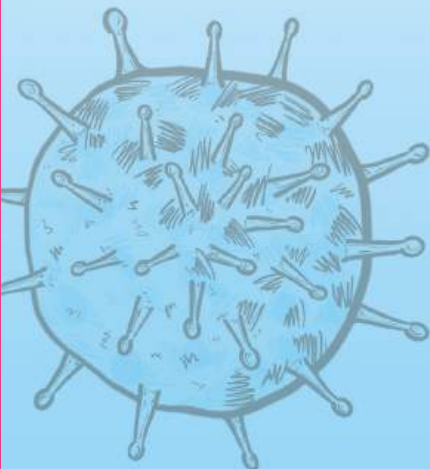
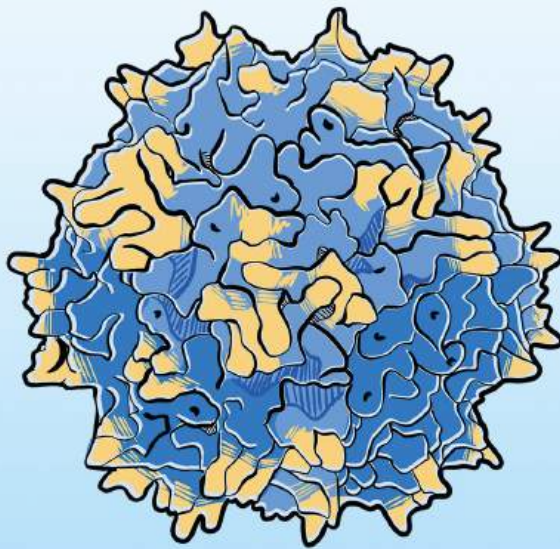
Download VectorBee



## Highlights

- Explore popular vectors from multiple vector systems, including control vectors
- Import vectors directly from VectorBuilder using vector ID or saved vector list
- Organize vectors in the Project Dashboard, including binder creation and file editing
- Automatic detection of common features
- View all features in the feature list to edit individually or in bulk
- Copy and paste features, including sequence and attributes
- Create primers, highlighting length, melting temperature and GC content
- Simulate restriction enzyme digestion with a catalog of almost 700 restriction enzymes
- Insert components, including Promoter, ORF, Tag, and Linker
- Send Design Request directly to the VectorBuilder team

# Research Vectors & Viruses



# Vector Cloning



Free, highly-intuitive platform for quick and easy design of custom vectors using our vast inventory of functionally validated vector backbones and components.



Modular “Lego-like” production workflow enabling parallel cloning of custom vectors efficiently and reliably, with over 95% of projects completed on time.

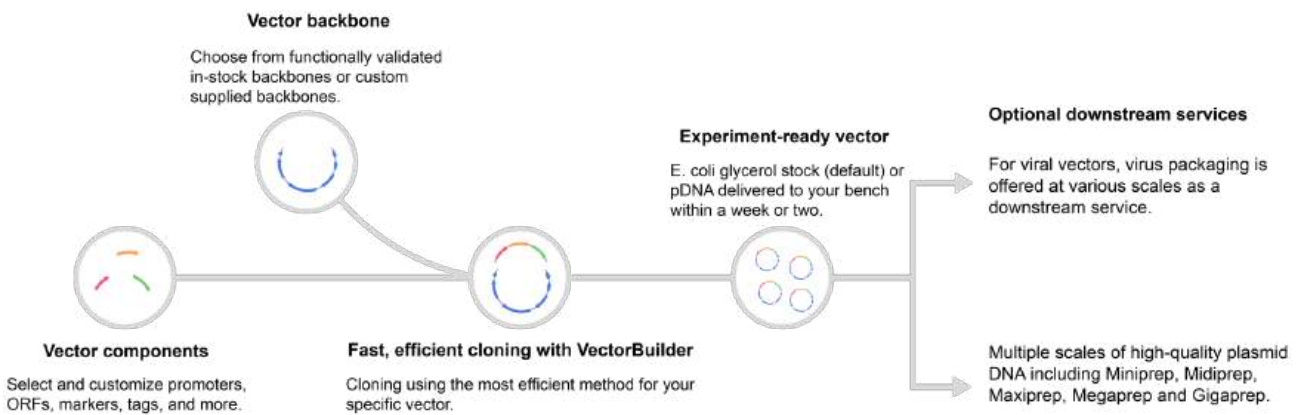


Extensive experience in cloning complex and challenging vectors as well as performing a wide variety of downstream services.



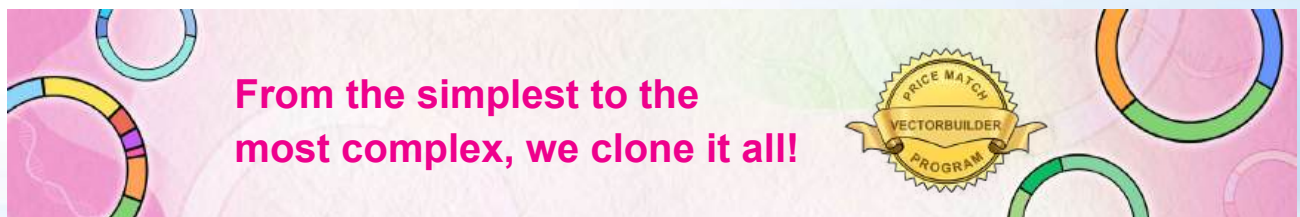
Full ownership of the IP for your custom vectors and free vector storage.

## Overview and workflow of custom cloning services



VectorBuilder streamlines even the most complex vector production for a wide range of applications. The table below provides an overview of our custom vector production process.

Process	Description
Sourcing vector backbones and components	Vector backbones and components (promoters, ORFs, markers, etc.) are sourced in-house (~80% of all projects), de novo synthesized, or customer-supplied.
Vector cloning	Cloning methods include PCR, ligation, Gibson, Golden Gate or other, depending on the complexity of the vector.
Final QC & delivery	Comprehensive and customizable QC (sequencing, restriction digestion, as appropriate) before delivery.
Downstream services	Multiple scales of high-quality plasmid DNA for all vectors and virus packaging at various scales for viral vectors.



## Vector Systems Offered Online

	Regular plasmid	Lentivirus	Adeno-virus	AAV	Retrovirus (MMLV and MSCV)	VSV	PB transposon	Sleeping Beauty	ToI2
<b>Mammalian Gene Expression Vectors</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Mammalian Inducible Gene Expression Vectors (Tet-Based)</b>	✓	✓		✓			✓		
<b>Mammalian Conditional Gene Expression Vectors (Cre-Lox Based)</b>	✓	✓	✓	✓			✓		✓
<b>Mammalian CAR Expression Vectors</b>	✓	✓			✓		✓	✓	✓
<b>Mammalian Antibody Expression Vectors (Heavy and/or Light Chain Expression)</b>	✓						✓		
<b>Mammalian Non-Coding RNA Expression Vectors</b>	✓	✓	✓	✓	✓		✓		✓
<b>Mammalian shRNA Knockdown Vectors (U6 and miR30-Based)</b>	✓	✓ (U6-based inducible available)	✓	✓			✓		✓
<b>Mammalian CRISPR Gene Editing Vectors (Single or Dual gRNA +/- Cas9 Coexpression, Cas9 Expression)</b>	✓ (donor, tRNA-gRNA available)	✓ (tRNA-gRNA available)	✓	✓ (donor vector available)			✓ (tRNA-gRNA available)		
<b>Mammalian CRISPR Gene Regulation Vectors (CRISPR Activation and Inhibition)</b>		✓	✓ (activation only)						
<b>Enhancer/ Promoter Testing Vectors (In Vitro and In Vivo)</b>	✓						✓ (in vivo only)		
<b>Zebrafish Gene Expression Vectors</b>									✓
<b>Zebrafish CRISPR Vectors (gRNA +/- Cas9 Coexpression or Cas9 Expression)</b>									✓

Vector system	Vector type
<b>Drosophila Vectors</b>	pattB, pUAST, pUASTattB, pUASTB
<b>Plant Vectors</b>	T-DNA binary vector, regular plasmid
<b>Worm Gene Expression Vectors</b>	Regular plasmid, ttTi5606 locus expression vector
<b>Worm CRISPR Gene Editing Vectors</b>	For gRNA and Cas9 co-expression, gRNA expression and Cas9 expression
<b>Recombinant Protein Expression Vectors</b>	Bacteria - pET, pBAD, cold-shock induced
	Yeast - Pichia pastoris, Saccharomyces cerevisiae
	Insect - Baculovirus transfer vector (single and dual promoter)
<b>In Vitro Transcription Vectors</b>	For mRNA, in situ hybridization and small RNA

## Plasmid DNA Preparation

High-quality plasmid DNA is integral to a wide range of molecular biology techniques, from cloning and transfection to virus packaging and protein production. VectorBuilder's plasmid DNA preparation service offers rapid, cost-effective production on a customizable scale, from micrograms to grams, to meet the needs of basic research scientists and industrial customers. In addition to the Research-grade, Research Plus-grade and Industrial-grade plasmids below, we also offer GMP plasmid manufacturing for clinical applications.

As part of our GMP offerings, we recently launched MiniVec™, a miniaturized plasmid with antibiotic-free and supplement-free selection, offering higher plasmid manufacturing and virus packaging yields, improved transgene expression, and an enhanced safety profile. See page 51 for more detailed information on MiniVec™.

*Detailed descriptions of our plasmid DNA preparation services, including ordering information, are also available on our website under **Products & Services**.*

### Price and turnaround

Grade	Scale	Application	Deliverable		Price	Turnaround
			High copy plasmid	Medium/low copy plasmid		
Research	Mini	Cloning and various molecular biology experiments	>200 ng/ul, 50 ul	>100 ng/ul, 50 ul	\$39	1-2 days
Research Plus	Midi	Various cell culture (e.g. transfection, virus packaging, protein expression, in vitro assays) and in vivo experiments	>1 ug/ul, 100 ul	>500 ng/ul, 100 ul	\$99	2-4 days
	Maxi		>1 ug/ul, 300 ul	>500 ng/ul, 300 ul	\$149	
	Mega		>1 ug/ul, 1 ml	>500 ng/ul, 1 ml	\$249	
	Giga		>1 ug/ul, 10 ml	>500 ng/ul, 10 ml	\$799	5-7 days
Industrial		Preclinical experiments (e.g. efficacy and safety profile studies) and large-scale production of recombinant protein, virus, and IVT RNA for industrial applications	100 ug-1 g	100 ug-1 g	Please inquire	

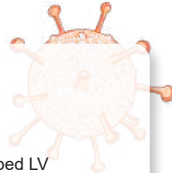


# Virus Packaging

VectorBuilder offers recombinant virus production services for a wide range of virus types with super affordable prices. Our production technology and reagents are optimized to achieve the highest quality of research-grade, GMP-like and GMP-grade virus in terms of titer, purity, potency and consistency. VectorBuilder offers over a dozen different types of recombinant viruses. The major ones are listed below.

## Lentivirus

- 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)



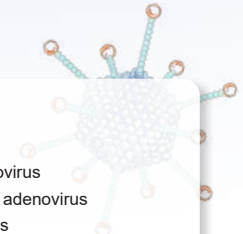
## Adeno-Associated Virus

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



## Adenovirus

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



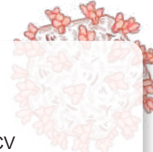
## MMLV Retrovirus

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



## MSCV Retrovirus

- VSV-G pseudotyped MSCV



## Baculovirus

- Baculovirus strain AcMNPV
- Baculovirus-AAV with 6+ serotypes



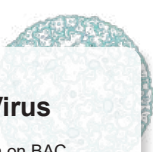
## Vesicular Stomatitis Virus

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



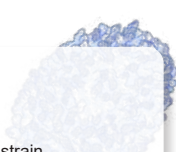
## Herpes Simplex Virus

- 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



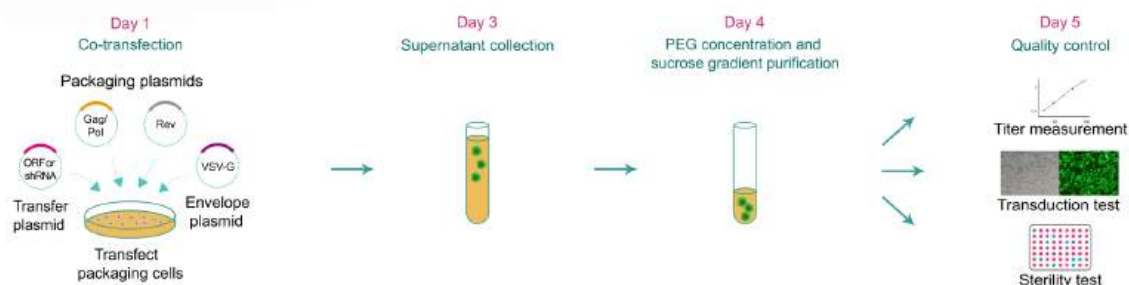
# Lentivirus

## Types of lentivirus offered

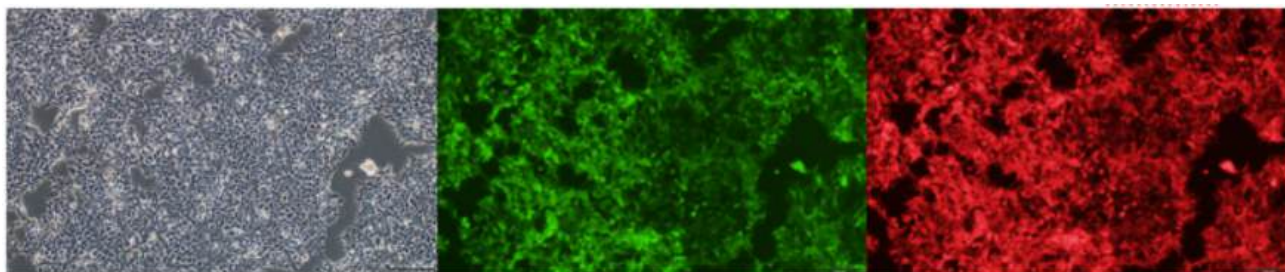
- VSV-G pseudotyped third-generation lentivirus (this is the default virus type)
- VSV-G pseudotyped second-generation lentivirus
- Lentivirus pseudotyped with other envelope proteins as requested, such as coronavirus spike (S) proteins

- Bald lentivirus lacking viral envelope protein
- Integrase-deficient lentivirus (IDLV)

**Note:** We also offer lentivirus pseudotyping services with other envelope proteins.



**Figure 1.** Typical workflow of lentivirus packaging.



**Figure 2.** Lentivirus-mediated fluorescent protein expression in 293T cells. Magnification: 100X. Left: bright field. Middle: EGFP. Right: mCherry.

## Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
Mini	Cell culture	>10 <sup>8</sup> TU/ml	100 ul (4x25 ul)	\$239	6-12 days
Pilot		>10 <sup>8</sup> TU/ml	250 ul (10x25 ul)	\$449	
Medium			1 ml (10x100 ul)	\$649	
Large		>10 <sup>9</sup> TU/ml	1 ml (10x100 ul)	\$1,099	
Ultra-purified medium	Cell culture & in vivo	>10 <sup>9</sup> TU/ml	500 ul (10x50 ul)	\$1,399	6-12 days
Ultra-purified large			1 ml (10x100 ul)	\$1,699	
High-throughput**	Cell culture	>2x10 <sup>6</sup> TU/ml	100 ul/well	\$99/well	14-21 days

\* The above table applies to VSV-G pseudotyped 2nd- and 3rd-generation lentivirus (integrase-deficient lentivirus (IDLV) included).

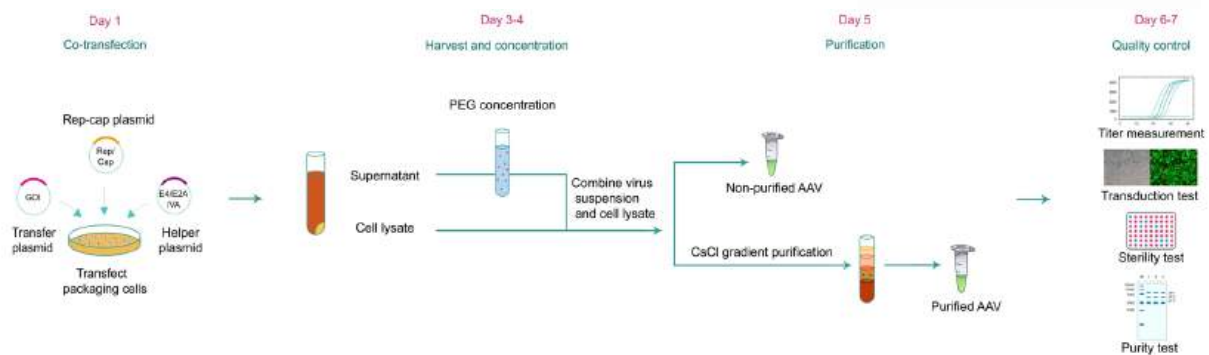
\*\* The high-throughput packaging service is performed using 96-well plates, with a minimum order of 50 wells.

# Adeno-Associated Virus (AAV)



## Types of AAV offered

- Single-stranded AAV (ssAAV) and self-complementary AAV (scAAV)
- 18 serotypes: 1, 2, 3, 4, 5, 6, 6.2, 7, 8, 9, rh10, DJ, DJ/8, PHP.eB, PHP.S, AAV2-retro, AAV2-QuadYF and AAV2.7m8
- AAV empty capsids or virus-like particles (VLPs) - custom and off-the-shelf products available
- AAV serotype testing panel- offers you the flexibility to customize your AAV panel with 3 or more AAVs from our collection of 18 serotypes



**Figure 1.** Typical workflow of triple transfection-based AAV packaging.

Tissue type	Recommended serotypes	Tissue type	Recommended serotypes
<b>Smooth muscle</b>	AAV1, 2, 3, 5, 6, 7, 8, 9, rh10	<b>Heart</b>	AAV1, 4, 5, 6, 8, 9, rh10, DJ
<b>CNS</b>	AAV1, 2, 4, 5, 7, 8, 9, rh10, PHP.eB	<b>Kidney</b>	AAV2, 4, 8, 9, rh10, DJ, DJ/8
<b>PNS</b>	AAV-PHP.S	<b>Lung</b>	AAV1, 3, 4, 5, 6, 6.2, 9, rh10
<b>Brain</b>	AAV1, 2, 5, 7, 8, DJ/8	<b>Testes</b>	AAV2, 9
<b>Retina</b>	AAV1, 2, 4, 5, 7, 8, 9, rh10, 2.7m8, 2-QuadYF	<b>Adipose</b>	AAV6, 8, 9
<b>Inner ear</b>	AAV1, 2, 6.2, 8, 9, 2.7m8	<b>Spinal nerves</b>	AAV2- retro
<b>Spleen</b>	AAV-DJ, DJ/8	<b>Endothelial cells</b>	AAV2-QuadYF
<b>Liver</b>	AAV1, 2, 3, 6, 6.2, 7, 8, 9, rh10, DJ, DJ/8	<b>Skeletal muscle</b>	AAV1, 9
<b>Pancreas</b>	AAV1, 2, 6, 8, 9, rh10		

**Table 1.** Recommended AAV serotypes for different tissues.

## Research grade AAV packaging

Our research grade AAV packaging services meet the vast majority of AAV-based gene delivery needs in basic research. Both triple transfection and baculovirus-based packaging methods can be selected based on your needs.

### Triple transfection-based AAV price and turnaround

Scale	Application	Typical titer	Minimum titer	Volume	Price	Turnaround
<b>Pilot</b>	Non-purified, suitable for most cell culture experiments	$>10^{12}$ GC/ml	$>2 \times 10^{11}$ GC/ml	250 ul (10x25 ul)	\$449	6-12 days
<b>Medium</b>				1 ml (10x100 ul)	\$649	
<b>Large</b>		$>5 \times 10^{12}$ GC/ml	$>2 \times 10^{12}$ GC/ml	1 ml (10x100 ul)	\$1,099	
<b>Ultra-purified pilot</b>	Cell culture & in vivo	$>2 \times 10^{13}$ GC/ml	$>10^{13}$ GC/ml	100 ul (4x25 ul)	\$1,399	7-14 days
<b>Ultra-purified medium</b>				500 ul (10x50 ul)	\$1,999	
<b>Ultra-purified large</b>				1 ml (10x100 ul)	\$3,099	
<b>Ultra-purified large 5</b>				5 ml (10x500 ul)	From \$9,899	14-21 days
<b>Ultra-purified large 10</b>				10 ml (10x1 ml)	From \$15,899	
<b>Other scales</b>	Please inquire					

### Baculovirus-based AAV price and turnaround

Scale	Application	Minimum titer	Volume	Price	Turnaround
<b>Ultra-purified pilot</b>	Cell culture & in vivo	$>5 \times 10^{13}$ GC/ml	1 ml (10x100 ul)	\$5,599	35-49 days
<b>Ultra-purified medium</b>			5 ml (25x200 ul)	\$20,199	
<b>Ultra-purified large</b>			10 ml (50x200 ul)	\$38,199	

## Research plus grade AAV packaging

Our research plus AAV packaging services are suitable for applications that are sensitive to impurities (e.g. host cell protein, endotoxin, etc.), or applications with special requirements on purification method, titer, or formulation. They are also optimal choices for your preclinical animal experiments.

### Price and turnaround

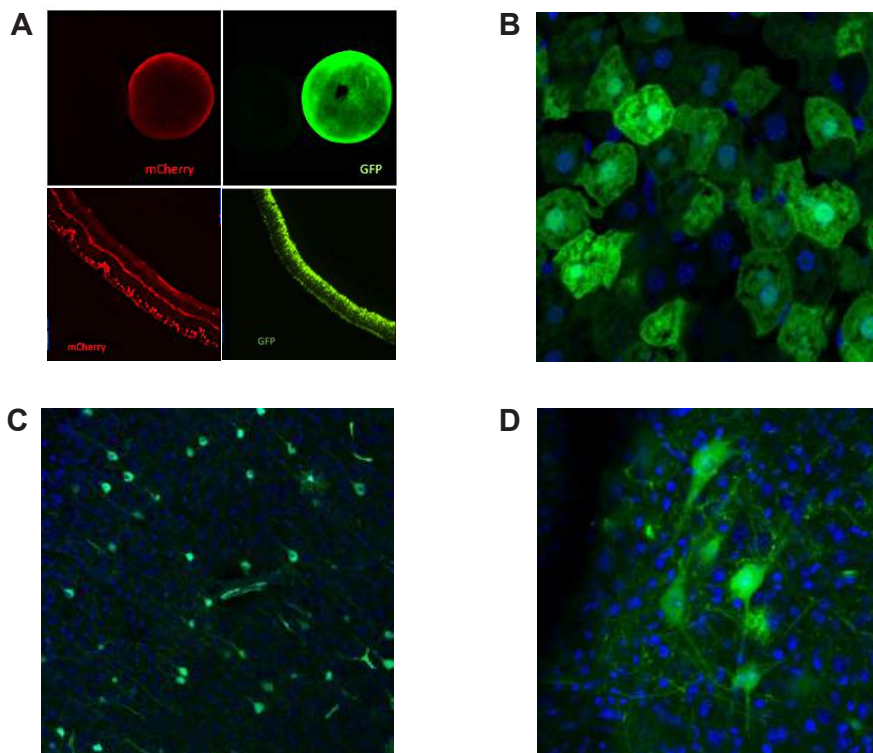
Scale	Application	Total yield (GC)	Price	Turnaround
<b>Research-plus 1</b>	Various in vitro and in vivo experiments	$1 \times 10^{13}$	From \$4,699	10-16 days
<b>Research-plus 5</b>		$5 \times 10^{13}$	From \$14,899	14-21 days
<b>Research-plus 10</b>		$1 \times 10^{14}$	From \$23,899	
<b>Other scales</b>		Up to $1 \times 10^{16}$	Please inquire	

#### Note:

- GC = Genome copies.
- The above listed price and turnaround are based on purification by CsCl density gradient centrifugation. When other purification methods (e.g. iodixanol density gradient, affinity chromatography, ion-exchange chromatography, etc.) are required, please send us a design request to get the quote.

