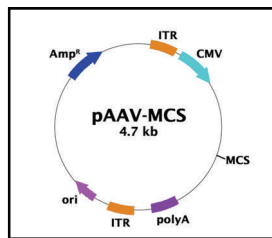


AAV Expression

Choose your Viral Vector for Gene Delivery				
	Adenovirus	Adeno-Associated Virus (AAV)	Lentivirus (HIV-1, FIV, SIV)	Retrovirus (MMLV)
Gene Expression	Transient	Transient or Stable	Transient or Stable	Stable
Infect Dividing Cells	Yes	Yes	Yes	Yes
Infect Non-dividing Cells	Yes	Yes	Yes	No
Integration into Target Cell Genome	No	Yes	Yes	Yes
Immune Response in Target Cells	High	Very Low	Low	Moderate
Relative Viral Titer	XXXX	XXX	XXX	XX
Relative Transduction Efficiency	XXXX	XXX	XXX	XX

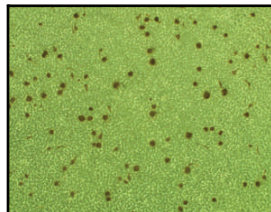
AAV Expression Procedure



Package Virus with Gene of Interest
(p. 2-3)



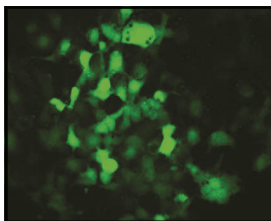
Measure Viral Titer
(p. 4)



Purify your AAV
(p. 5)



Infect Target Cells
(p. 5)



Generate high-titer adeno-associated virus with a flexible and user-friendly expression system

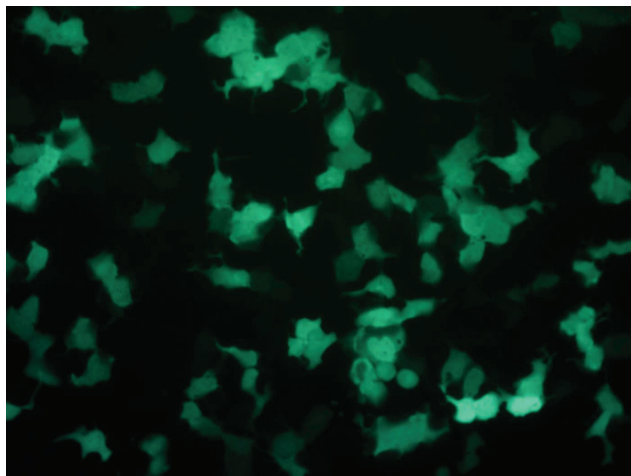
AAV Helper Free Expression and Packaging Systems

Production of recombinant adeno-associated virus requires certain genes from the adenovirus genome, which means that a “helper” adenovirus usually needs to be present during viral packaging.

Our AAV Helper Free Expression Systems eliminate the need for a helper adenovirus. Most of the required adenoviral genes (E2A, E4 and VA RNA) are provided in a pHelper plasmid, while the E1 gene is provided by the 293 cells.