### Comparison of different AAV grades

	Nonpurified research grade	Ultra-purified research grade	Research plus grade
Available purification method	-	CsCl density gradient	CsCl density gradient (default), iodixanol density gradient, affinity chromatography, ion-exchange chromatography
Titer	$>10^{12}$ GC/ml	$>10^{13}$ GC/ml	$1 \times 10^{13}$ - $5 \times 10^{13}$ GC/ml
Achievable purity (assessed by SDS-PAGE)	-	$>80\%$	$>90\%$
Achievable endotoxin level	$<30$ EU/ml	$<10$ EU/ml	$<2$ EU/ml
Typical full capsid ratio	-	$>70\%$	$>80\%$



**Figure 2.** (A) AAV8-mediated mCherry and EGFP expression in mouse retina. (Hoang et al., unpublished data) (B) AAV9-mediated EGFP expression in (B) mouse hepatocytes, (C) mouse cortical neurons, and (D) mouse motor neurons. Magnification: 240X. Green: EGFP. Blue: DAPI.



## Adenovirus

### Types of adenovirus offered

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

### Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
<b>Human Ad5 adenovirus</b>					
Pilot	Cell culture	$>10^{10}$ IFU/ml	250 ul (10x25 ul)	\$649	28-35 days
Medium			1 ml (10x100 ul)	\$1,099	
Large		$>10^{11}$ IFU/ml	1 ml (10x100 ul)	\$1,699	
Ultra-purified medium	Cell culture & in vivo	$>10^{12}$ VP/ml	500 ul (10x50 ul)	\$2,099	
Ultra-purified large			1 ml (10x100 ul)	\$2,499	
<b>Chimeric Ad5/F35 adenovirus</b>					
Pilot	Cell culture	$>10^{10}$ IFU/ml	250 ul (10x25 ul)	\$1,099	35-42 days
Medium			1 ml (10x100 ul)	\$1,699	
Large		$>10^{11}$ IFU/ml	1 ml (10x100 ul)	\$2,599	
Ultra-purified medium	Cell culture & in vivo	$>10^{12}$ VP/ml	500 ul (10x50 ul)	\$3,199	
Ultra-purified large			1 ml (10x100 ul)	\$3,799	
<b>Gutless Ad5 &amp; Ad5/F35 adenovirus</b>					
Ultra-purified pilot	Cell culture & in vivo	$>10^{11}$ VP/ml	5x50 ul	\$2,599	35-42 days
Ultra-purified medium	Cell culture & in vivo	$>10^{11}$ VP/ml	10x50 ul	\$3,999	
Ultra-purified large	Cell culture & in vivo	$>10^{11}$ VP/ml	10x100 ul	\$4,999	

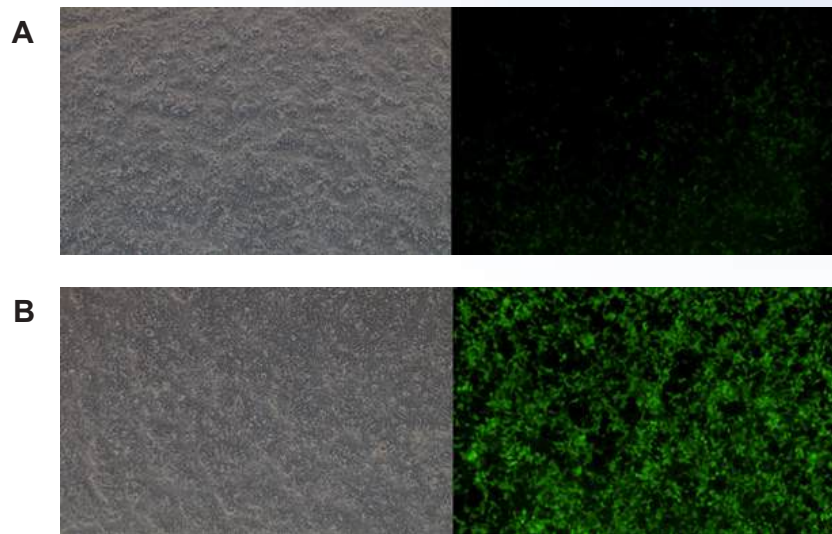
## MMLV Retrovirus

### Types of MMLV retrovirus offered

VSV-G pseudotyped wild-type and self-inactivating MMLV retrovirus

### Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
Pilot	Cell culture	$>10^7$ TU/ml	250 ul (10x25 ul)	\$449	6-12 days
Medium			1 ml (10x100 ul)	\$649	
Large		$>10^8$ TU/ml	1 ml (10x100 ul)	\$1,099	
Ultra-purified large	Cell culture & in vivo	$>10^8$ TU/ml	1 ml (10x100 ul)	\$1,699	



**Figure 1.** Comparison of two MMLV systems. (A) Wild-type MMLV vector pMMLV[Exp]-EGFP:T2A:Puro and (B) Self-inactivating MMLV vector pMMLV-SIN[Exp]-CMV>EGFP:T2A:Puro were packaged and transfected with an equal MOI. Magnification: 100X. Left: bright field. Right: EGFP.

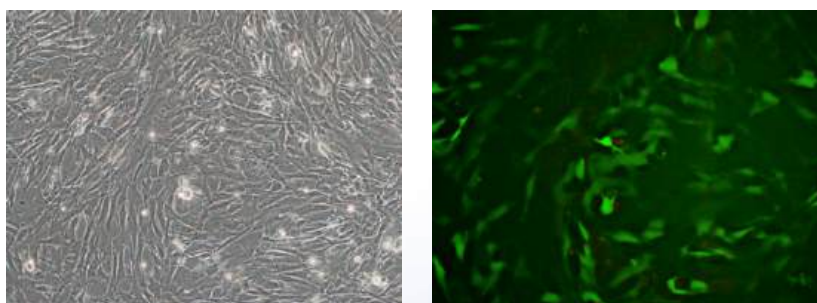
## MSCV Retrovirus

### Types of MSCV retrovirus offered

VSV-G pseudotyped MSCV retrovirus

### Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
Pilot	Cell culture	$>10^7$ TU/ml	250 ul (10x25 ul)	\$449	6-12 days
Medium			1 ml (10x100 ul)	\$649	
Large		$>10^8$ TU/ml	1 ml (10x100 ul)	\$1,099	
Ultra-purified large	Cell culture & in vivo	$>10^8$ TU/ml	1 ml (10x100 ul)	\$1,699	



**Figure 1.** MSCV-mediated EGFP expression in mouse mesenchymal stem cells. Magnification: 100X. Left: bright field. Right: EGFP.

## Baculovirus

### Types of baculovirus offered

Baculovirus strain AcMNPV (*Autographa californica* multicapsid nucleopolyhedrovirus)

### Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
Medium	Cell culture	>10 <sup>6</sup> PFU/ml	1 ml (10x100 ul)	\$649	15-22 days
Large		>10 <sup>7</sup> PFU/ml		\$1,099	22-29 days

## Herpes Simplex Virus (HSV)

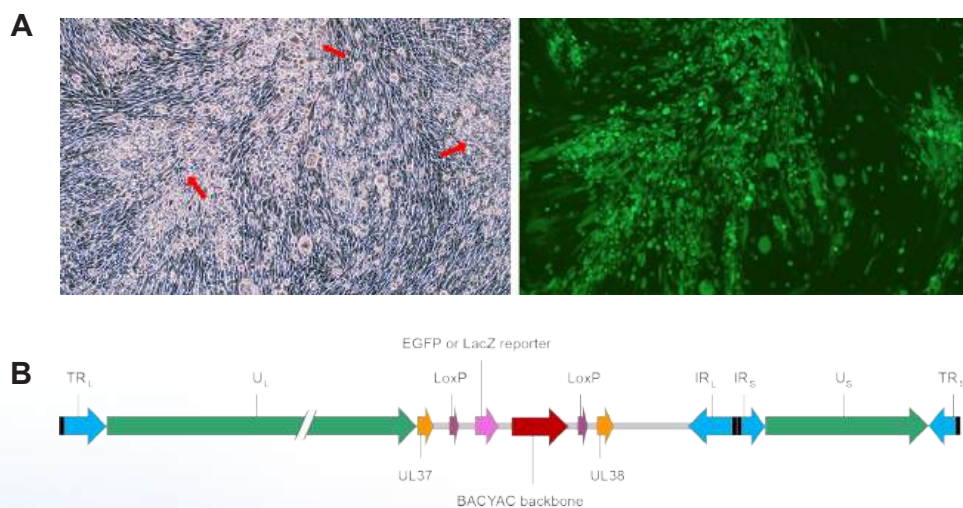


### Types of HSV services offered

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

### Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
Ultra-purified pilot	Cell culture & in vivo	>10 <sup>7</sup> PFU/ml	1 ml (10x100 ul)	\$2,099	28-35 days
Ultra-purified medium		>10 <sup>8</sup> PFU/ml		\$3,099	



**Figure 1.** (A) BHK21 cells were transfected with our BACYAC vector carrying the full genome sequence of wildtype HSV-1 (KOS strain) along with an EGFP reporter. Images were taken at 48 hours post-transduction. Magnification: 100x. Left: bright field. Right: EGFP. (B) Map of HSV BACYAC backbone.

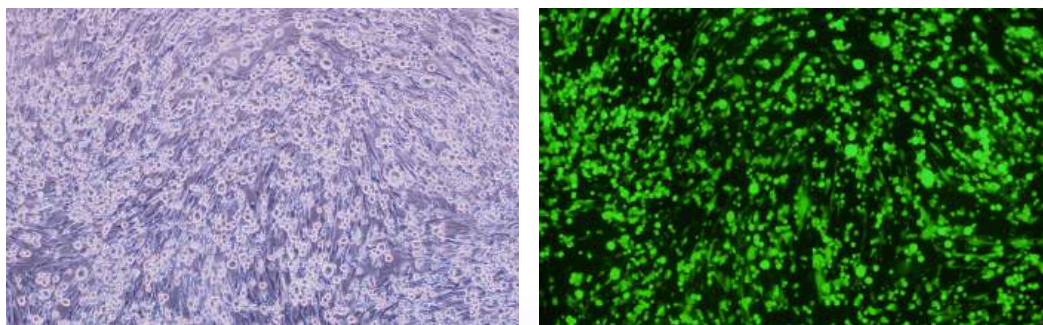
# Vesicular Stomatitis Virus (VSV)

## 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)

## Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
<b>VSV pseudotyped with VSV-G</b>					
Medium	Cell culture	$>10^7$ PFU/ml	1 ml (10x100 ul)	\$1,099	21-35 days
Large		$>10^8$ PFU/ml		\$1,399	
Ultra-purified medium	Cell culture & in vivo	$>10^8$ PFU/ml	500 ul (5x100 ul)	\$1,699	
Ultra-purified large			1 ml (10x100 ul)	\$2,699	
<b>VSV pseudotyped with SARS-CoV-2 S protein and its variants (Luc or EGFP as transgene)</b>					
Medium	Cell culture	$>10^7$ PFU/ml	1 ml (10x100 ul)	\$2,199	21-35 days
Large		$>10^8$ PFU/ml		\$2,799	
Ultra-purified medium	Cell culture & in vivo	$>10^8$ PFU/ml	500 ul (5x100 ul)	\$3,399	
Ultra-purified large			1 ml (10x100 ul)	\$5,399	
<b>VSV pseudotyped with SARS-CoV-2 S protein and its variants (other transgenes)</b>					
Medium	Cell culture	$>10^7$ PFU/ml	1 ml (10x100 ul)	\$2,199	21-35 days
Large		$>10^8$ PFU/ml		\$2,799	
Ultra-purified medium	Cell culture & in vivo	$>10^8$ PFU/ml	500 ul (5x100 ul)	\$3,399	
Ultra-purified large			1 ml (10x100 ul)	\$5,399	



**Figure 1.** BHK-21 cells transduced with VSV pseudotyped with VSV-G protein. Magnification: 100X. Left: bright field. Right: EGFP.

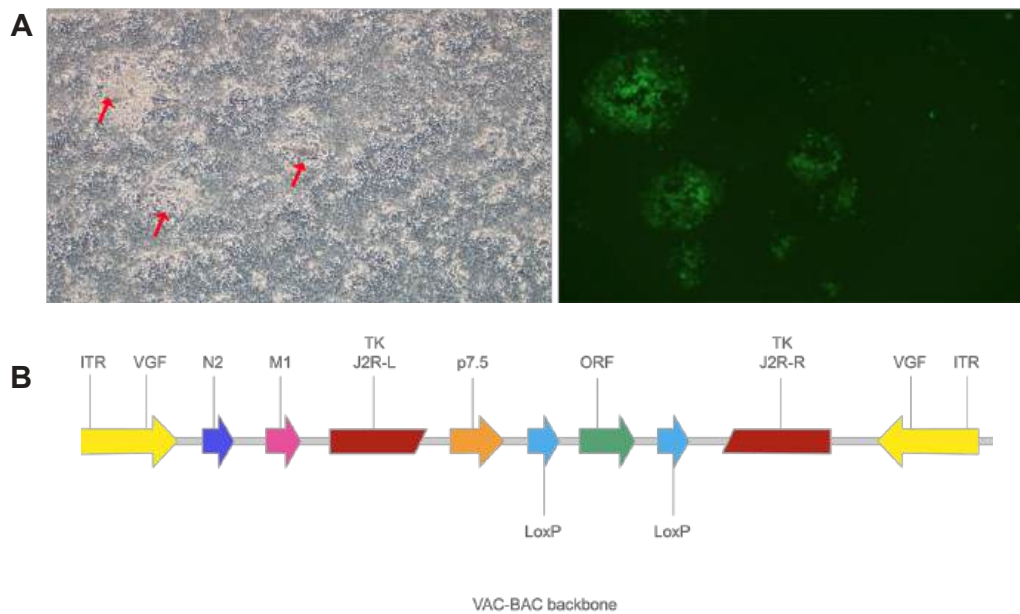
## Vaccinia Virus (VACV)

### Types of VACV offered

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

### Price and turnaround

Scale	Application	Titer	Volume	Price	Turnaround
<b>Pilot</b>	Cell culture	$>10^8$ PFU/ml	250 ul (10x25 ul)	\$399	21-28 days
<b>Medium</b>	Cell culture	$>10^8$ PFU/ml	1 ml (10x100 ul)	\$1,699	
<b>Ultra-purified medium</b>	Cell culture & in vivo	$>10^8$ PFU/ml	1 ml (10x100 ul)	\$2,699	21-35 days



**Figure 1.** (A) 293T cells were transduced with VACV particles expressing EGFP (MOI:  $2 \times 10^{-3}$ ). Images were taken at 96 hours post-transduction. Magnification: 200 $\times$ . Arrows indicate signs of cytopathic effect (CPE). Left: bright field. Right: EGFP. (B) Map of recombinant VAC-BAC vector with ORF insert.

# CRO Services



## Therapeutic IVT RNA

VectorBuilder offers comprehensive CRO services for the development of RNA therapeutics including vaccines, gene replacement, chimeric antigen receptor (CAR), and gene editing. Our team of experts understand key considerations for therapeutic design and process development and can utilize their know-how to enhance the efficacy, safety, and manufacturability of RNA drugs.

For large-scale manufacturing of RNA therapeutics, check out our CDMO services on page 46.

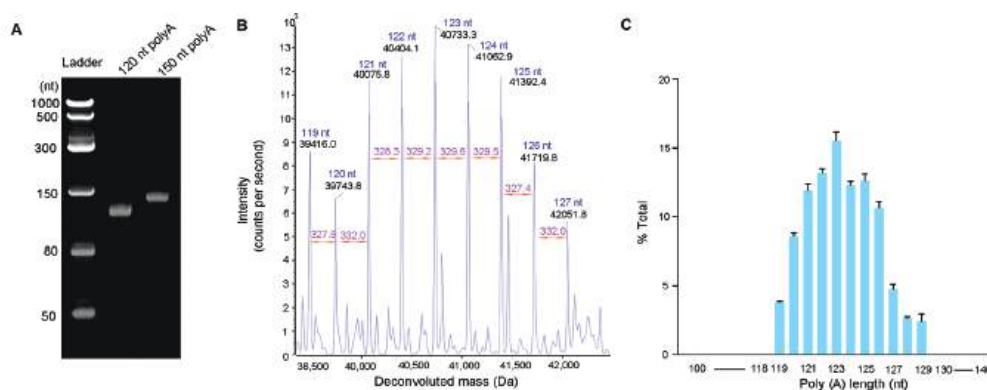
*Detailed information about our CDMO services and descriptions of our mRNA synthesis services, including ordering information, are also available on the VectorBuilder website under **Products & Services**.*



**Figure 1.** Workflow for IVT RNA therapeutic production.

### IVT vector design and cloning

- Proprietary sequence optimization for optimal expression
- Robust cloning and transcription of 120 nt (and longer) polyA tail
- Codon optimization support through literature-based, computational, and experimental approaches



**Figure 2.** PolyA tail size analysis. (A) Isolated polyA tails analyzed by Urea-PAGE gel electrophoresis and (B) LC-MS, with an expected size of 120 nt. (C) Size distribution of polyA tails with an expected size of 120 nt.

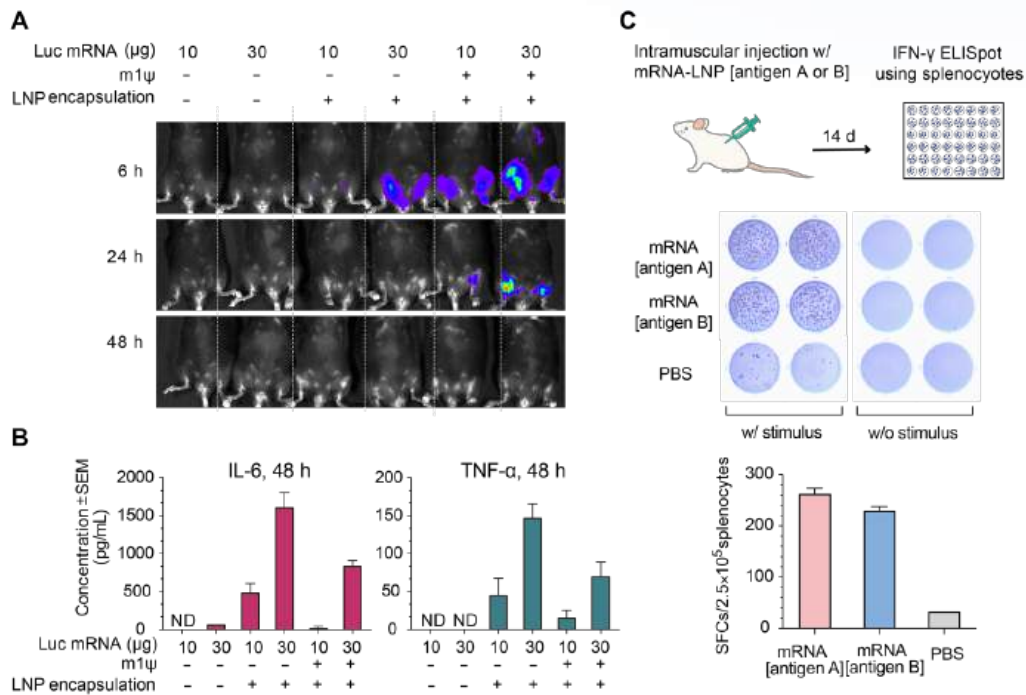
### IVT RNA production and & lipid nanoparticle (LNP) encapsulation

- As fast as 5 weeks from vector cloning to LNP encapsulation
- Synthesis of up to 10,000 nt mRNA and self-amplifying RNA from ug to g scales
- High capping efficiency (up to 99%) by co-transcriptional or enzymatic methods
- Proprietary purification process to efficiently remove impurities
- High-quality mRNA-LNP encapsulation at mg scale
- Various modified nucleotide options: m<sup>1</sup>Ψ, m<sup>5</sup>C, 5mU, etc.
- Comprehensive QC panel and LNP profiling
- Cell-free production of IVT template DNA for efficient large-scale IVT RNA manufacturing available

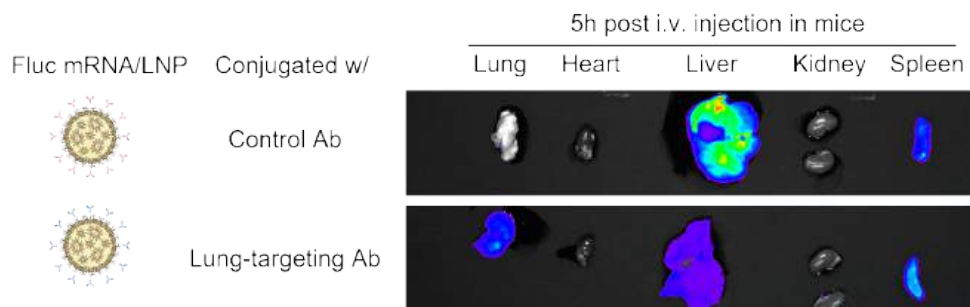
### Functional validation

We can help you with functional studies to optimize your IVT RNA design for therapeutic purposes, including:

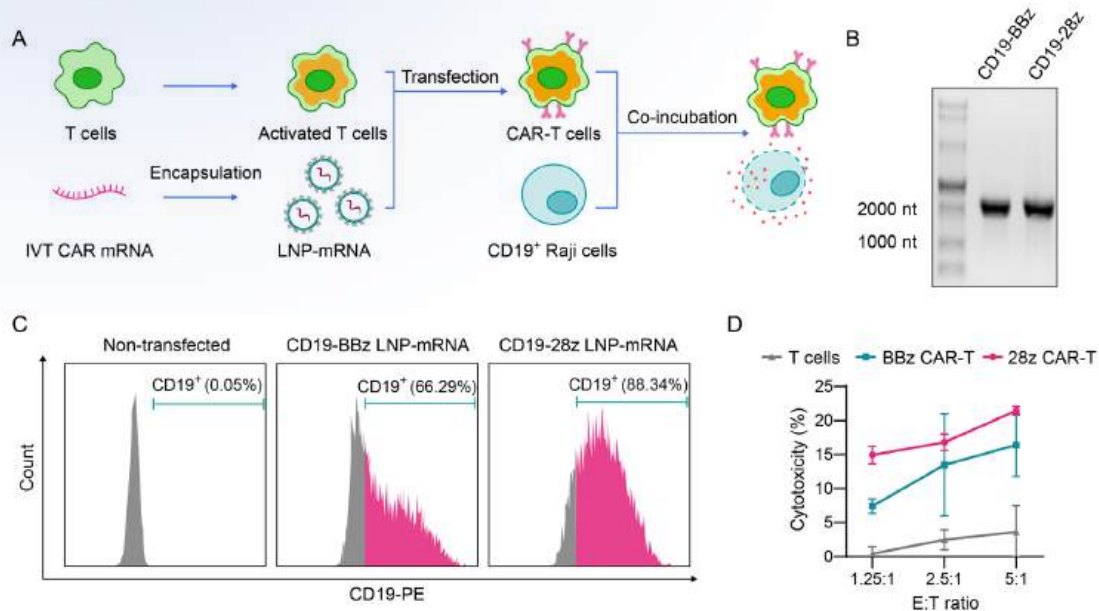
- Assessing sequence optimization of various vector components (UTR, coding sequence, polyA, Kozak, etc.) in vitro and in vivo
- Testing for various applications, such as antigen presentation, antibody expression, CAR expression, and CRISPR
- Assessing efficacy and safety using animal models including rodents and non-human primates



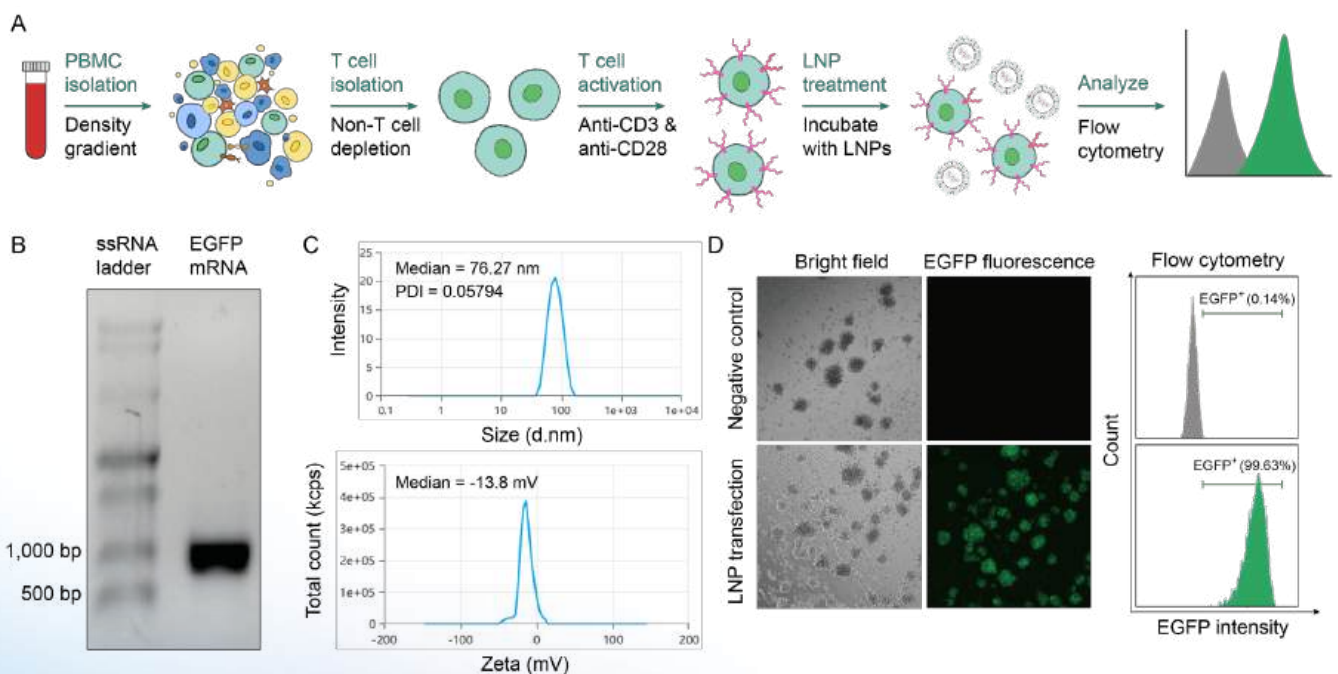
**Figure 3.** Expression of luciferase (Luc) mRNA and induced immune response in mice. (A) Luciferase activity visualized by live imaging post intramuscular injection. (B) Pro-inflammatory cytokines quantified in the serum. (C) IFN-γ ELISpot assay of splenocytes following injection of LNP-encapsulated mRNA coding for viral antigen A, viral antigen B, or PBS.



**Figure 4.** Anti-CD31 conjugated firefly luciferase (FLuc) LNP-mRNA showed improved luciferase expression in lung following injection into tail vein.



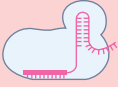
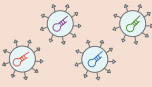

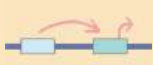

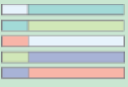
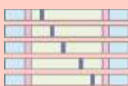
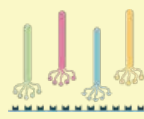
**Figure 5.** Human CAR-T cells generated using VectorBuilder's LNP-mRNA exhibited cytotoxicity against CD19+ cells. (A) Primary human T cells were transfected with lipid nanoparticle (LNP) encapsulated anti-CD19 CAR mRNA. The killing function of the CAR-T cells was validated by co-incubation with CD19+ Raji cells and measuring the released lactate dehydrogenase (LDH). (B) Two IVT mRNAs coding anti-CD19 CAR with different co-stimulatory domains, 4-1BB (CD19-BBz, 1949 nt) or CD28 (CD19-28z, 1931 nt), were encapsulated in LNPs. (C) Activated human T cells were transfected with the corresponding LNP-mRNA and validated for CD19 CAR expression. (D) T cell-induced cytotoxicity was measured by LDH assay 18 hours after co-incubation of CAR-T cells with Raji cells at various effector-to-target (E:T) ratios.



**Figure 6.** Highly efficient human T cell transfection using EGFP LNP-mRNA. (A) Activated T cells were transfected with LNP-encapsulated EGFP mRNA at 6  $\mu$ g mRNA per  $1 \times 10^6$  cells. (B) Denaturing agarose gel electrophoresis confirmed the correct length and integrity of the EGFP mRNA before encapsulation. (C) The particle size and Zeta potential of the LNPs were measured before T cell transfection. (D) EGFP expression was imaged and analyzed 24 hours post-transfection using fluorescence microscopy and flow cytometry.

# Library Screening

## Libraries Offered

<p><b>CRISPR Library</b></p>  <ul style="list-style-type: none"> <li>• Various CRISPR technologies</li> <li>• &gt;98% coverage of designed gRNAs</li> </ul>	<p><b>shRNA Library</b></p>  <ul style="list-style-type: none"> <li>• Wide range of complexity</li> <li>• &gt;98% coverage of designed shRNAs</li> </ul>	<p><b>ORF Library</b></p>  <ul style="list-style-type: none"> <li>• &gt;16,000 validated human ORFs</li> <li>• Multiple categories and pathways</li> </ul>
<p><b>Enhancer/ Promoter Library</b></p>  <ul style="list-style-type: none"> <li>• High signal-to-noise ratio</li> <li>• Incorporation of barcode and reporter</li> </ul>	<p><b>AAV Capsid Library</b></p>  <ul style="list-style-type: none"> <li>• High complexity</li> <li>• In vivo screening including NHP</li> </ul>	<p><b>Barcode Library</b></p>  <ul style="list-style-type: none"> <li>• &gt;10<sup>8</sup> diversity</li> <li>• High uniformity and unbiased nucleotide distribution</li> </ul>
<p><b>Mutation Library</b></p>  <ul style="list-style-type: none"> <li>• &gt;10<sup>8</sup> complexity</li> <li>• Diverse approaches</li> </ul>		<p><b>Phage Display Library</b></p>  <ul style="list-style-type: none"> <li>• 10<sup>9</sup> -10<sup>10</sup> complexity</li> <li>• Synthetic and native phage display libraries</li> </ul>

VectorBuilder is your full-service platform for library construction and screening services, streamlining your research from start to finish. Our team of experts is dedicated to assisting you in experimental design, creating high-quality libraries, and performing screening services that are tailored to your specific research goals.

Detailed descriptions of our pooled library services, including ordering information, are available on the VectorBuilder website under **Products & Services**.

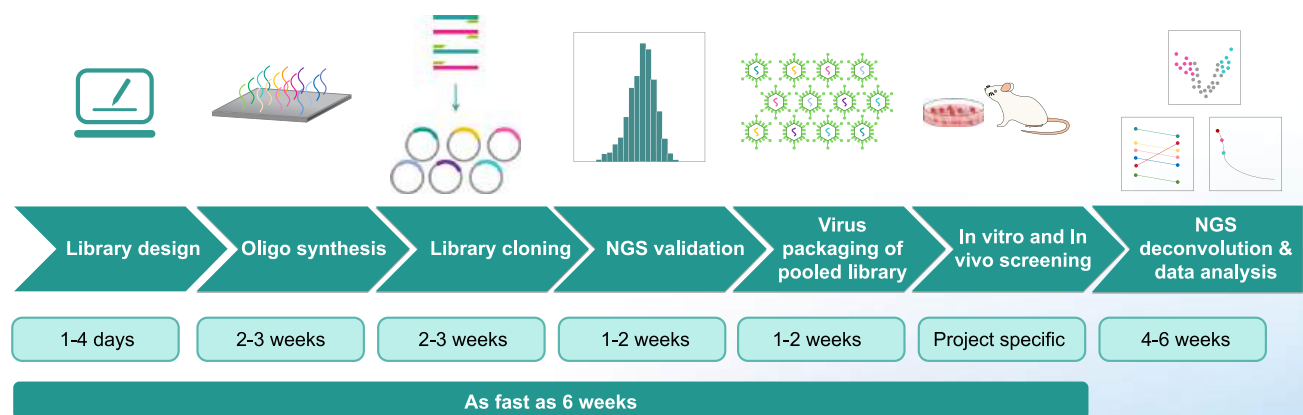


Figure 1. Workflow for library construction and screening.

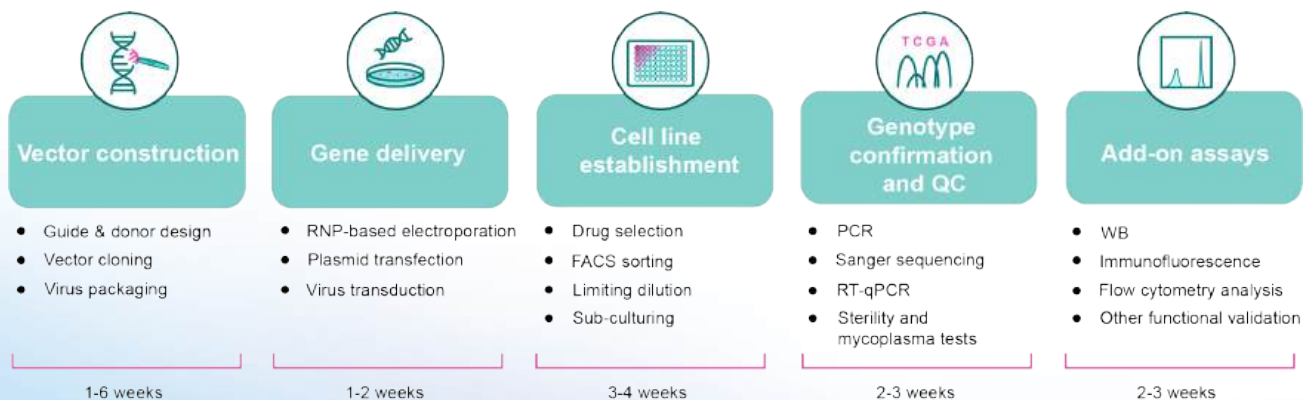
### Price and turnaround

Service	Brief description	Price	Turnaround
<b>Library design</b>	Library vector backbone design for CRISPR, RNAi, barcode, enhancer/promoter, mutation, AAV capsid, and more pooled libraries, and gRNA or shRNA sequence design for your target genes/regions.	Free	1-4 days
<b>Pooled library cloning (including oligo synthesis and NGS validation)</b>	Massive parallel cloning of DNA variants into desired vector backbone, followed by preliminary QC by Sanger sequencing and full QC by NGS. The default deliverable is E. coli glycerol stock.	From \$2,300	5-8 weeks
<b>Virus packaging of pooled library</b>	Please see "Virus Packaging" on page 18. The price for packaging library is 1.5-fold of the price for packaging single vector.		
<b>Pooled screening of library samples</b>	In vitro or in vivo screening of your libraries. Includes cell viability screening, drug resistance screening, pathway screening, reporter screens, phenotypic screening, target-based screening, toxicity screening, and custom screenings.	Please inquire	
<b>NGS deconvolution of post-screening sample</b>	Includes NGS library preparation from genomic DNA of screened cells, Illumina sequencing (>500x coverage), and data analysis.	From \$320 per sample	3-5 weeks

## Stable Cell Line Engineering

VectorBuilder offers cell line engineering services ensuring fast and efficient production of cells with precise genome targeting, from design to thorough QC assays. Your cells can be delivered in as little as 6 weeks starting at \$2,999. All cells are guaranteed to have desired genotypes, be contaminant-free, and authenticated according to ATCC standards.

*Detailed descriptions of our stable cell line generation services, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

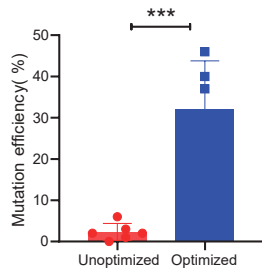


**Figure 1.** Workflow for Stable Cell Line Engineering.

## CRISPR Gene Editing

### Point mutation

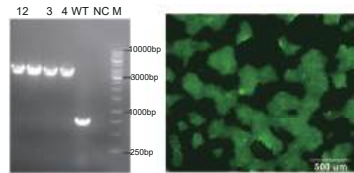
- HDR efficiency up to 50%
- Effective and safe non-viral delivery
- Homozygous clones delivered in **12-18 weeks from \$7,999**



Increased HDR efficiency is achieved through optimized donor design and delivery approach.

### Gene knockin

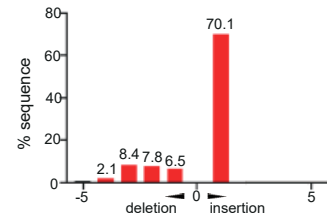
- 30-50% HDR rate for most cells
- Efficient knockin of large fragment
- Heterozygous clones delivered in **14-20 weeks from \$7,999**



Knockin of 2.4 kb GFP expression cassette into iPSCs.

### Gene knockout

- Expert gene targeting design
- Homozygous clones delivered in **6-12 weeks from \$3,999**

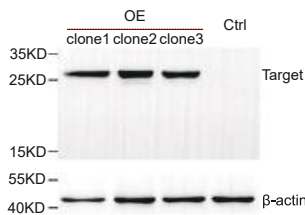


Efficient mutations generated around CRISPR target site in Huh-7 cells.

## Gene Overexpression and Knockdown

### Overexpression

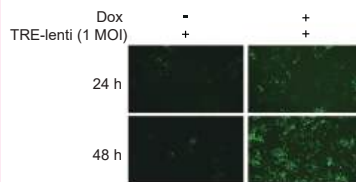
- Robust and stable expression of GOI via lentiviral transduction
- Mixed pool or single clones delivered in as fast as **8 weeks from \$2,999**



Western Blot exhibits protein expression of GOI in Caco-2 cells

### Tet inducible gene expression

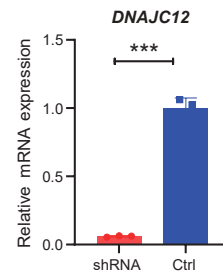
- Minimized leaky expression and high induction achieved by optimized vector design
- Mixed pool or single clones delivered in as fast as **8 weeks from \$3,999**



Doxycycline-induced EGFP expression in tTS/rtTA-expressing 293T cells.

### Gene knockdown

- Knockdown achieved by 3 different shRNAs and cells with most efficient knockdown delivered
- Mixed pool or single clones delivered in as fast as **8 weeks from \$3,999**



90.9% knockdown efficiency for the GOI in Hep-G2 cells.

### Price and turnaround

Service type	Deliverable	Price	Turnaround
Gene knockin (<3 kb)	One heterozygous single clone (>10 <sup>6</sup> cells/vial, 2 vials)	From \$7,999	14-20 weeks
Gene knockin (>3 kb)	One heterozygous single clone (>10 <sup>6</sup> cells/vial, 2 vials)	From \$10,999	16-24 weeks
Gene knockin	One homozygous single clone (>10 <sup>6</sup> cells/vial, 2 vials)	Please inquire	
Gene knockout (frameshift mutation)	Two homozygous single clones (>10 <sup>6</sup> cells/vial, 2 vials per clone)	From \$3,999	6-12 weeks
Gene knockout (deletion mutation)	One homozygous single clone (>10 <sup>6</sup> cells/vial, 2 vials)	From \$5,999	6-12 weeks
Point mutation	One homozygous single clone (>10 <sup>6</sup> cells/vial, 2 vials)	From \$7,999	12-18 weeks
Gene overexpression	Mixed pool (>10 <sup>6</sup> cells/vial, 2 vials)	From \$2,999	8-11 weeks
	Two single clones (>10 <sup>6</sup> cells/vial, 2 vials per clone)	From \$3,999	13-16 weeks
Gene knockdown	Mixed pool (>10 <sup>6</sup> cells/vial, 2 vials)	From \$3,999	8-11 weeks
	Two single clones (>10 <sup>6</sup> cells/vial, 2 vials per clone)	From \$4,499	13-16 weeks
Tet-inducible gene expression	Mixed pool (>10 <sup>6</sup> cells/vial, 2 vials)	From \$3,999	8-11 weeks
	Two single clones (>10 <sup>6</sup> cells/vial, 2 vials per clone)	From \$4,499	13-16 weeks

## Antibody Discovery

VectorBuilder offers a full spectrum of solutions for discovering and developing monoclonal antibodies with therapeutic applications. Our end-to-end antibody discovery services offer the flexibility of choosing from a variety of animal platforms, immunization strategies, and screening methodologies, including our proprietary single-cell technology.

*Detailed descriptions of our antibody discovery services, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

Phage Display



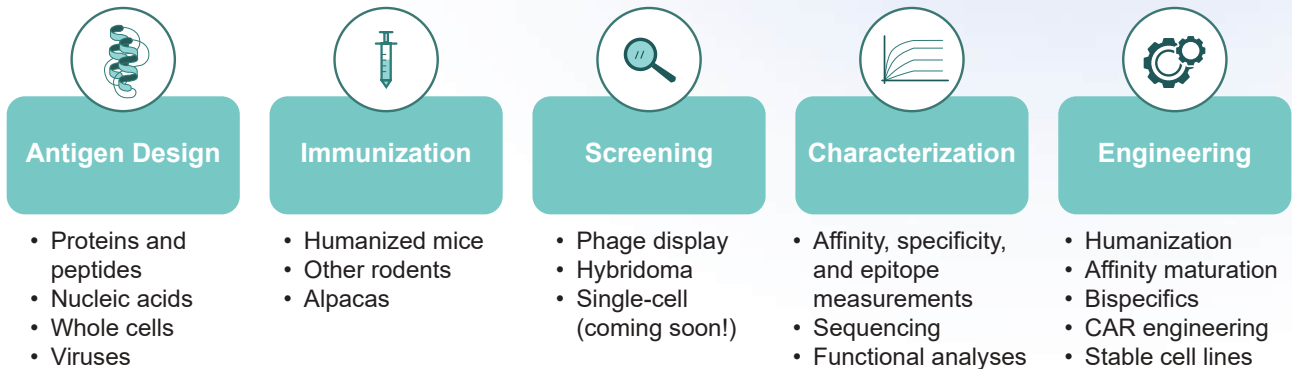
Hybridoma



Proprietary Single-Cell Technology

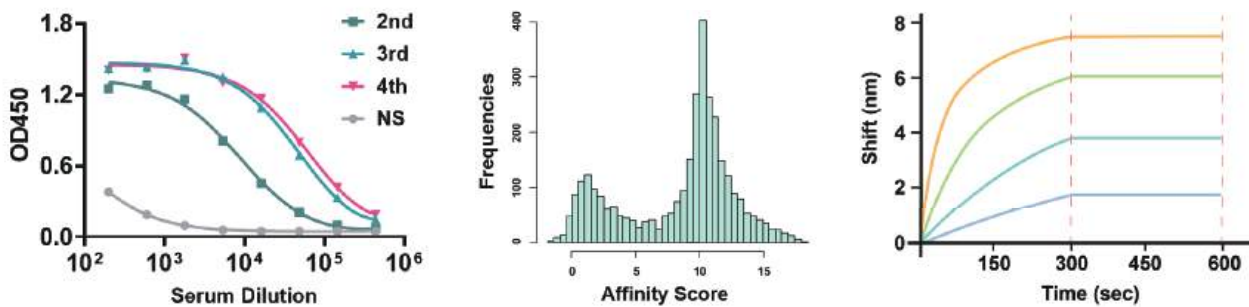
*(Coming soon)*





## Phage Display

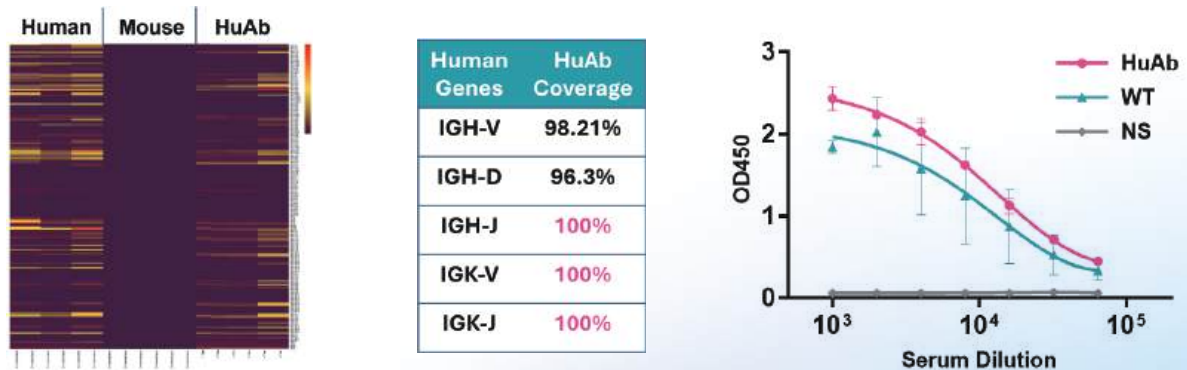
Ultra high-throughput, unbiased solutions for discovering native VHH antibodies



**Figure 1.** Following successful immunization in the alpaca, antibodies were discovered through our proprietary sequence-guided workflow, and their exceptional affinity was confirmed by biolayer-interferometry (BLI).

## Hybridoma

In vivo generation of human antibodies using cutting-edge humanized mice



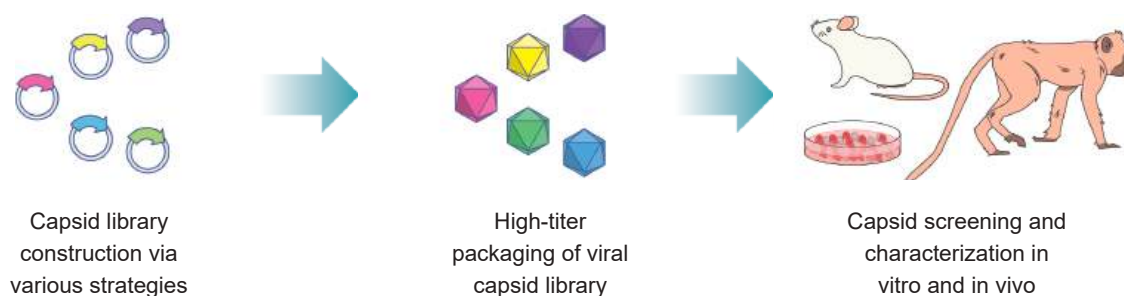
**Figure 2.** Our fully immunocompetent HuAb humanized mouse platform captures the depth and diversity of the human antibody repertoire, enabling efficient hybridoma-based discovery.

## AAV Capsid Evolution

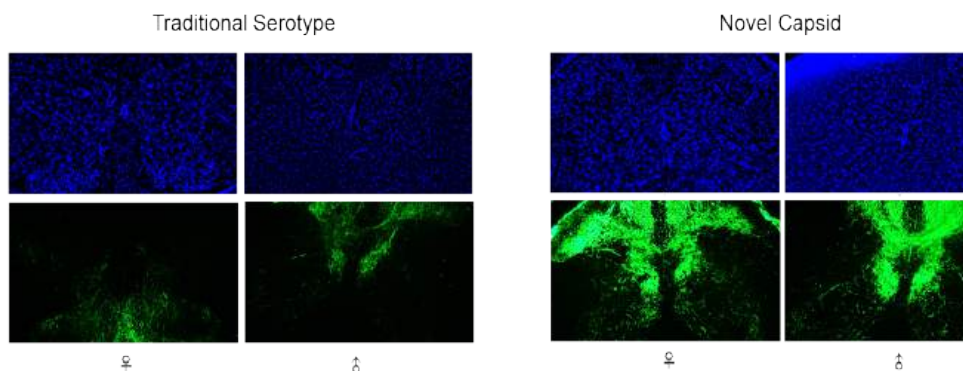
Recombinant adeno-associated virus (AAV) is a highly popular gene delivery vector for a wide range of gene therapy and vaccine applications, thanks to its broad tropism, prolonged transgene expression, non-pathogenicity, and low immunogenicity.

Although many AAV serotypes exist, they may not be optimal in terms of tissue targeting capabilities, gene delivery efficiency, specificity, ability to evade host neutralizing antibodies and manufacturability.

To overcome these limitations, VectorBuilder offers an AAV capsid evolution service to generate novel AAV variants with improved features. Utilizing directed evolution, a process which mimics natural selection, wildtype AAV capsid genes are mutated to generate highly diverse AAV capsid libraries, which are then screened to identify novel capsid variants with improved properties.



**Figure 1.** Our capabilities for developing novel AAVs by directed evolution of AAV capsids.

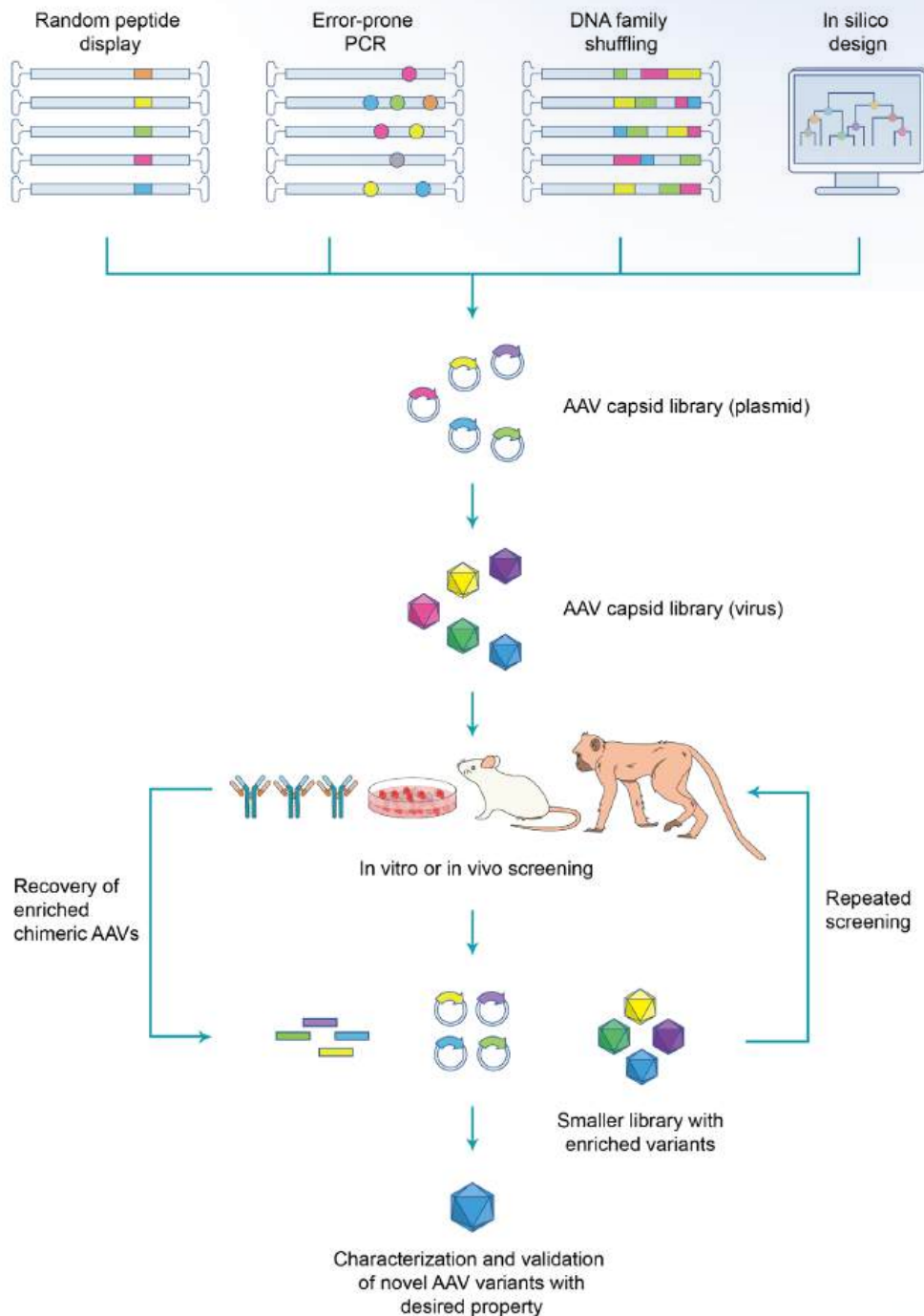


**Figure 2.** Optimization of vector delivery shells through AAV capsid evolution. Comparison of transgene delivery (CMV>EGFP) to mouse cervical spine from a traditional AAV serotype and a novel AAV serotype.

### Highlights

- Full-service platform to fulfill all your needs along the workflow of generating highly diverse AAV capsid libraries
- High-complexity capsid library construction via any mutagenesis or combinatorial approach, including error-prone PCR, random peptide display, DNA family shuffling, and in silico design
- High-titer packaging of viral capsid library by either one-step or two-step approach
- In vivo screening in multiple species, including mice, rats, and NHPs
- Full technical support covering every aspect of your AAV capsid project from library design and construction to in vivo screening and NGS analysis

*Detailed descriptions of our AAV capsid evolution services are available on the VectorBuilder website under **Products & Services**.*



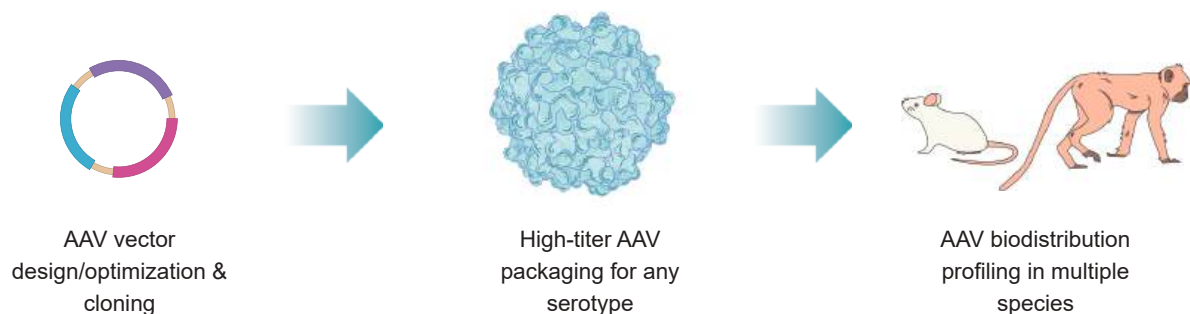
**Figure 3.** Typical workflow for screening novel AAV capsids by directed evolution. Generation of a highly diverse capsid library with plasmids carrying a rep gene and a capsid gene variant generated using various approaches, including error-prone PCR, random peptide display, DNA family shuffling, or in silico design. The capsid library is then packaged into viral particles and undergoes multiple rounds of screening to enrich for high-confidence hits. These are then validated and characterized to identify novel AAV capsid variants with enhanced properties.

## AAV Biodistribution Profiling

Assessing the distribution and persistence of AAV vectors in various body tissues and organs at the developmental and preclinical stages is critical to ensure the success of AAV-based gene therapy. AAV biodistribution studies have been highly instrumental in identifying off-target effects, thereby playing a significant role in the safety assessment of AAV vectors.

VectorBuilder offers the most comprehensive AAV biodistribution studies in the industry to help you obtain high-resolution data in the most appropriate species, including NHPs.

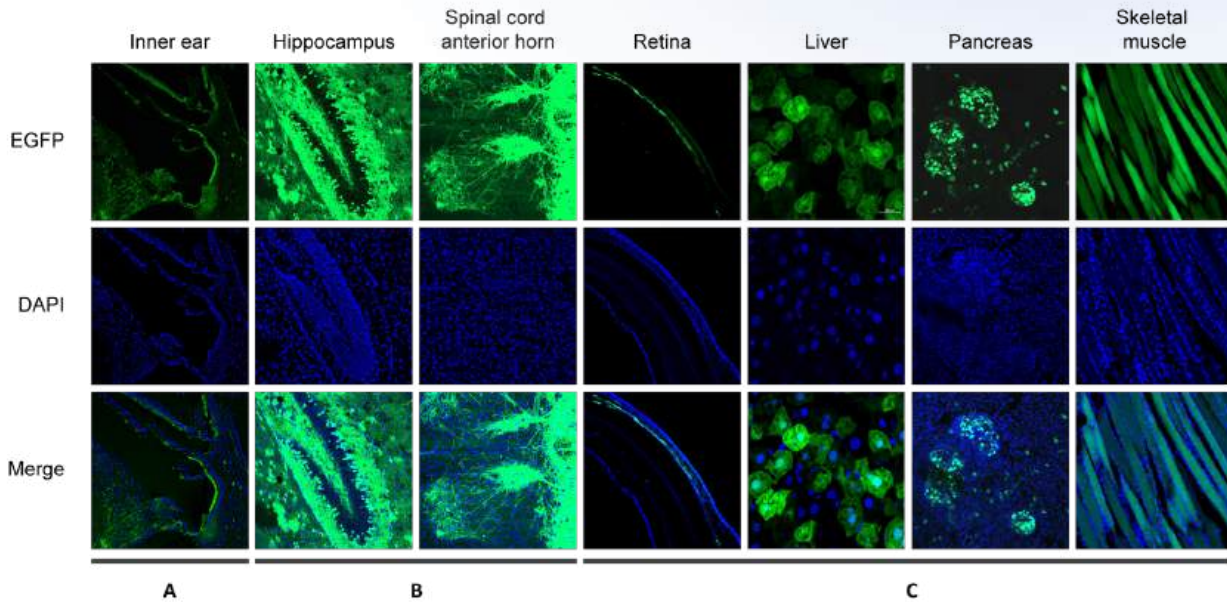
*Detailed descriptions of our AAV biodistribution profiling services are available on the VectorBuilder website under **Products & Services**.*



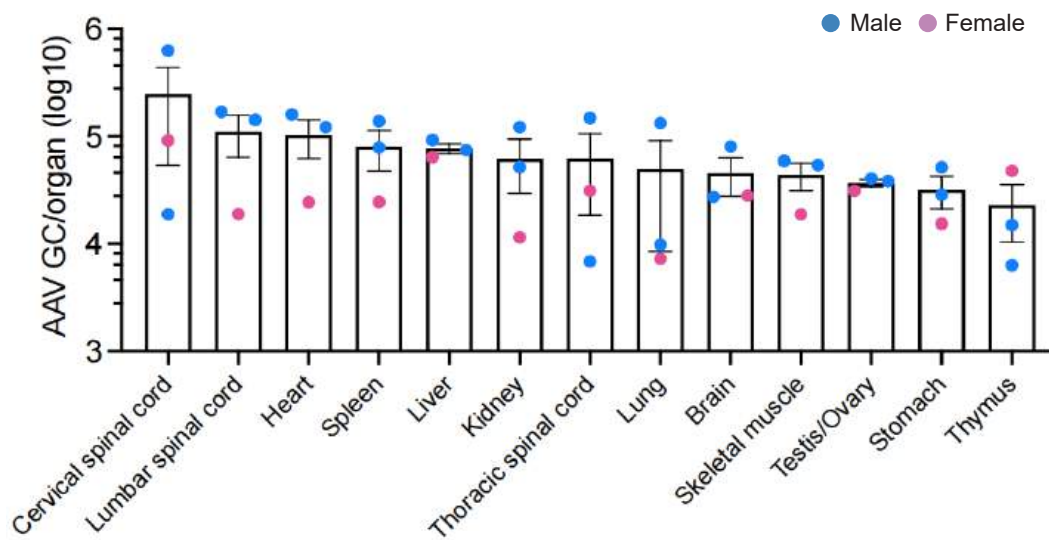
**Figure 1.** Our capabilities for performing biodistribution profiling studies of AAV vectors.

### Highlights

- Full-service platform to fulfill all your needs along the workflow of biodistribution assessment for your AAV vectors
- Services available for multiple species, including mice, rats, and NHPs
- Multiple analytical assays, including fluorescence imaging, flow cytometry analysis, luciferase assay, qPCR, and RT-qPCR
- Multiplexing analysis using barcode and NGS for assessing the biodistribution of different vectors within the same animal
- Multiple routes of AAV administration by highly trained experts, including tail vein injection, facial vein injection (for neonatal mice and rats), intracerebroventricular injection, intrathecal injection, subretinal injection, intravitreal injection, intratympanic injection, and intramuscular injection
- Full technical support that covers every aspect of your AAV biodistribution project



**Figure 2.** AAV9 biodistribution profiling. AAV9 carrying CAG promoter driving EGFP was administered to mice using various injection methods and analyzed in the following organs: (A) inner ear, (B) hippocampus and spinal cord anterior horn, (C) retina, liver, pancreas, and skeletal muscle.



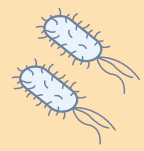
**Figure 3.** Recombinant AAV9 particles ( $\sim 1.5 \times 10^{10}$  GC/mouse) were intravenously administered to three neonatal mice within 48 h of birth. AAV9 biodistribution in several organs was quantified using qPCR six weeks after the injection.

# Recombinant Protein Expression

## Recombinant Protein Expression Systems


**Bacteria**  
 Delivery in 4-8 weeks from \$2,099

- Low cost, high yield
- Versatile and scalable
- Multiple optimized backbones and strains available




**Mammalian Cells**  
 Delivery in 4-6 weeks from \$1,960

- Inherent eukaryotic PTMs
- Transient or stable expression




**Insect Cells**  
 Delivery in 8-10 weeks from \$2,560

- Highly scalable
- Inherent eukaryotic PTMs
- Multiple insect cell lines available



**Cell-Free System**  
 Delivery in ~1 week

- High level of control
- Rapid and high throughput
- Adaptable for difficult antibody fragments



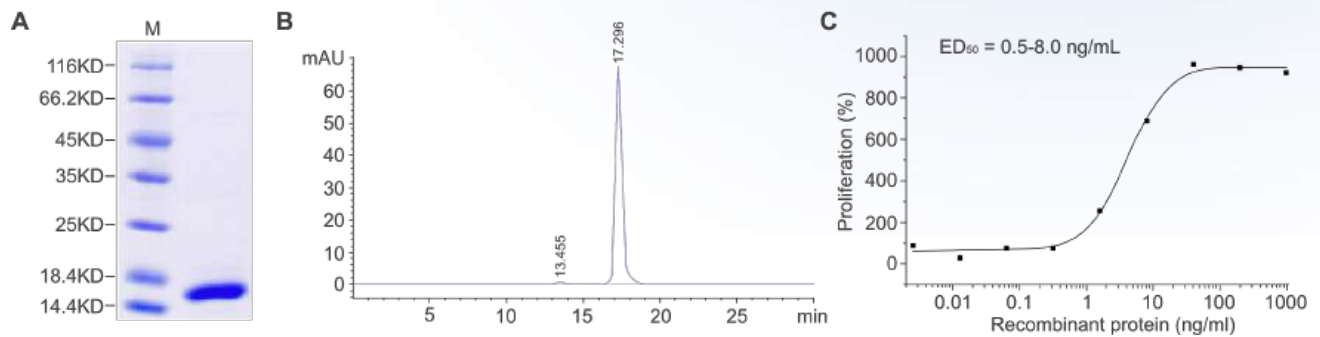

**Figure 1.** Workflow for recombinant protein production.

Default QC services	Method
Validation of protein expression vector	Restriction digestion analysis
	Sanger sequencing
Protein concentration and purity measurement	A260/280 measurement
	SDS-PAGE

**Table 1.** Overview of default QC methods available.

Additional QC services	Method
Endotoxin test	LAL
Protein characterization	Western Blot
	Intact MS (reduced)
	SEC-HPLC
	SEC-MALS
	Protein N-terminal sequencing
Host cell protein test	Host cell protein test
Tag removal	Protease digestion
Kinetics and affinity analysis	Octet
	Biacore

**Table 2.** Overview of additional QC methods available.



**Figure 2.** Characterization of a recombinant protein produced with *E. coli*. (A) SDS-PAGE analysis shows the molecular mass of the recombinant protein, with (B)  $\geq 95\%$  purity determined by SEC-HPLC. (C) The biological activity of the recombinant protein was measured by a cell proliferation assay.

### Price and turnaround

Service module	Brief description	Deliverables	Price	Turnaround
<b>Vector design and cloning</b>	Vector design includes fusion partner selection, purification tag selection, and codon optimization. This is followed by gene synthesis and cloning into the bacterial recombinant protein expression vector, such as the pET.	<i>E. coli</i> glycerol stock	From \$139	5-10 days
<b>Expression evaluation and condition optimization</b>	The expression vector is transformed into the appropriate host strain, such as BL21 (DE3). A small-batch evaluation will be conducted with various conditions, and the expression and solubility of the target protein will be assessed.	Expression evaluation report	From \$600	1-2 weeks
<b>Pilot-scale expression and purification</b>	Based on the evaluation from the last step, 0.5-1 mg of purified target proteins can be produced if feasible, and quality control (QC) will be performed.	<ul style="list-style-type: none"> <li>0.5-1 mg purified proteins (if feasible)</li> <li>COA</li> </ul>	From \$1,200	2-4 weeks
<b>Production-scale expression and purification</b>	Scaled up production of >100 mg of purified proteins.	<ul style="list-style-type: none"> <li>Up to 100+ mg purified proteins</li> <li>COA</li> </ul>	Please inquire	

## Bacterial Genome Editing

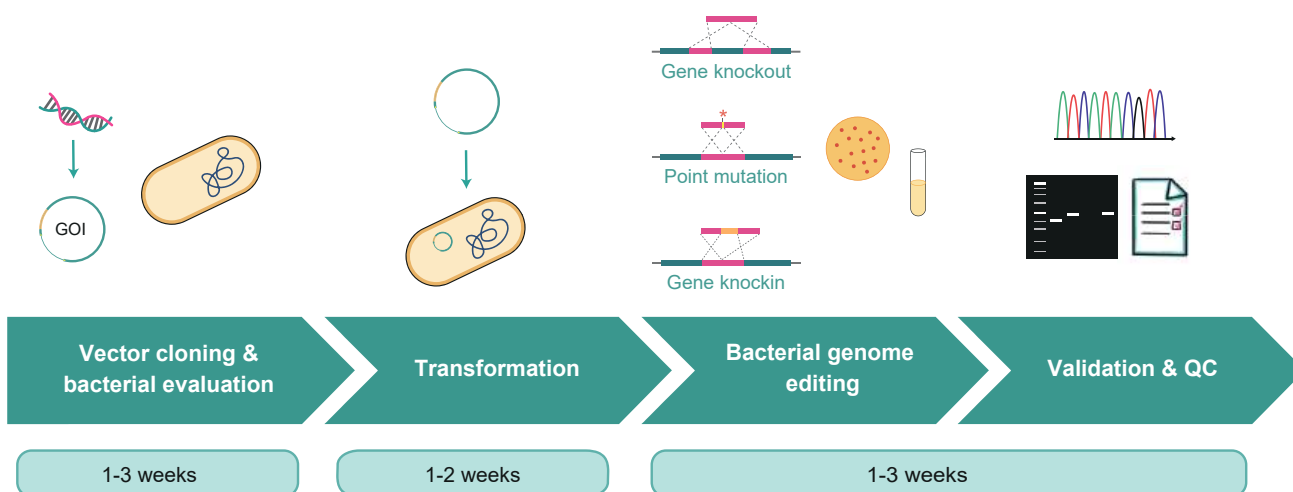
Bacterial genome editing enables precise modifications to study and manipulate physiological or metabolic traits. VectorBuilder's bacterial genome editing service provides a comprehensive solution, from custom strategy design to the delivery of sequence-guaranteed bacteria. Our expertise includes generating deletions, insertions, and targeted

mutations, ensuring efficient and reliable bacterial genome modification tailored to your research needs.

*Detailed descriptions of our bacterial genome editing services, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

### Highlights

- One-stop solution covering everything from strategy design to strain engineering and validation.
- Multiple editing strategies to support different research needs in both Gram-positive and Gram-negative bacteria.
- Tailor-made services designed to accelerate research timelines and enhance results.

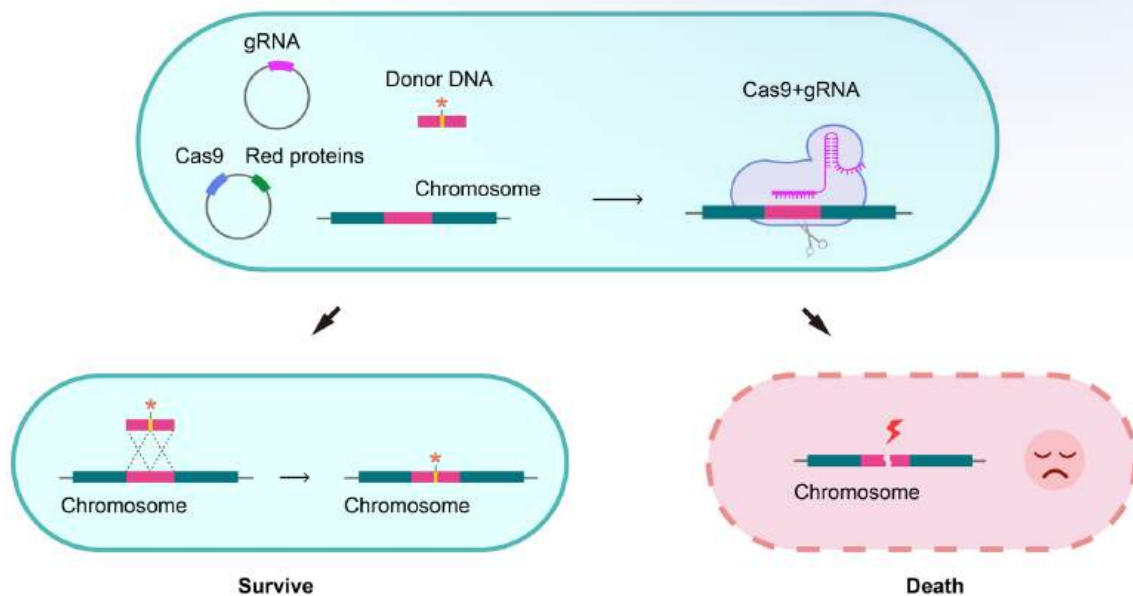


**Figure 1.** Typical workflow of genome engineering in bacteria.

### Price and turnaround

Service module	Brief description	Price	Turnaround
Vector design and cloning	VectorBuilder's highly experienced scientists will support you with optimized design, incorporating essential components into the appropriate plasmid backbone.	From \$499	2-3 weeks
Bacterial evaluation	The target strain is evaluated for key parameters, including growth conditions, transformation efficiency, sequence verification, and other relevant factors.	Free	1 week
Engineered strain generation*	Plasmids are introduced into the target bacteria, which are then cultured under specific conditions to enable genome editing. Colonies with the desired modification are subsequently selected and validated.	From \$3,500	2-5 weeks

\* The default deliverables include the engineered strain in glycerol stock. Our standard quality control (QC) includes PCR and Sanger sequencing. Additional QC services are available upon request.



**Figure 2.** Schematic representation of CRISPR editing in bacteria to create point mutations. The plasmid encoding Cas9 and the recombinases is first introduced into bacterial cells, followed by the induction of lambda Red protein expression. Subsequently, the gRNA plasmid and donor DNA are introduced into cells expressing Cas9 and the recombinases. If homologous recombination fails, the DSBs induced by Cas9 result in cell death (right). Alternatively, cells survive only if homologous recombination occurs between the donor DNA and the target genomic sequence, leading to the desired point mutations (left).

## BAC Recombineering

Bacterial artificial chromosomes (BACs) are DNA vectors suitable for cloning and stably maintaining large DNA inserts of up to 300 Kb in *E. coli*. BACs can be genetically manipulated relatively easily and quickly to carry any desired modification using a homologous recombination-based genetic engineering technique known as BAC recombineering.

VectorBuilder offers a variety of BAC modification services, including placing reporters behind regulatory sequences on your BAC, introducing point mutations into genes of interest, transferring regions of the BAC onto

a plasmid, and adding drug-selection or visualization markers to the BAC backbone. All you will need to do is send us a design request describing your experimental goal and we will take care of the rest for you starting from designing your BAC modification strategy and ordering your BAC to generating and validating your final modified BAC clones.

*Detailed descriptions of our BAC recombineering services, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

# GMP Manufacturing for Genetic Medicine



# CDMO Services for GMP Manufacturing

VectorBuilder is a full-service CDMO with extensive expertise in manufacturing GMP-grade gene therapy vectors. We support the full spectrum of vector design, production, and QC needs along the entire gene therapy drug development pipeline. Our highly experienced team has worked with thousands of customers to create research-grade vectors for early discovery, GMP-like vectors for pre-clinical research, and full GMP-grade vectors for clinical applications.

## Services Offered

### Process development

VectorBuilder has a dedicated process development team with extensive experience in developing optimal manufacturing processes for GMP-grade gene therapy vectors. We consider many factors in our process development, including biological properties, quality and safety requirements, production quantity and scalability needs, regulatory requirements in the intended market, as well as the customer's cost and target timeline. Our process development services include **vector optimization as well as upstream and downstream process development.**

### Analytical development

VectorBuilder provides the full range of analytical development services capable of developing, optimizing, qualifying and validating in-process, and release QC assays tailored to individual gene therapy vectors. We also provide drug stability studies to ascertain drug shelf life under various storage and transport conditions.

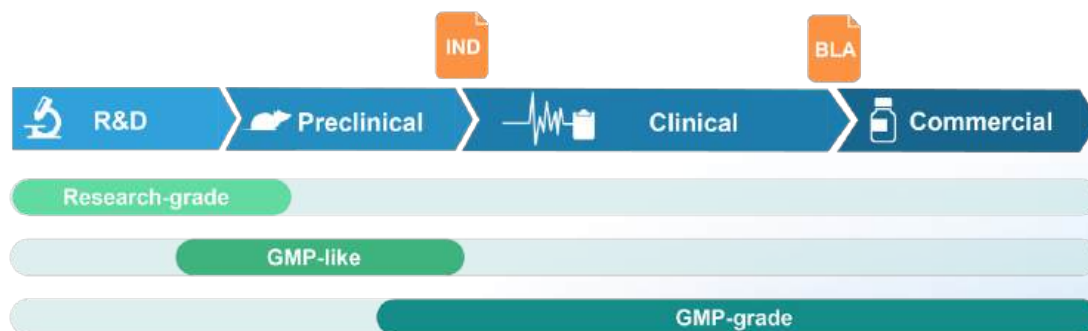
### Plasmid DNA manufacturing

We can manufacture GMP-grade plasmid DNA at various scales, employing antibiotic-free, and animal component-free production methods.

**GMP-like plasmid DNA** is intended for pre-clinical studies such as animal testing of drug safety. Its production adopts key features of GMP guidelines, including comparable production processes and similar quality attributes. Its production is performed in segregated production suites with document control and traceability. Where appropriate, we produce GMP-like plasmids under antibiotic-free, animal component-free, and RNAase-free fermentation and purification conditions.

**GMP-grade plasmid DNA** is produced in our certified GMP suite with strict adherence to GMP guidelines.

We implement a comprehensive quality assurance system throughout the production process. We perform a wide range of in-process and releasing QC assays to ensure that plasmid DNA meets the desired quality and safety standard.



**Figure 1.** Grades of Plasmid DNA Offered.

## Virus manufacturing

We provide viruses of different scales and quality attributes to meet the full range of demands throughout the gene therapy drug development pipeline. We have established and validated platform technology for large-scale GMP manufacturing of AAV and lentivirus. We also have experience producing other types of viral vectors, such as adenovirus, MMLV, HSV, and VSV.

- **AAV:** We package AAV in HEK293 cells under either adherent conditions (Cell Factory or fixed-bed bioreactors) or serum-free suspension conditions (up to 200 L single-use bioreactors). We also package AAV in suspension Sf9 insect cells. We can achieve a scale of up to  $10^{17}$  GC AAV per batch.

- **Lentivirus:** We package lentivirus (2nd and 3rd generation, pseudotyped with VSV-G or other viral surface proteins) in HEK293, under either adherent growth conditions (Cell Factory or fixed-bed bioreactors) or serum-free suspension conditions (up to 200 L single-use bioreactors). We can achieve a scale of up to  $10^{12}$  TU per batch.

## Cell banking

We can generate GMP-grade Master Cell Banks (MCBs) and Working Cell Banks (WCBs) for *E. coli*, mammalian cells, and insect cells derived from either our in-house or customer-provided cell lines.

## Fill/finish

We can perform manual or automated aseptic filling of the DS/DP into glass vials (0.5 to 2 ml) or cryo bags. We have the capacity to complete 3,000+ vials per batch.

## Regulatory support

We can work closely with our customers to provide regulatory support at each critical milestone of their drug development process. These include on-site audit, consultation for regulatory strategies, CMC, and BLA documentation support.

## Technology transfer

We can provide technology transfer with best practices, including a detailed bill of materials, well-documented production processes, and fully qualified analytical methods used in the manufacturing of the gene therapy vector.

## Quality Assurance

Our comprehensive quality system is embedded in every aspect of our GMP manufacturing process, which spans facilities, supplies, production, fill/finish, storage, in-process and release QC, and personnel. Our company culture emphasizes quality, innovation, continuous improvement, and “white-glove” customer service. As such, we consistently meet and exceed customer expectations. We also strive to achieve rapid turnaround and affordable prices while maintaining high quality and full regulatory compliance.

## GMP Facilities

VectorBuilder currently has about 100,000 sq ft of modern GMP facilities with advanced designs and state-of-the-art equipment. All our facilities are designed to meet GMP regulations of US, EU, Japan, China and PIC/S. They are suitable for clinical trial Phase I/II/III manufacturing.

With all the areas combined, our facilities include:

- **10 GMP manufacturing suites:** Designed for plasmid, viral vector and cell line production at various scales, each with independent airflow; Grade A BSC in Grade B/C environment; BSL-2 certified
- **QC laboratories:** Multiple lab suites totaling 9,500 sq ft for a wide range of QC assays
- **Process and analytical development suites:** Multiple GMP suites totaling 8,000 sq ft for PD/pilot runs; Grade A BSC in Grade C environment; BSL-2 certified
- **Fill/finish suites:** Grade A isolator in Grade C environment



10 GMP manufacturing suites



Fill/finish suites



QC laboratories



Process and analytical development suites



GMP warehouse

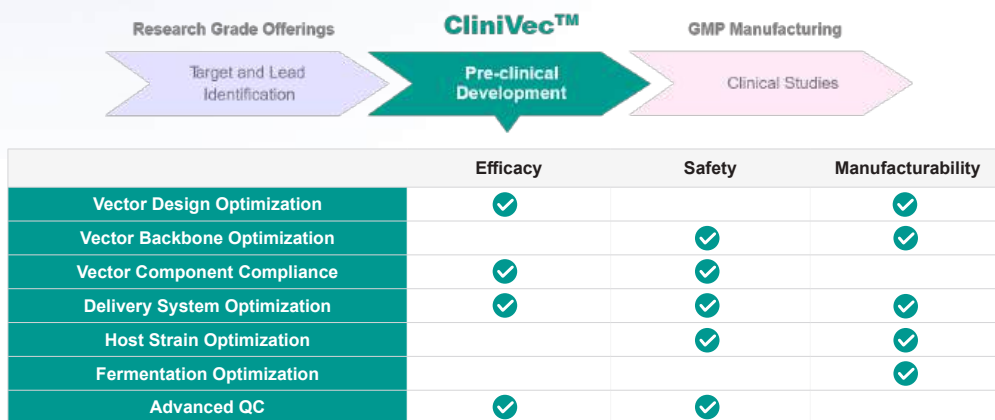


Upcoming expansion

Figure 2. Images of GMP Facilities.

## CliniVec™

VectorBuilder's CliniVec™ program provides researchers with comprehensive solutions, facilitating the smooth transition from research and validation to pre-clinical studies. The dedicated CliniVec™ design team at VectorBuilder focuses on optimizing vector designs specifically for pre-clinical and clinical studies.



### Vector design, crucial for safety and efficacy

Several key considerations are imperative in the design of a safe and efficacious pre-clinical vector, including the vector sequence, the antibiotic selection marker, incorporation of regulatory elements with viral origin, toxicity, and immunogenicity of vector components. VectorBuilder has extensive experience in optimizing each of these factors and more, contributing to improved therapeutic outcomes.

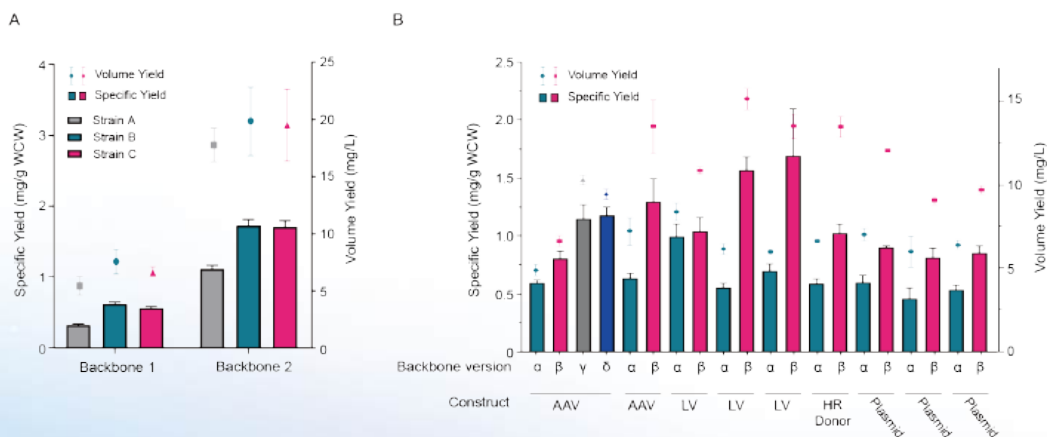
### Manufacturability

Additionally, optimization of yield through backbone design consideration, host strain optimization, and fermentation testing is essential for maximizing the quantity, quality and cost-effectiveness of vector production. We can

provide support by ensuring the scalability of upstream and downstream processes, reproducibility of yield and quality, and regulatory compliance.

### Experts in sequence screening

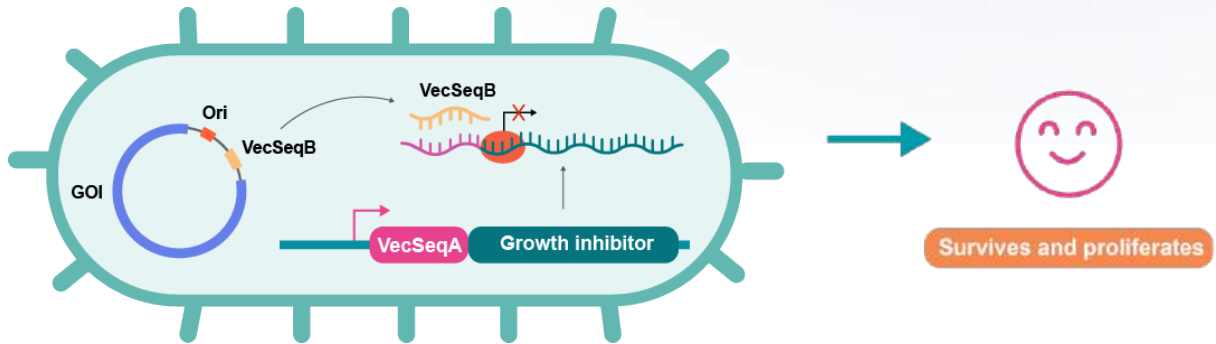
As experts in in vitro and in vivo screening services, VectorBuilder can provide tailored screening solutions, including promoter and coding sequence screening, in addition to screening vector delivery shells. We provide end-to-end screening services from library generation to NGS-sequencing and validation. Elevate the success of your vector development by partnering with the CliniVec™ design team for tailored screening solutions that meet the highest standards of precision and reliability.



**Figure 1.** Yield optimization through backbone and host strain optimization. Vector constructs were cloned into different backbones and subjected to lab scale fermentation to test for specific (bar) and volumetric (dot) yields.

# GMP Products - MiniVec™ Miniaturized Plasmid

VectorBuilder's proprietary MiniVec™ plasmid offers a miniaturized backbone, providing remarkable efficacy, safety, and manufacturability for cell and gene therapies. Compared to traditional plasmids, MiniVec™ plasmids have higher plasmid manufacturing and virus packaging yields, improved transgene expression, and an enhanced safety profile.

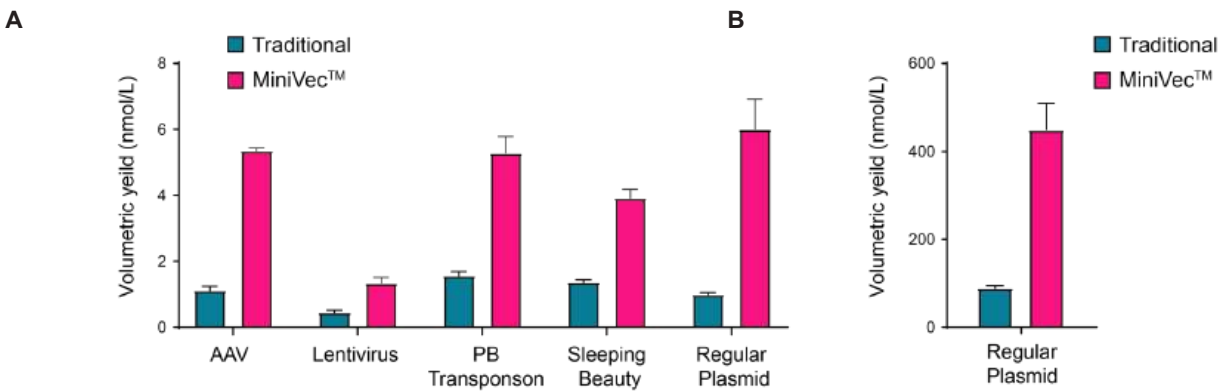


## Highlights

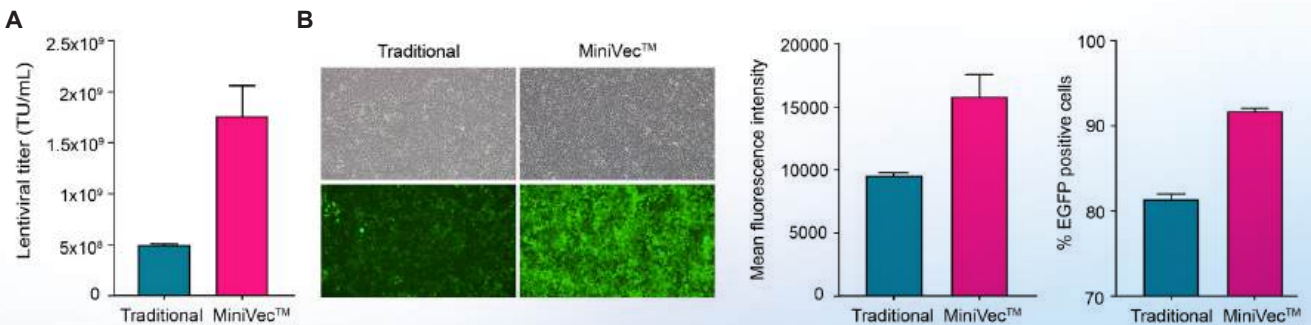
- Antibiotic-free and supplement-free fermentation
- Increased plasmid yields
- Enhanced transgene expression
- Efficient transposon delivery
- Safer source material for virus packaging

## Expression Systems Supported

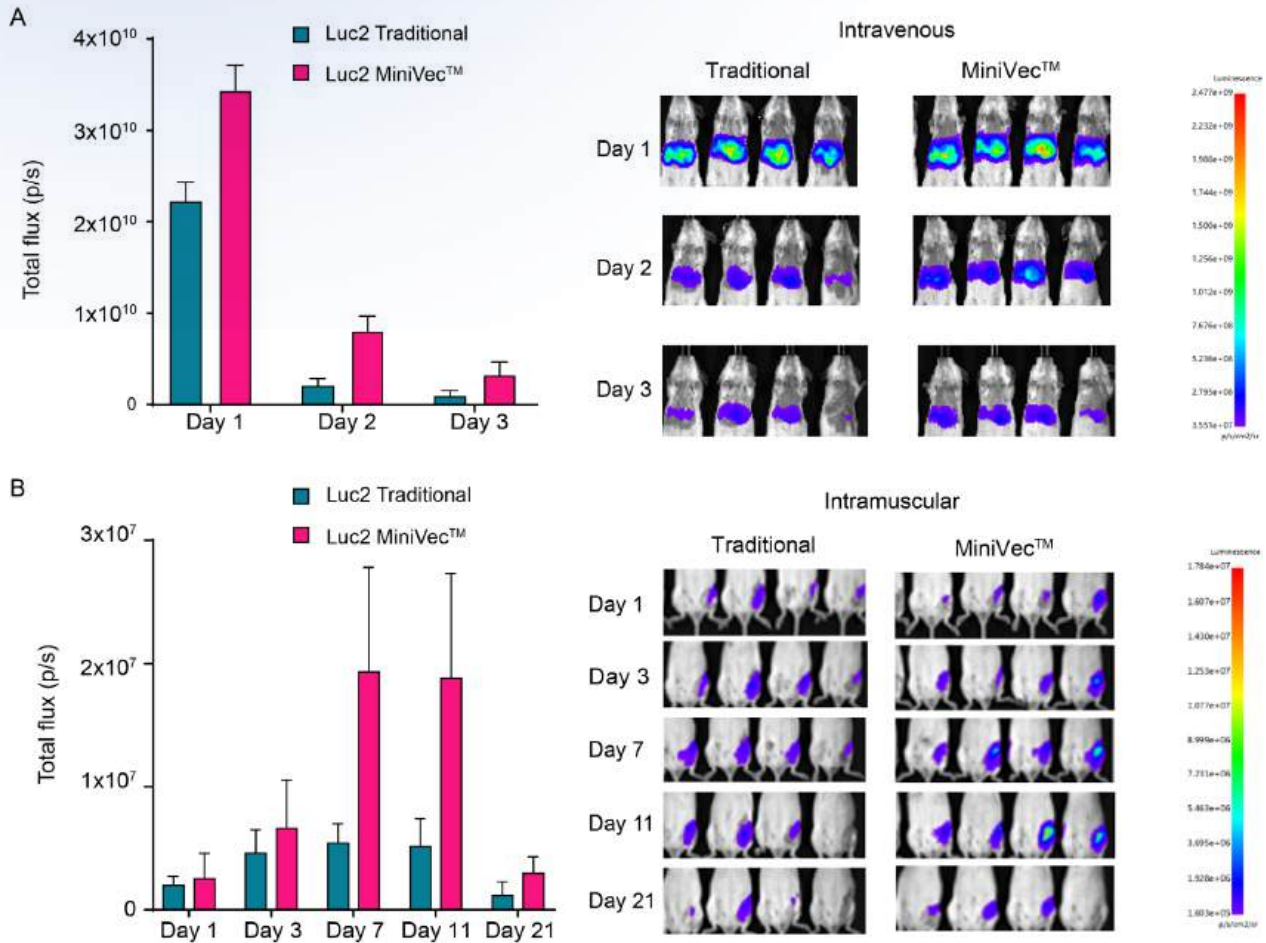
- Regular Plasmid
- Lentivirus
- AAV
- Sleeping Beauty
- PB Transposon



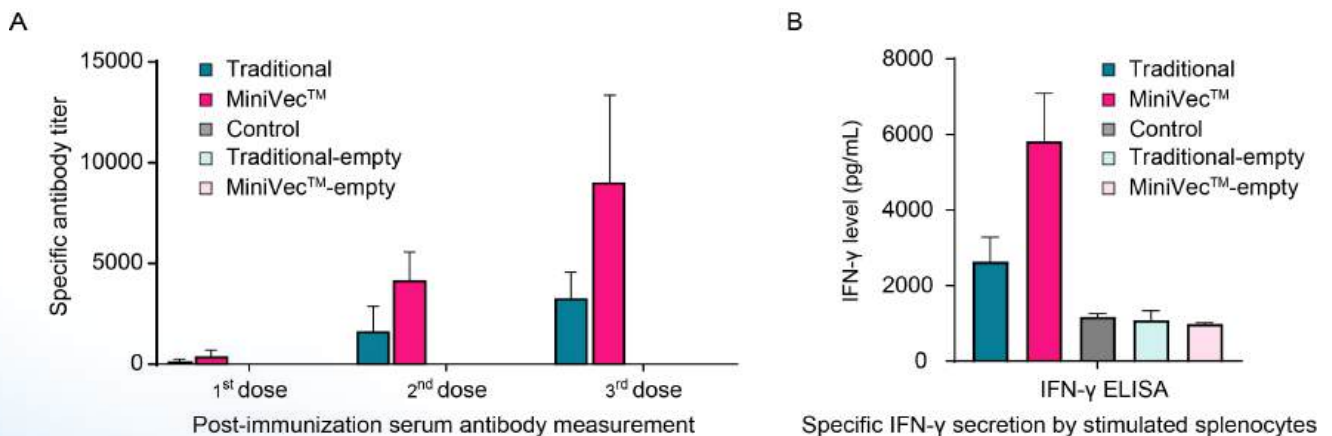
**Figure 1.** MiniVec™ exhibits increased plasmid yields compared to traditional plasmids. Measurement of plasmid yields from (A) lab-scale (200 ml) or (B) industrial-scale (2.7 L) fermentation of *E. coli* cultures under the same conditions transformed with traditional or MiniVec™ plasmids from different expression systems.



**Figure 2.** MiniVec™ exhibits enhanced viral titers and is a safer source material for virus packaging compared to traditional plasmids.



**Figure 3.** Comparison of transgene expression of traditional and MiniVec™ plasmids in vivo. Equimolar plasmids (CAG>Luc2) were administered in mice via (A) intravenous or (B) intramuscular injection. Luciferase expression was measured at the indicated time points.



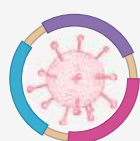
**Figure 4.** Comparison of immune response to naked DNA vaccination between traditional and MiniVec™ plasmids expressing the COVID-19 spike protein. BALB/c mice were injected intramuscularly with equimolar doses of either traditional- or MiniVec™-based vaccines, a negative control (PBS), or vehicle control (empty traditional or MiniVec™ plasmids) 3 times at 2-week intervals. (A) Specific antibody titer was measured in blood drawn from the animals 2 weeks after each injection, before the next immunization. On day 42, splenocytes were harvested and culture supernatant of the splenocytes was used to measure (B) total IFN-γ secretion upon spike protein stimulation.

## GMP Products - Virus Packaging Plasmids

VectorBuilder offers GMP-like and GMP-grade lentivirus and AAV packaging plasmids for the manufacturing of pre-clinical and clinical viral vectors for gene and cell therapies. Produced in our state-of-the-art facilities, each plasmid has been optimized to produce high titers of virus and has undergone thorough quality control.

### Plasmids offered

#### Lentivirus packaging plasmids



VB-VSV-G  
VB-Rev  
VB-Gag/Pol

#### AAV packaging plasmids



VB-AAV-Helper  
VB-AAV2-Rep/Cap  
VB-AAV9-Rep/Cap

### Highlights

- Optimized and validated for high virus yield
- Off-the-shelf plasmids available for immediate use
- Plasmids produced under animal-free and antibiotic-free conditions
- Royalty free
- DMFs available, simplifying FDA IND application
- Kan resistance

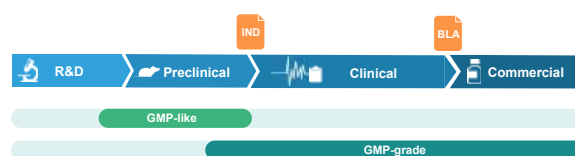


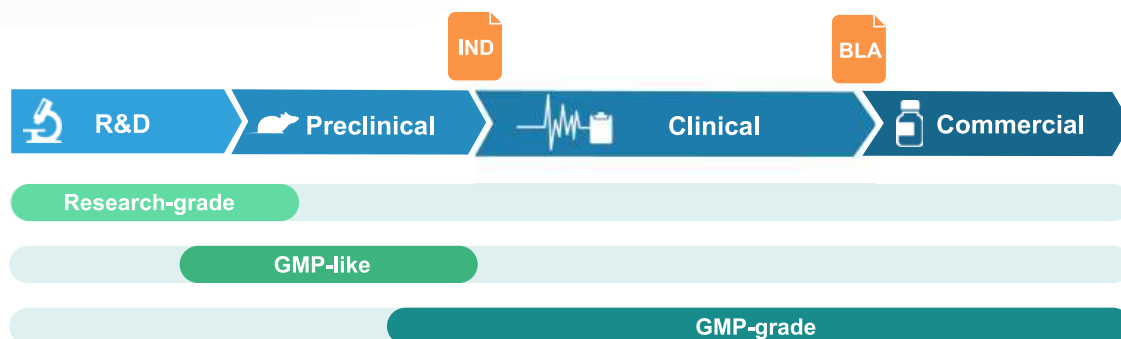
Figure 1. Grades of plasmid DNA offered.

QC	Method	GMP-like	GMP-grade
<b>Plasmid concentration</b>	UV spectrophotometry	≥500 ug/ml	≥500 ug/ml
<b>Restriction digestion</b>	Agarose gel electrophoresis	Identical to expected restriction pattern	Identical to expected restriction pattern
<b>Sanger sequencing</b>	Sanger sequencing of the entire plasmid	Identical to reference sequence	Identical to reference sequence
<b>A260/A280</b>	UV spectrophotometry	1.80-2.00	1.80-2.00
<b>ccc plasmid DNA ratio</b>	EtBr stained agarose gel electrophoresis	≥80%	≥80%
<b>Residual protein</b>	BCA or equivalent	≤2.00%	≤2.00%
<b>Residual RNA</b>	Fluorescence analysis or equivalent	≤5.00%	≤5.00%
<b>Residual host cell DNA</b>	Quantitative PCR or equivalent	Report result	≤5.00%
<b>Endotoxin</b>	Kinetic chromogenic assay	≤50 EU/ml	≤10 EU/ml
<b>Sterility</b>	Direct inoculation	No growth	No growth

Table 1. QC assays and specifications for GMP-like and GMP-grade plasmid.

## GMP IVT RNA and LNP Manufacturing

VectorBuilder offers a full range of CRO and CDMO services for in vitro transcription (IVT) mRNA manufacturing and lipid nanoparticle (LNP) therapeutic development. Relying on our revolutionary vector design platform and extensive experience, we can provide optimal in vitro transcription vector designs, large-scale IVT mRNA manufacturing, and LNP encapsulation followed by thorough quality control tailored to a wide range of research and clinical needs. We offer several grades that cover different downstream needs including drug discovery research and pre-clinical studies.



	Research-grade	GMP-like
<b>Applications</b>	Basic research, drug discovery, and preclinical studies	Preclinical studies such as animal testing of drug safety and metabolism
<b>Production scales</b>	mRNA: 0.1-10 mg LNP: 0.1-3 mg	mRNA: 0.01-5 g LNP: 3-20 mg
<b>Turnaround time</b>	49-71 days • Vector design & cloning: 26-36 days • Plasmid production & linearization: 14-21 days • IVT mRNA production: 14-21 days • LNP encapsulation: 9-14 days	59-90 days • Vector design & cloning: 31-41 days • Plasmid production & linearization: 14-28 days • IVT mRNA production: 14-28 days • LNP encapsulation: 14-21 days
<b>Quality system</b>	ISO9001	ISO9001 while adopting key features of GMP system
<b>Production facility</b>	In parallel production in shared laboratory space	Productions done in segregated suites
<b>Document control and traceability</b>	No	Yes
<b>QC and release</b>	Standard QC	Performed on a case-by-case basis depending on individual project needs
<b>Aseptic fill/ finish</b>	N/A	Available upon request
<b>Storage of retention sample</b>	Available upon request	Available upon request
<b>Other deliverable</b>	COA	1. COA 2. Manufacturing summary 3. TSE/BSE statement upon request

**Table 1.** Comparison of research and GMP-like mRNA-LNP manufacturing.

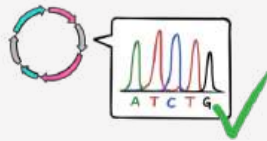
# Off-the-Shelf Products



## Premade Vectors



Large collection of ready-to-ship premade vectors available in viral and non-viral backbones.



Functionally validated vector backbones and components with 100% sequence guarantee.



Downstream services, including plasmid DNA preparation and virus packaging in just a few clicks.

### Premade Vectors

#### Control Vectors

- Fluorescent reporters
- Scramble shRNA
- Non-targeting gRNA
- Negative controls



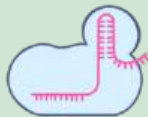
#### Transposon Vectors

- PB transposon
- Sleeping Beauty
- Tol2



#### CRISPR Vectors

- Cas proteins
- Non-targeting gRNA



#### Tet-Inducible Vectors

- Tet-On regulators
- Tet-Off regulator
- Tet-inducible controls
- Tet-inducible Cas9



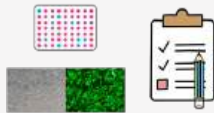
### Most popular premade vectors:

Vector name	Backbone	Application notes	Price
pRP[Exp]-CMV>EGFP	Regular plasmid	Commonly used overexpression control; EGFP expression.	\$189
pRP[Exp]-EGFP/Puro-CAG>PBase	Regular plasmid	Commonly used transposase expression vector; PBase and GFP co-expression.	\$189
pLV[Exp]-EGFP/Puro-EF1A>mCherry	Lentiviral	Commonly used transduction control; EGFP and mCherry co-expression.	\$189
pLV[shRNA]-EGFP/Puro-U6>Scramble_shRNA	Lentiviral	Negative control in shRNA knockdown experiments; EGFP expression.	\$149
pAAV[Exp]-CMV>EGFP:WPRES	AAV	AAV gene delivery control; CMV promoter driving EGFP expression.	\$189
pAAV[Exp]-CAG>EGFP:WPRES	AAV	AAV gene delivery control; CAG promoter driving EGFP expression which may show stronger fluorescence in vivo than CMV>EGFP.	\$189
pAV[Exp]-CMV>EGFP	Adenoviral	Commonly used adenovirus transduction control; EGFP expression.	\$189

## Premade Viruses

### High Quality, High Titer Viruses

- Experimentally validated
- Stringent QC including titer and sterility measurement



### Wide Range of Viral Systems Available

- Fluorescent reporters expressed in lentivirus, AAV, adenovirus, and more
- AAV serotype testing panel and virus-like particles to optimize your experiment



### Fast and Easy Ordering

- Select your virus and scale in a few clicks
- Receive your virus in a few days



## Premade Control Viruses

VectorBuilder provides experiment-ready control viruses spanning a wide range of viral systems and applications, including popular viral vector constructs for lentivirus, AAV, adenovirus, MMLV, MSCV, and VSV. Offered in a

range of scales, these viruses cover both in vitro and in vivo experiments, ensuring that you can select the right control for your experiment.

### Lentivirus

System	Vector name	Starting price
Lentivirus gene expression system	pLV[Exp]-EGFP/Puro-EF1A>mCherry	\$99
Lentivirus U6-based shRNA knockdown system	pLV[shRNA]-EGFP/Puro-U6>Scramble_shRNA	\$99
Lentivirus IPTG-inducible shRNA knockdown system	pLV[shRNA]-LacI/Puro-U6/2xLacO>Scramble_shRNA	\$99

### AAV

System	Vector name	Starting price
ssAAV gene expression system	pAAV[Exp]-CAG>EGFP:WPPE	\$329
ssAAV U6-based shRNA knockdown system	pAAV[shRNA]-CAG>EGFP-U6>Scramble_shRNA	\$329

## Adenovirus

System	Vector name	Starting price
Adenovirus gene expression system	pAV[Exp]-CMV>EGFP	\$549
Adenovirus U6-based shRNA knockdown system	pAV[shRNA]-EGFP-U6>Scramble_shRNA	\$549
Ad5/F35 adenovirus gene expression system	pAd5/F35[Exp]-CMV>EGFP	\$849
Gutless Ad5 adenovirus & Gutless Ad5/F35 adenovirus gene expression system	pGLAd[Exp]-CMV>EGFP	\$1,999

## MMLV

System	Vector name	Starting price
MMLV gene expression system	pMMLV[Exp]-EGFP/Puro	\$329
Self-inactivating MMLV gene expression system	pMMLV-SIN[Exp]-MSCV>EGFP/Puro	\$329

## MSCV

System	Vector name	Starting price
MSCV gene expression system	pMSCV[Exp]-EGFP/Puro	\$329

## VSV

System	Vector name	Starting price
VSV gene expression system	pVSV[Exp]-EGFP	\$549

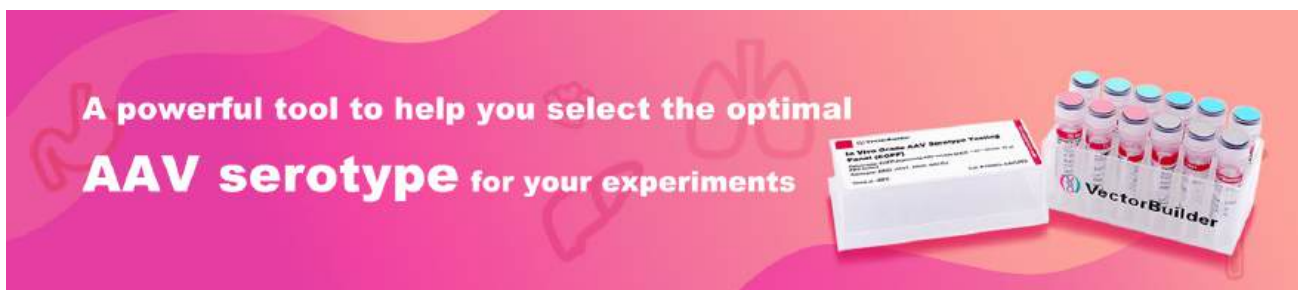
## AAV Serotype Testing Panel

Adeno-associated viruses (AAVs) have emerged as the most effective viral vectors for gene therapy due to their ability to transduce a wide variety of mammalian cell types and their low immunogenicity in host organisms. VectorBuilder offers the AAV serotype testing panel to enable users to select the optimal AAV serotype for specific applications by systematic comparison of a variety of serotypes in cells or in animals.

## Highlights

- High-titer, ready-to-use AAVs
- Option to select between either CMV- or CAG-driven EGFP reporter expression
- Flexibility to choose any 3 or more serotypes of your choice
- In vitro and in vivo grade panels
- Prices start at only \$237 for in vitro panel and \$417 for in vivo panel
- Comprehensive collection of AAV serotypes to select from

Product	Application	Titer & volume per unit	Unit price
In vitro grade AAV serotype testing panel (EGFP)	Cell culture	~10 <sup>12</sup> GC/ml, 25 ul	\$79 per aliquot
In vivo grade AAV serotype testing panel (EGFP)	Cell culture & in vivo	~10 <sup>13</sup> GC/ml, 25 ul	\$159 per aliquot



## AAV Virus-Like Particles (VLPs)

VectorBuilder offers premade as well as custom AAV-like particles that can be used for a variety of applications during the development of AAV gene therapy vectors, including optimization of analytical assays, biodistribution assessment, and evaluation of in vivo immune responses of serotype-specific AAV capsids. Our AAV-like particles are extensively characterized and can therefore serve as reliable standards for evaluating the quality of AAV-like particles generated in house. Moreover, they can be used as negative controls in studies intended to demonstrate that an observed effect is caused by the expression cassette harbored by an AAV vector rather than its capsid.

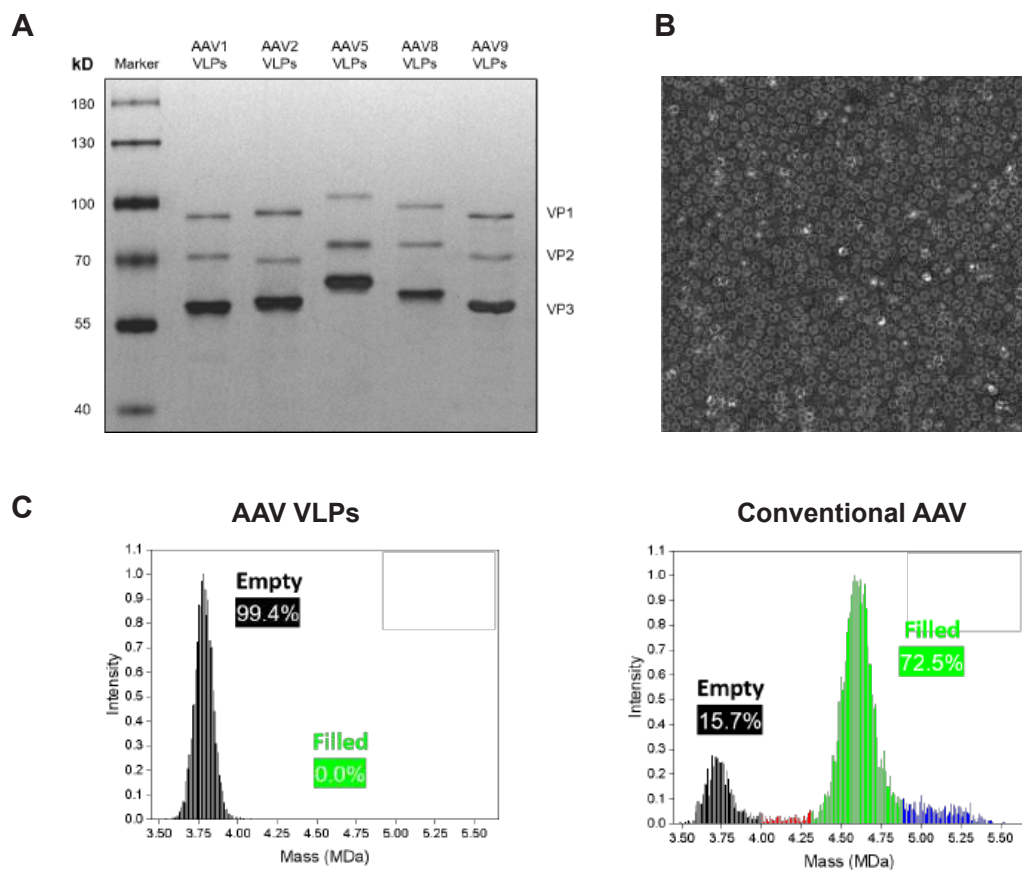
## Highlights

- Ready-to-ship AAV-like particles for serotypes 1, 2, 3, 5, 6, 8, 9, 2-retro, DJ, and DJ/8
- Custom services available for AAV-like particles produced using any desired serotype, production system, purification methods, or QC requirements
- Thoroughly characterized using various methods including SDS-PAGE, BCA, endotoxin testing, mycoplasma detection, and full/empty capsid ratio analysis

### Price and turnaround

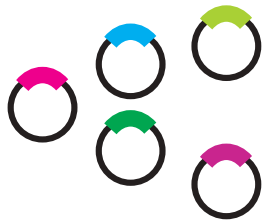
Scale*	Volume	Price	Turnaround
10 ug	25 ul	\$399	In stock
100 ug	0.1 ml (1x100 ul)	\$2,299	In stock
500 ug	0.5 ml (5x100 ul)	\$8,399	In stock
1 mg	1 ml (10x100 ul)	\$12,599	In stock

\* 1 mg =  $1.6 \times 10^{14}$  VPs



**Figure 1.** (A) Silver stained SDS-PAGE of ready-to-ship AAV virus-like particles of serotypes 1, 2, 5, 8, and 9. (B) Transmission electron microscopy of serotype 9 AAV virus-like particles showing empty (black-filled spheres) and filled (white-filled spheres) capsids. (C) Charge detection mass spectrometry analysis indicating percentages of empty (black) and filled (green) capsids for AAV virus-like particles and conventional AAV preparations of serotype 8.

## Premade Libraries



### Premade CRISPR and shRNA Libraries starting at **\$1,999**

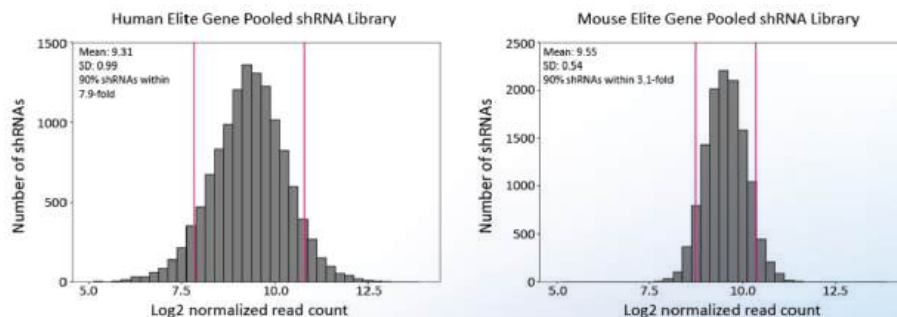
VectorBuilder offers high-quality premade CRISPR and shRNA libraries that serve as powerful and cost-effective tools for knock-out, knock-down, or knock-up across various scales, from whole-genome to pathway-specific. These libraries are validated by NGS, exhibit high uniformity, and come in our well-established lentiviral vector that is packaged at a high titer and ready to use.

*Detailed descriptions of our pooled library construction services, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

### Premade shRNA Libraries

#### Price and turnaround

Product	Target genes	No. of shRNAs	Scale	Price	Turnaround
<b>Human Elite Gene Pooled shRNA Library</b>	2,161	12,471	Medium ( $>1.0 \times 10^8$ TU/ml, 1 ml)	\$1,999	7-14 days
<b>Mouse Elite Gene Pooled shRNA Library</b>	2,233	12,472	Medium ( $>1.0 \times 10^8$ TU/ml, 1 ml)	\$1,999	
<b>Human Whole Genome Pooled shRNA Library</b>	20,593	105,233	Medium ( $>1.0 \times 10^8$ TU/ml, 1 ml)	\$1,999	
			Plus ( $>1.0 \times 10^8$ TU/ml, 5 ml)	\$2,499	
<b>Mouse Whole Genome Pooled shRNA Library</b>	22,023	105,170	Medium ( $>1.0 \times 10^8$ TU/ml, 1 ml)	\$1,999	
			Plus ( $>1.0 \times 10^8$ TU/ml, 5 ml)	\$2,499	



**Figure 1.** Representation of shRNAs in different pooled plasmid libraries.

## Premade CRISPR Libraries

VectorBuilder offers the only commercially available dual-gRNA lentivirus libraries for CRISPR-based whole-genome knockout screens in human and mouse cells. Each CRISPR vector contains a pair of gRNAs targeting the same gene. Dual-gRNA libraries are more effective

for knockout screens because the introduction of large deletions by these libraries can have much higher efficiencies in generating loss-of-function mutations. Additionally, VectorBuilder offers popular pathway knockout, knockdown, and knockup libraries.

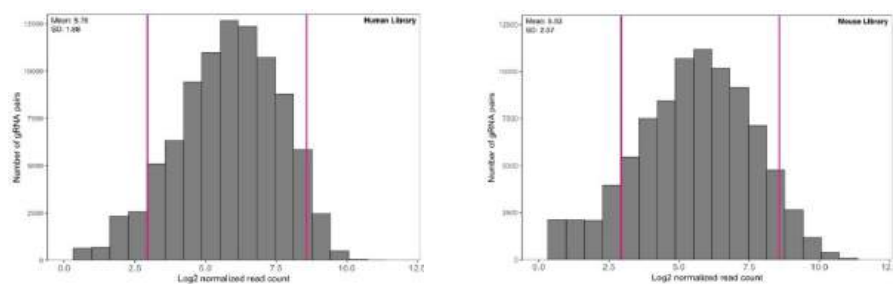
### Price and turnaround

Product name	No. of genes	No. of gRNAs	Scale	Price
<b>Whole-genome CRISPR knockout libraries</b>				
Human Whole-Genome Dual-gRNA Library	20,048	91,926 (pairs)	Medium	\$2,999
Mouse Whole-Genome Dual-gRNA Library	20,493	90,344 (pairs)	Medium	\$2,999
Human GeCKO V2 Library A	19,050	65,383	Medium	\$1,999
Human GeCKO V2 Library B	19,050	58,028	Medium	\$1,999
Human GeCKO V2 Library A + B	19,050	123,411	Medium	\$2,999
Mouse GeCKO V2 Library A	20,611	67,405	Medium	\$1,999
Mouse GeCKO V2 Library B	20,611	62,804	Medium	\$1,999
Mouse GeCKO V2 Library A + B	20,611	130,209	Medium	\$2,999
Human Whole-Genome CROP-seq KO Library	19,050	123,411	Medium	\$4,099
Mouse Whole-Genome CROP-seq KO Library	20,611	130,209	Medium	\$4,099
Human Whole-Genome Perturb-seq KO Library	19,050	123,411	Medium	\$4,999
Mouse Whole-Genome Perturb-seq KO Library	20,611	130,209	Medium	\$4,999
<b>Whole-genome CRISPRa libraries</b>				
Human CRISPRa (SAM) Library	23,430	70,290	Medium	\$4,099
Mouse CRISPRa (SAM) Library	23,439	69,225	Medium	\$4,099
<b>Whole-genome CRISPRi libraries</b>				
Human CRISPRi Library	23,430	70,290	Medium	\$4,099
Mouse CRISPRi Library	23,439	69,225	Medium	\$4,099

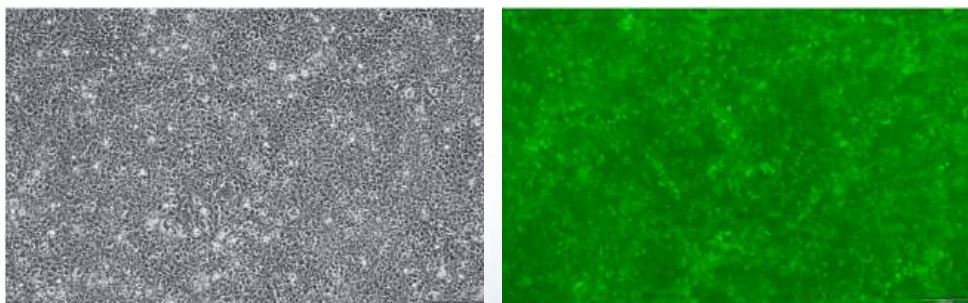
Product name	No. of genes	No. of gRNAs	Scale	Price
<b>Pathway-specific CRISPR knockout libraries</b>				
DNA Damage Response Genes MKOv4 Library	460	4,530	Medium	\$2,399
Human Epigenetic Genes KO Library	2,508	20,051	Medium	\$3,499
Human Ubiquitination-Related Genes KO Library	660	11,108	Medium	\$2,799
Human Transcription Factors KO Library	1,639	11,364	Medium	\$2,799
Human Metabolic Genes KO Library	2,981	30,290	Medium	\$3,499
Human Kinase Domain-Focused KO Library	482	3,051	Medium	\$2,399
Human Messenger-RBP KO Library	725	8,260	Medium	\$2,799

### Scale and titer for CRISPR lentivirus libraries

Scale	Application	Titer	Volume
Medium	Cell culture & in vivo	$>10^8$ TU/ml	1 ml (10x100 ul)
Plus	Cell culture & in vivo	$>10^8$ TU/ml	5 ml (50x100 ul)



**Figure 1.** Representation of gRNA pairs in human (left) and mouse (right) pooled libraries.



**Figure 2.** EGFP marker expression in 293T cells transduced with Human Whole-Genome Dual-gRNA Lentivirus Library (MOI=10) after 4 days of puromycin selection (1.5 ug/ml). Magnification: 200X. Left: bright field. Right: EGFP.

## Premade Stable Cell Lines

VectorBuilder offers high-quality, ready-to-use cell lines that undergo rigorous quality control and validation, ensuring reliability and optimal performance for applications such as CRISPR genome editing, fluorescent reporter assays, and inducible gene expression. Your edited cells can be delivered in as little as 6 weeks.

*Detailed descriptions of our premade stable cell lines, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

### Highlights

- Single clone-derived cell lines for consistency and reproducibility.
- Stringent QC, including RT-qPCR and sterility/mycoplasma tests.
- Functionally validated to offer confidence in downstream assays.
- Simplified workflow, saving time and effort.

### Products Offered

**Fluorescent Reporter Cell Lines**



**CRISPR Cell Lines**



**Tet Regulatory Protein Expression Cell Lines**



### Fluorescent Reporter Cell Lines

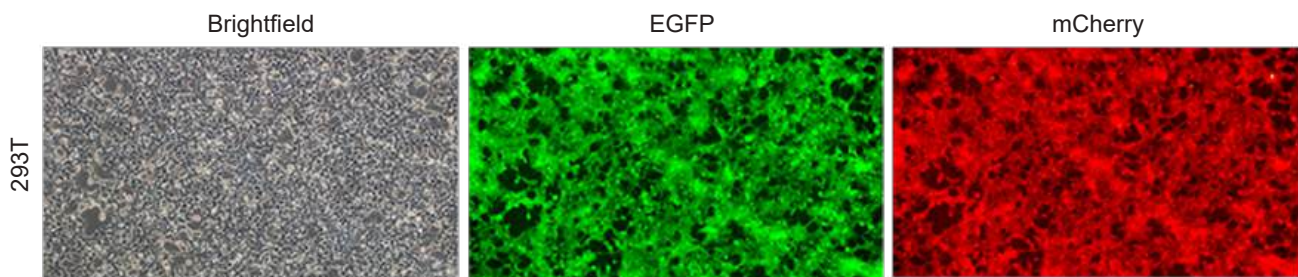
Product	Resistance	Catalog #	Scale	Price
EGFP-expressing 293T cells	Puro	CL02011	10 <sup>6</sup> cells/ml, 1 ml	\$1,499
EGFP-expressing K562 cells	Hygro	CL02022	10 <sup>6</sup> cells/ml, 1 ml	\$1,999
EGFP-expressing HT1080 cells	Puro	CL02031	10 <sup>6</sup> cells/ml, 1 ml	\$1,999
mCherry-expressing 293T cells	Hygro	CL02042	10 <sup>6</sup> cells/ml, 1 ml	\$1,499
mCherry-expressing K562 cells	Hygro	CL02052	10 <sup>6</sup> cells/ml, 1 ml	\$1,999
Dual-EGFP/mCherry-expressing 293T cells	Hygro	CL02062	10 <sup>6</sup> cells/ml, 1 ml	\$1,499
Dual-EGFP/mCherry-expressing K562 cells	Hygro	CL02072	10 <sup>6</sup> cells/ml, 1 ml	\$1,999

### CRISPR Cell Lines

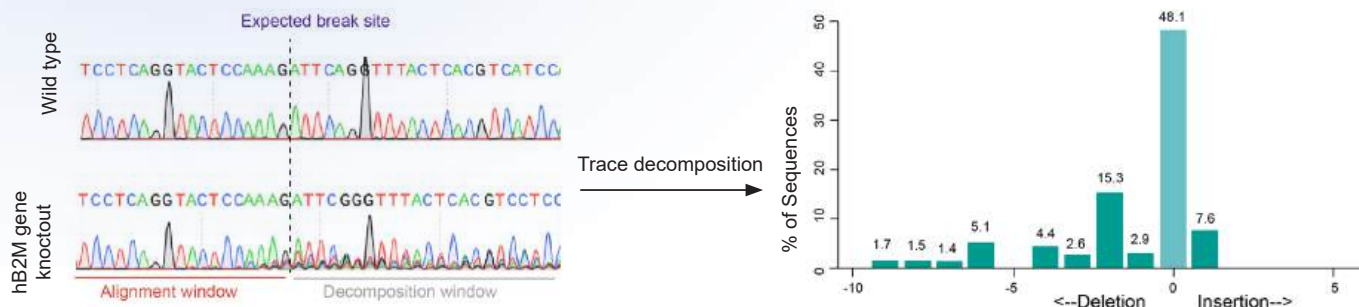
Product	Resistance	Catalog #	Scale	Price
hCas9-expressing 293T cells	Hygro	CL01012	10 <sup>6</sup> cells/ml, 1 ml	\$1,999
hCas9-expressing K562 cells	Hygro	CL01022	10 <sup>6</sup> cells/ml, 1 ml	\$2,499
dCas9-SAM-expressing 293T cells	Bsd/Hygro	CL010323	10 <sup>6</sup> cells/ml, 1 ml	\$2,499
dCas9-SAM-expressing K562 cells	Bsd/Hygro	CL010423	10 <sup>6</sup> cells/ml, 1 ml	\$2,999
dCas9-KRAB-MeCP2-expressing 293T cells	Hygro	CL01052	10 <sup>6</sup> cells/ml, 1 ml	\$2,499
dCas9-KRAB-MeCP2-expressing K562 cells	Hygro	CL01062	10 <sup>6</sup> cells/ml, 1 ml	\$2,999

### Tet Regulatory Protein Expression Cell Lines

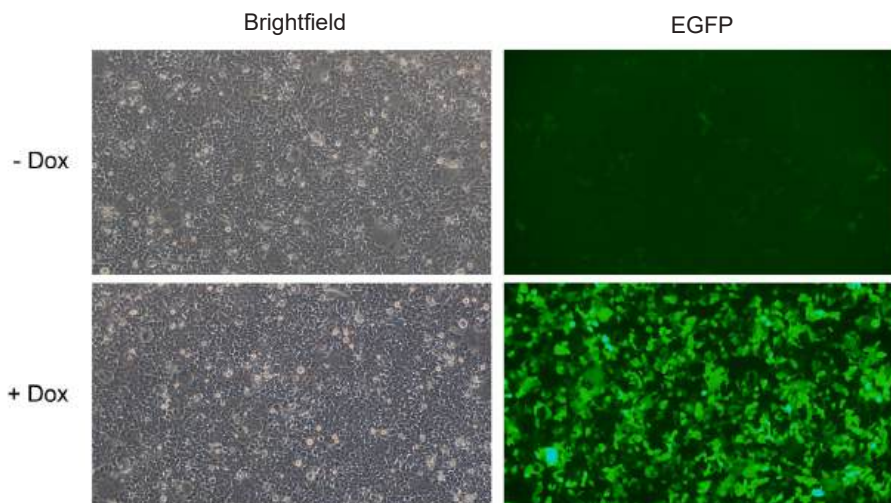
Product	Resistance	Catalog #	Scale	Price
tTS/rtTA-expressing 293T cells	Hygro	CL03012	10 <sup>6</sup> cells/ml, 1 ml	\$1,999
tTS/rtTA-expressing K562 cells	Hygro	CL03022	10 <sup>6</sup> cells/ml, 1 ml	\$2,499
tTS/rtTA-expressing HEK293 cells	Hygro	CL03032	10 <sup>6</sup> cells/ml, 1 ml	\$1,999
Tet3G-expressing 293T cells	Hygro	CL03042	10 <sup>6</sup> cells/ml, 1 ml	\$2,499
Tet3G-expressing K562 cells	Hygro	CL03052	10 <sup>6</sup> cells/ml, 1 ml	\$2,999



**Figure 1.** Representative fluorescence images of 293T cells expressing EGFP and mCherry. Magnification: 100x.



**Figure 2.** Validation of hCas9-expressing K562 cells. Cells were transfected with a plasmid expressing a single gRNA targeting the hB2M gene. 72 hours post-transfection, genomic DNA was extracted, and the target region was amplified for Sanger sequencing. Indel decomposition analysis was then performed to assess editing efficiency (43.2% of sequence with mutation inferred by trace decomposition).



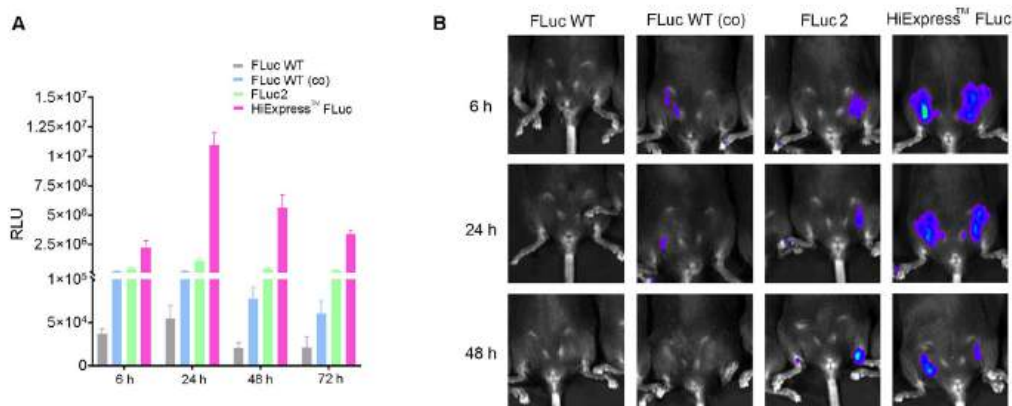
**Figure 3.** Validation of tTS/rtTA-expressing HEK293 cells. Cells were transduced with TRE-driven EGFP-expressing lentivirus, followed by antibiotic selection. EGFP expression was assessed by fluorescence imaging 48 hours after induction with 2  $\mu$ g/ml doxycycline (Dox) (+ Dox) or in the absence of Dox (- Dox). Magnification: 100x.

## IVT RNA and LNP-RNA

### Price and turnaround

Category	Product	Price
mRNA	EGFP IVT mRNA	From \$249
	Zebrafish EGFP IVT mRNA	From \$359
	mCherry IVT mRNA	From \$249
	HiExpress™ Firefly Luciferase IVT mRNA	From \$299
	HiExpress™ Guassia Luciferase IVT mRNA	From \$299
	Anti-hCD19-h28z CAR IVT mRNA	From \$349
	Anti-hCD19-hBBz CAR IVT mRNA	From \$349
	hSpCas9 IVT mRNA	From \$319
	HiExpress™ hSpCas9 IVT mRNA	From \$399
	HiExpress™ Sleeping Beauty Transposase IVT mRNA	From \$319
	HiExpress™ Cre IVT mRNA	From \$319
	B18R-E3L IVT mRNA	From \$549
	HiExpress™ Chicken Ovalbumin IVT mRNA	From \$299
LNP-mRNA	EGFP LNP-mRNA	From \$1,099
	HiExpress™ Firefly Luciferase LNP-mRNA	From \$1,199
	HiExpress™ Firefly Luciferase GalNAc LNP-mRNA	From \$1,199
	Mouse Anti-CD31 Conjugated HiExpress™ Firefly Luciferase LNP-mRNA	From \$1,999
	HiExpress™ Cre LNP-mRNA	From \$1,199
saRNA	EGFP IVT saRNA	From \$339
	HiExpress™ Firefly Luciferase IVT saRNA	From \$349
	Anti-hCD19-h28z CAR IVT saRNA	From \$899
	Anti-hCD19-hBBz CAR IVT saRNA	From \$899
circRNA	IRES-EGFP IVT circRNA	From \$2,799
	Anti-hCD19-h28z CAR IVT circRNA	From \$2,899
	Anti-hCD19-hBBz CAR IVT circRNA	From \$2,899

Product	Modification	Catalog #	Scale	Price
<b>LNP-RNA</b>				
HiExpress™ Firefly Luciferase LNP-mRNA	unmodified	NL1020-0100	100 ug (200 ug/ml, 500 ul)	\$1,199
	m1Psi	NL1021-0100		\$1,299
HiExpress™ Cre LNP-mRNA	unmodified	NL1030-0100	100 ug (200 ug/ml, 500 ul)	\$1,199
	m1Psi	NL1031-0100		\$1,299
HiExpress™ FLuc GalNAc LNP-mRNA	unmodified	NL1040-0100	100 ug (200 ug/ml, 500 ul)	\$1,199
	m1Psi	NL1041-0100		\$1,299



**Figure 1.** Firefly Luciferase IVT mRNA expression in vitro and in vivo (A) Expression of HiExpress™ Firefly Luciferase mRNA and other luciferase mRNA measured at 6 h, 24 h, 48 h, and 72 h post transfection. (B) Luciferase activity measured in adult mice injected intramuscularly with LNP encapsulated mRNA encoding wildtype (WT), codon-optimize (co), Luc2, or HiExpress™ luciferase.

## LentiBuilder™ Lentivirus Packaging Kit

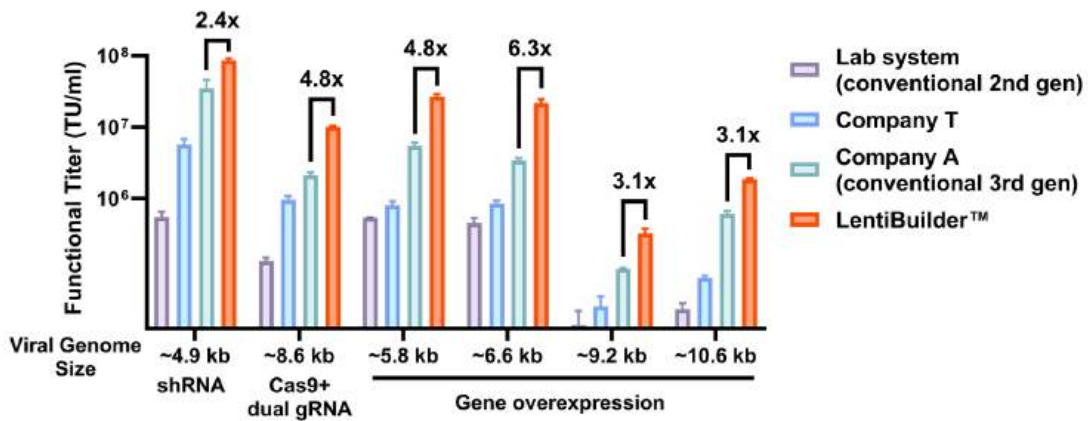
VectorBuilder offers the LentiBuilder™ Lentivirus Packaging Kit, enabling effortless in-house production of high-quality third-generation lentivirus directly at your bench. Built on our proprietary MiniVec™ technology and extensive optimizations of the packaging system, the kit delivers exceptional virus titers and transduction results.

*Detailed descriptions of our lentivirus packaging kit, including ordering information, are available on the VectorBuilder website under **Products & Services**.*

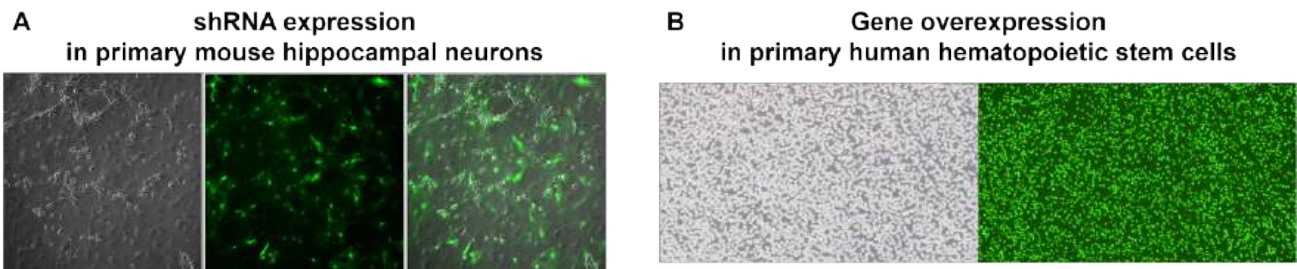
### Highlights

- Functional titers ( $10^7$ - $10^8$  TU/ml) for regular-sized vectors and reliable yields for oversized vectors.
- Streamlined packaging with ready to use plasmids and reagents, eliminating complex optimization processes.
- Compatible when used with transfer vectors designed on our Vector Design Studio for best packaging performance.

Catalog No.	Component	Specifications	Price
LVKT0010	LentiBuilder™ Packaging Mix	1 x 80 ul	\$559
	LentiBuilder™ Transfection Reagent	1 x 500 ul	
LVKT0050	LentiBuilder™ Packaging Mix	5 x 80 ul	\$1,999
	LentiBuilder™ Transfection Reagent	5 x 500 ul	



**Figure 1.** The LentiBuilder™ Lentivirus Packaging Kit delivers market-leading functional titers of lentivirus across various transgenes and genome sizes.



**Figure 2.** Lentivirus produced from the LentiBuilder™ packaging system can easily transduce challenging cell types.

## Research Antibodies

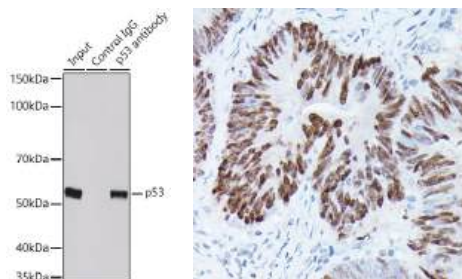
VectorBuilder offers an extensive collection of ready-to-use antibodies, targeting thousands of proteins, and covering a wide range of applications and research areas, including cancer, immunology, and neuroscience. Our antibodies are affinity purified and rigorously validated, ensuring high quality and reliable performance in your experiments.

*Detailed descriptions of our research antibody offerings, including price and ordering information, are available on the VectorBuilder website under **Products & Services**.*

### Highlights

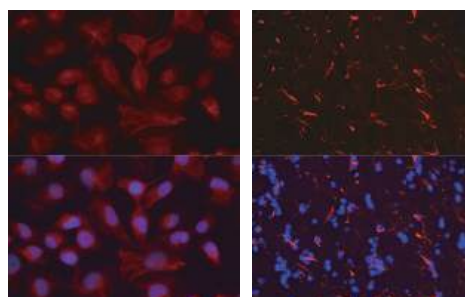
- Choose from thousands of monoclonal and polyclonal antibodies.
- Seamlessly search for antibodies by name, or filter by application, reactivity, and more.
- Ensure your antibody is of the highest quality with our extensive validation
- Receive your antibody designed for optimal performance in your experiments.

### Cancer



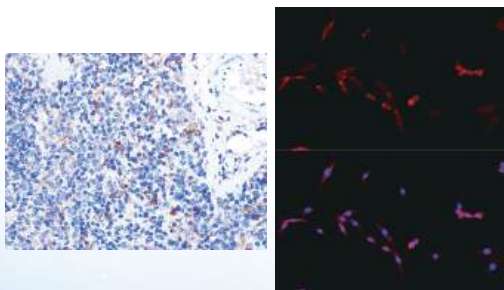
**Figure 1.** Immunoprecipitation analysis of 293T cell extracts and immunohistochemical analysis of paraffin-embedded human colon carcinoma using p53 Rabbit pAb (AT00076).

### Neuroscience



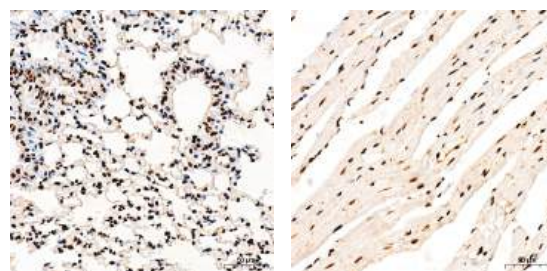
**Figure 2.** Immunofluorescence staining of U-251 MG cells and paraffin-embedded mouse brain using GFAP Rabbit pAb (AT01336).

### Immunology



**Figure 3.** Immunohistochemical analysis of paraffin-embedded mouse spleen and immunofluorescence staining of PC-12 cells using CD40L Rabbit pAb (AT00904).

### DNA damage repair



**Figure 4.** Immunohistochemical analysis of paraffin-embedded rat lung and mouse heart tissues using Phospho-Histone H2AX-S139 Rabbit pAb (AT04604).

# VB UltraStable™ Chemically Competent Cells

VB UltraStable™ chemically competent cells are designed for achieving high transformation efficiency ( $>1 \times 10^9$  cfu/ug) and propagation of DNA plasmids with unstable elements such as repeated sequences.

## Highlights

- Lacks the ability to undergo homologous recombination due to mutations introduced in the recA gene
- Suitable for the cloning and hosting of lentiviral and retroviral vectors as well as vectors with repeated sequences and unstable fragments
- Deficient of the functional ccdAB operon making them suitable for highly efficient Gateway Cloning
- Can produce high-quality plasmid DNA due to the endA mutation (plasmids won't be digested by endonuclease)
- T1 phage resistant due to fhuA mutation
- Can be used for blue/white screening because it expresses the omega fragment of lacZ gene

Product name	Deliverable	Catalog no.	Price
VB UltraStable™ Chemically Competent Cells	10x100 ul	UC001-010	\$199

## User Testimonials

“

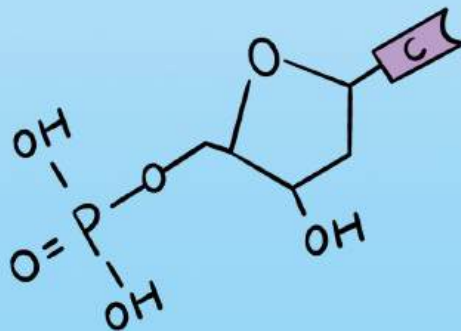
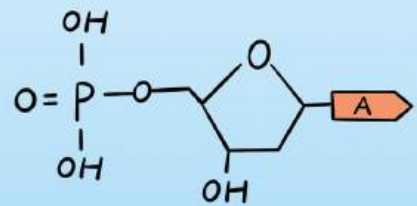
Before using VectorBuilder, producing lentiviral overexpression vectors for our in vitro models was a recurring and time-consuming enterprise. We faced frequent challenges in every experimental step, which made it difficult to plan the actual experiments. Setting up the process with VectorBuilder was very efficient, thanks to their great expertise and support. Once we started using VectorBuilder's services, we noticed a substantial increase in productivity as well as a more uniform and predictable transduction pattern of our target cells.

We went on to use VectorBuilder for a large-scale CRISPR screen with a custom library spanning over 1,600 genes. With the provided virus, we were able to easily maintain cell representation and we derived a number of interesting hit genes, which we are excited to follow up on. A big thank you to the entire VectorBuilder Team!

”

**Dominic Schmid**  
University of Basel

# Featured Offerings





# CRISPR Genome Editing Solutions

VectorBuilder offers a variety of CRISPR products and services for in vitro and in vivo genome editing experiments at unbeatable prices and with rapid turnaround. Additionally, our online vector design platform features a free and user-friendly CRISPR design tool that allows you to design CRISPR vectors with high targeting efficiency.

Detailed descriptions of our CRISPR genome editing services, including ordering information, are available on the VectorBuilder website under **Products & Services**.

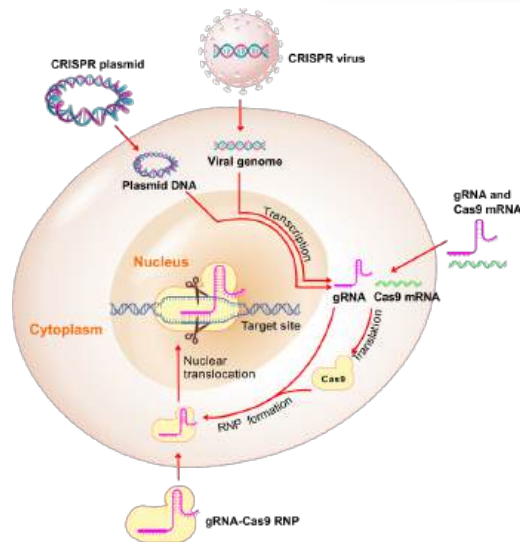


Figure 1. Overview of CRISPR genome editing solutions offered at VectorBuilder.

## Custom CRISPR vectors

Vector type	Price	Turnaround
gRNA and Cas9* coexpression vectors	From \$149	5-10 days
gRNA expression vectors	From \$149	
Cas9* expression vectors	From \$189	
Gene targeting donor vectors	From \$659	10-20 days
CRISPR-based gene activation vectors	From \$149	5-10 days
CRISPR-based gene inhibition vectors	From \$149	
gRNA sensor vectors	From \$299	9-18 days

\* We offer a variety of Cas9 variants including hCas9, Cas9 (D10A), SaCas9, and many others.

## Premade CRISPR vectors

Vector type	Price
Cas9 expression vectors	From \$189
Scramble gRNA control vectors	From \$149
Cas9 and scramble gRNA coexpression vectors	From \$149
CRISPRa and CRISPRi helper vectors	From \$189

### CRISPR virus

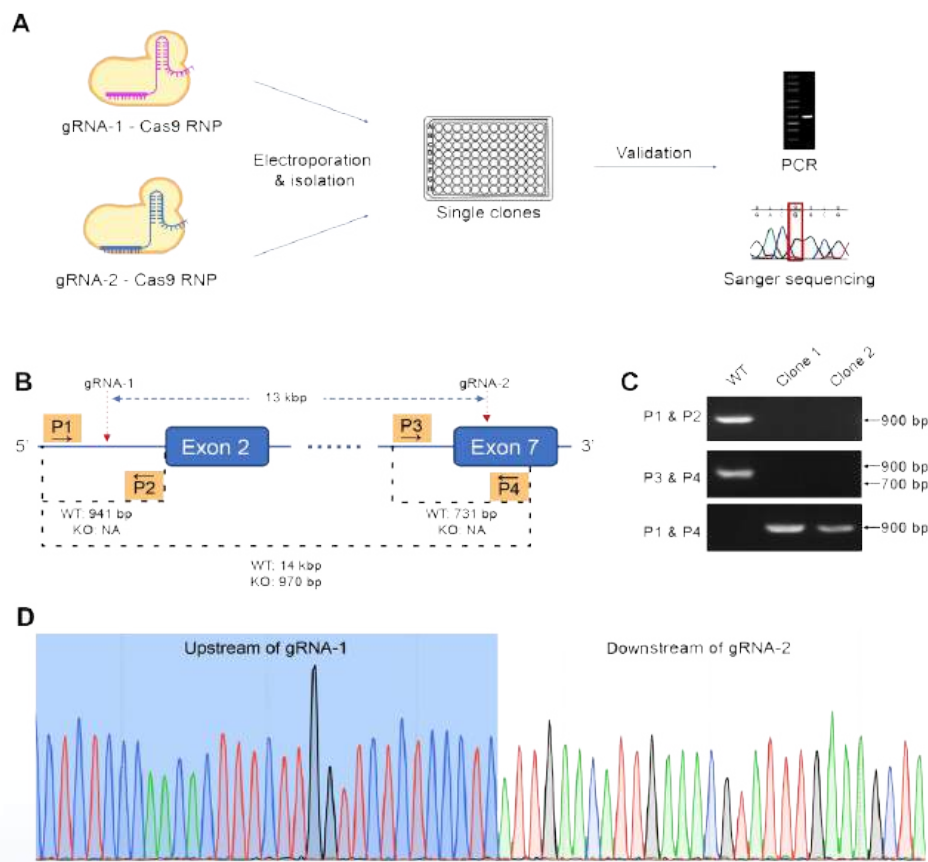
Lentivirus, AAV, and adenovirus are widely used to deliver CRISPR components into mammalian cells. VectorBuilder offers premium-quality virus packaging services for lentivirus, AAV, and adenovirus for achieving highly efficient CRISPR targeting in difficult-to-transfect cells. (See page 18 for detailed information on our virus packaging services.)

### Cas9 mRNA and gRNA

VectorBuilder provide transfection-ready and microinjection-ready Cas9 mRNA and gRNA specifically designed against user-selected target sites for easy RNA-based delivery of CRISPR components into mammalian cells.

Reagent	Concentration & volume	Price	Turnaround
hCas9 mRNA	>500 ng/ul, 25 ul	\$449	2-4 days
Cas9(D10A) mRNA			
Custom gRNA*		\$349	

\* Cloning of gRNA in vitro transcription vector has an additional cost of \$149 and turnaround of 5-10 days.



**Figure 2.** Generating homozygous knockout (KO) mutants using the gRNA-Cas9 ribonucleoprotein (RNP) approach. (A) The RNP is electroporated into target cells, and single clones are isolated and validated by PCR and Sanger sequencing. (B) RNP binding to two sites on the targeted gene to KO a 13-kbp region. (C) Three PCR reactions using primer combinations (P1-P4) confirmed clones are homozygous KO mutants, confirmed by (D) sequencing results.

## Cas9 protein

VectorBuilder offers purified wild-type *Streptococcus pyogenes* Cas9 protein (SpCas9) and the Cas9 nickase (Cas9(D10A)) for preparing preformed Cas9-gRNA RNP to deliver CRISPR components into mammalian cells.

Reagent	Concentration & volume	Price	Turnaround
SpCas9 protein	100 ug	\$599	5-7 days
SpCas9(D10A) nickase protein			

## Gene targeting donor DNA

VectorBuilder offers donor DNA templates in the form of single-stranded oligodeoxynucleotide (ssODN) or dsDNA from linearized plasmids for guiding HDR-based DNA

Reagent	Price	Turnaround
ssODN (normally 120-200 nt)	From \$349	2-3 weeks
Gene targeting donor vector	From \$659	10-20 days

## Pooled CRISPR libraries

VectorBuilder specializes in the custom design and construction of a variety of pooled CRISPR libraries such as CRISPR knockout, CRISPRa/i, and CRISPR barcode libraries. In addition to custom pooled CRISPR libraries,

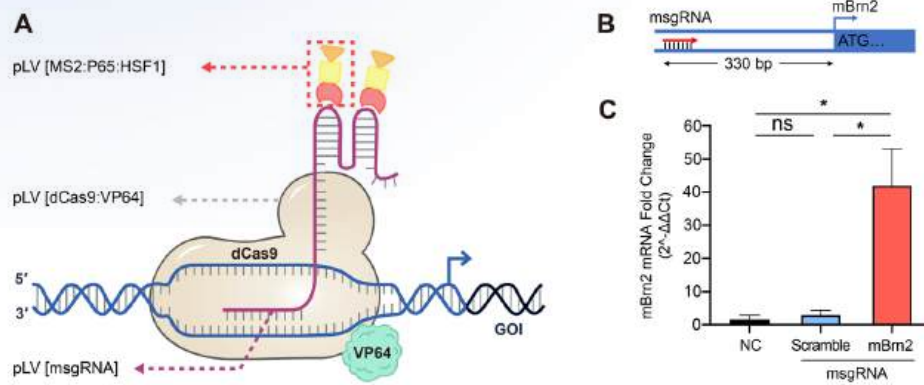
we offer premade dual-gRNA lentivirus libraries for whole-genome knockout screens of human and mouse genes. *(See page 62 for detailed information on our premade CRISPR libraries.)*

## CRISPR knockout and knockin stable cell lines

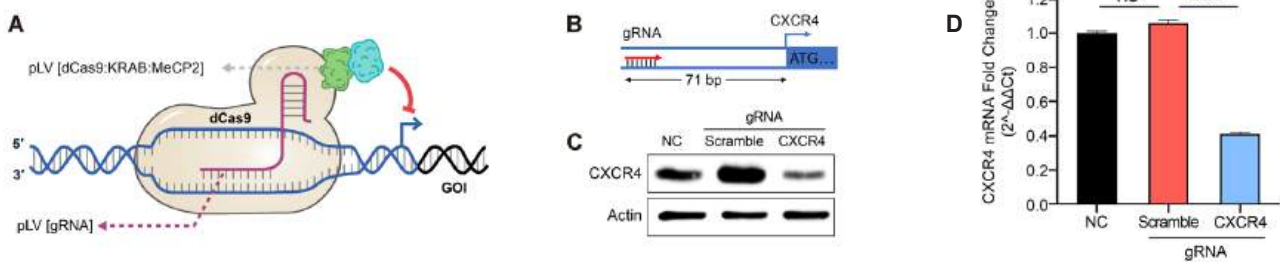
VectorBuilder can generate stable cell lines with a permanent knockout of your GOI using a CRISPR-based approach. A pair of gRNAs targeting the GOI is introduced into the cells along with Cas9, which leads to the generation of two cuts on the target gene. Attempts by cells to repair the broken ends of the two cut sites typically result in a large deletion spanning the two sites. In addition, we can generate stable cell lines with permanent knockin of your GOI at desired genomic target sites. Stable knockin of the GOI is achieved by introducing a target site-specific gRNA into the cells along with Cas9 and a donor vector which serves as the template for HDR-mediated gene knockin. Using a similar approach, we can also generate stable cell lines harboring

desired point mutations at genomic target sites of interest. In this case, a target site-specific gRNA is introduced into the cells along with Cas9 and a ssODN which serves as the template for HDR-mediated insertion of the point mutation.

The final cell line is evaluated by Sanger sequencing of the targeted locus to confirm knockout, knockin, or the presence of the point mutation. Additionally, a series of standard QC assays, such as sterility tests and mycoplasma detection, are performed before releasing the final cell line products. *(See page 34 for detailed information on our stable cell line generation service.)*



**Figure 3.** Up-regulation of gene expression achieved by the lentivirus-based CRISPRa. (A) Illustration of SAM-regulated transcriptional activation. (B) Diagram of msgRNA design targeting the promoter region of the mouse Brn2 gene. (C) Relative gene expression of Brn2 in cells transduced with scramble or targeting msgRNA or no treatment control (NC).



**Figure 4.** Down-regulation of gene expression achieved by the lentivirus-based CRISPRi. (A) Illustration of dCas9/KRAB/MeCP2-regulated transcriptional inhibition. (B) Diagram of gRNA design targeting the promoter region of the human CXCR4 gene. (C) CXCR4 protein levels in cells transduced with scramble or targeting gRNA or no treatment control (NC), measured by western blot or (D) qRT-PCR.

# Inducible Gene Expression Solutions

VectorBuilder offers a comprehensive collection of Tet-inducible gene expression system reagents to help you achieve nearly complete silencing of your GOI in the absence of tetracycline or its analogs (e.g. doxycycline), and rapid, robust expression in response to the addition of tetracycline or its analogs.

## Highlights

- Utilizes the rtTA/tTS fusion cassette to achieve maximal induction in the presence of tetracycline and minimal leaky expression in its absence
- Available in dual-vector and all-in-one formats
- Low-leak, tissue-specific vectors available with minimal leaky expression in non-target tissues in the absence of tetracycline
- Available in a variety of backbones, including regular plasmid, lentivirus, AAV, adenovirus, and PB transposon

## Custom Tet vectors

Vector type	Price	Turnaround
All-in-one Tet-On vectors	From \$239	5-10 days
Tet regulatory protein expression vectors	From \$189	
TRE driven GOI expression vectors		
Low-leak Tet-On vectors		

## Popular Tet vectors

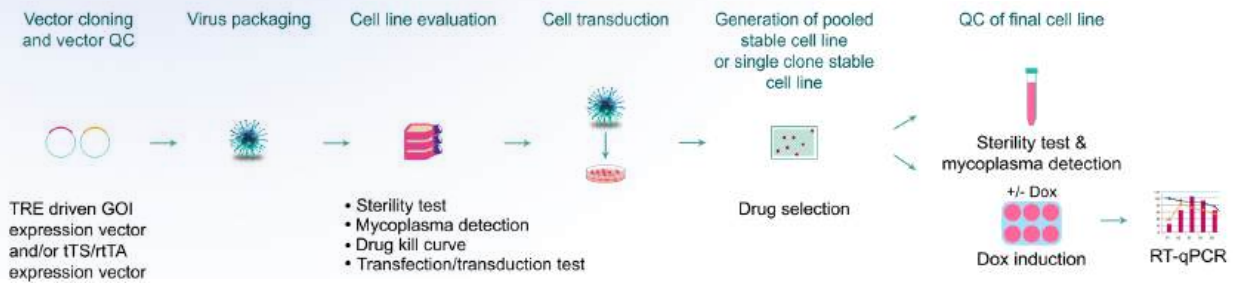
Vector type	Price
Tet-inducible vectors for EGFP, mCherry, TagBFP, or luciferase	\$189
All-in-one Tet-On vectors for EGFP, mCherry, TagBFP, or luciferase	\$239
Tet regulatory protein expression vectors	\$189

## Tet-inducible stable cell lines

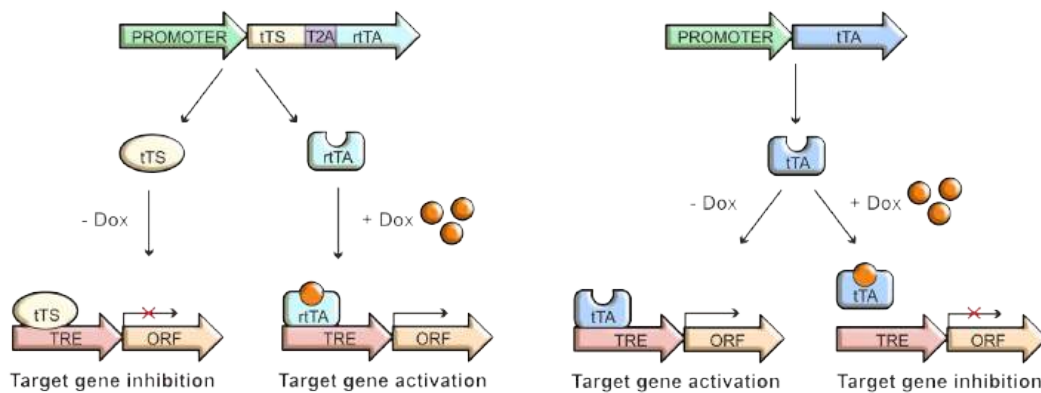
VectorBuilder can custom-build Tet inducible gene expression stable cell lines with minimal background expression and high induction of your GOI(s). Additionally, we can generate Tet regulatory protein expression stable cell lines (e.g. rtTA, tTS/rtTA, etc.) which can then be transfected and transduced with plasmids and viruses carrying TRE-driven GOI(s) for flexible experimental design and reliable Tet inducible gene expression. For Tet-On stable cell lines, induction of the GOI is validated by RT-qPCR. What's more, a series of standard QC assays, such as sterility tests and mycoplasma detection, are performed before releasing the final cell line products.

## Tet-inducible virus

VectorBuilder can design, construct, and package a variety of viral vectors expressing the components of the Tet-inducible system to help you achieve virus-mediated inducible expression of your target genes in difficult-to-transfect cell lines. We can package recombinant lentivirus, AAV, adenovirus, MMLV, and MSCV retrovirus. (See page 18 for detailed information on our virus packaging services.)



**Figure 1.** Workflow for Tet-inducible cell line generation process.



**Figure 2.** Mechanisms of Tet regulated gene expression using Tet-On and Tet-Off systems. Dox: doxycycline (tetracycline analog)

## shRNA Gene Knockdown Solutions

VectorBuilder offers a comprehensive collection of shRNA reagents to provide you with the ideal tools for your gene knockdown experiments. We can provide both U6-based and miR-30 based shRNA systems to give you the flexibility to control shRNA expression in different ways based on your experimental needs. Additionally, our online vector design tool is integrated with shRNA databases, enabling you to easily select suitable shRNAs targeting your GOI while designing your shRNA vectors.

### Highlights

- Free and intuitive vector design tool with integrated shRNA databases for human, mouse, and rat models
- Versatile control of shRNA expression by either U6 or miR30
- Vast collection of backbones, including regular plasmid, lentivirus, AAV, adenovirus, and PB transposon
- Premade and custom-made shRNA library options
- Powerful technical support for shRNA selection, vector design, and troubleshooting

## Custom shRNA vectors

Vector type	Price	Turnaround
U6-based shRNA vectors	From \$149	5-10 days
miR30-based shRNA vectors	From \$299	8-16 days
U6-based inducible shRNA vectors	From \$149	5-10 days
shRNA sensor vectors (for testing shRNA efficiency)	Please inquire	

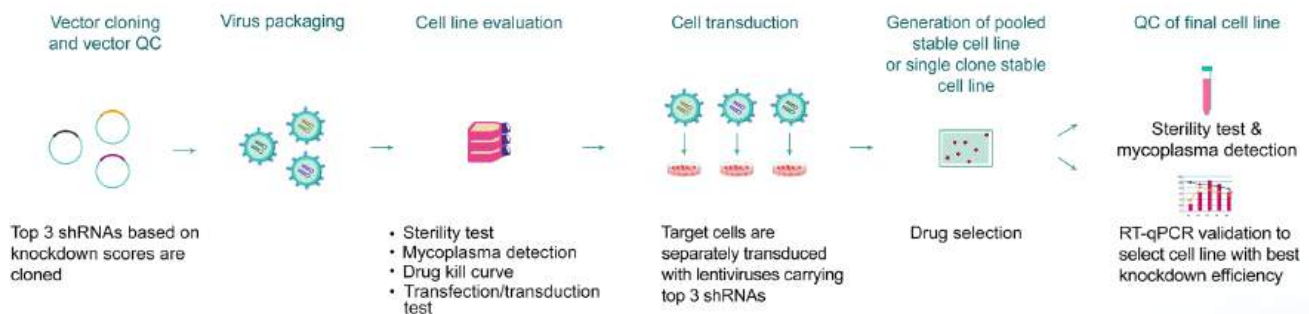
## Popular shRNA vectors

Vector type	Price
Scramble shRNA vectors	From \$149
Anti-EGFP shRNA vectors	
Anti-mCherry shRNA vectors	
Anti-luciferase shRNA vectors	
Anti-lacZ shRNA vectors	

## shRNA knockdown stable cell lines

VectorBuilder can custom-build shRNA knockdown stable cell lines for applications requiring long-term knockdown of your GOI. We identify the top three candidate shRNAs based on the knockdown score to ensure efficient knockdown of your GOI. We then use the shRNA with the best knockdown efficiency to generate the stable cell line

via lentivirus transduction. The knockdown level of the cell line is validated by RT-qPCR. Additionally, we perform a series of standard QC assays, such as sterility tests and mycoplasma detection, before releasing the final cell line products. (See page 34 for detailed information on our stable cell line generation services.)



**Figure 1.** Workflow for our shRNA knockdown stable cell line generation process.

## shRNA virus

Viral vectors are the preferred shRNA delivery vehicles given their ability to efficiently transduce a wide variety of cell types and achieve long-term knockdown of the targeted genes. We can design and construct shRNA

vectors in various viral vector formats, including lentivirus, AAV, and adenovirus. (See page 18 for detailed information on our virus packaging services.)

### shRNA (3+1) virus packaging

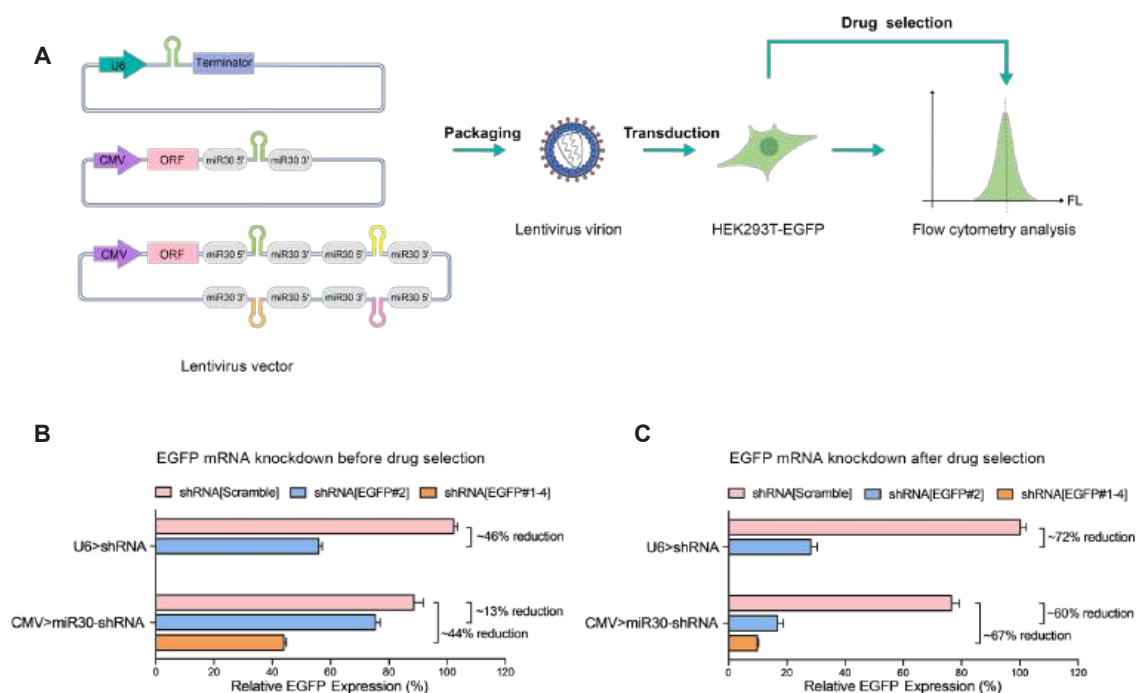
VectorBuilder offers shRNA (3+1) virus packaging services which include 3 custom shRNA viruses targeting your GOI and 1 scramble control virus, enabling you to test multiple

shRNA against your target genes at highly affordable prices.

### Pooled shRNA libraries

VectorBuilder specializes in the design and construction of pooled shRNA libraries to perform large-scale, loss-of-function screens in mammalian cells. In addition, VectorBuilder offers premade whole-genome shRNA

libraries for human and mouse genes that have been validated by NGS. (See page 33 for detailed information on our library construction services.)



**Figure 2.** Comparisons of EGFP knockdown through U6-based versus miR30-based shRNA lentiviral systems. (A) Lentiviral vectors shRNAs were packaged into lentiviral particles and transduced into EGFP-expressing cells, followed by measurement using flow cytometry before (B) and after (C) drug selection. (B) Before drug selection, EGFP expression was reduced by ~46% thru U6-based shRNA, by 13% thru CMV-driven miR30-based single shRNA, and by 44% thru quad shRNA. (C) After drug selection, EGFP expression was reduced by ~72% thru U6-based shRNA, by 60% thru CMV-driven miR30-based single shRNA, and by 67% thru quad shRNA.

## shRNA (3+1) Virus Packaging

The knockdown effects of empirically designed shRNAs are often limited by variations in specificity and efficiency observed from one shRNA to another. Therefore, it is important to test multiple shRNAs to find the most potent shRNA for knocking down your GOI. VectorBuilder's shRNA (3+1) virus packaging services enable you to select optimal shRNAs for your target genes at highly

affordable prices. This offering includes cloning and packaging three custom shRNA viruses targeting your GOI and one scramble control virus. Currently available viral types include lentivirus, AAV, and adenovirus.

### Price and turnaround

Virus type	Application	Starting price*	Turnaround**
Lentivirus	Cell culture	\$999	10-19 days
	Cell culture & in vivo	\$3,999	
AAV	Cell culture	\$1,499	10-19 days
	Cell culture & in vivo	\$4,199	11-21 days
Adenovirus	Cell culture	\$2,399	34-47 days
	Cell culture & in vivo	\$6,199	34-47 days

\* Price includes the cost of both vector cloning and virus packaging.

\*\* Turnaround includes the production time for both vector cloning and virus packaging.



# Save Money with VectorBuilder Store Credit



Desired Credit	You Pay	You Save
\$10,000	\$9,419	\$581
\$20,000	\$18,523	\$1,477
\$30,000	\$27,444	\$2,556
\$40,000	\$36,196	\$3,804
\$50,000	\$44,891	\$5,109
\$60,000	\$53,511	\$6,489
\$70,000	\$62,021	\$7,979
\$80,000	\$70,532	\$9,468
\$90,000	\$79,043	\$10,957
\$100,000	\$87,553	\$12,447
\$200,000	\$171,146	\$28,854

VectorBuilder Store Credit is calculated using a graduated bonus rate system.



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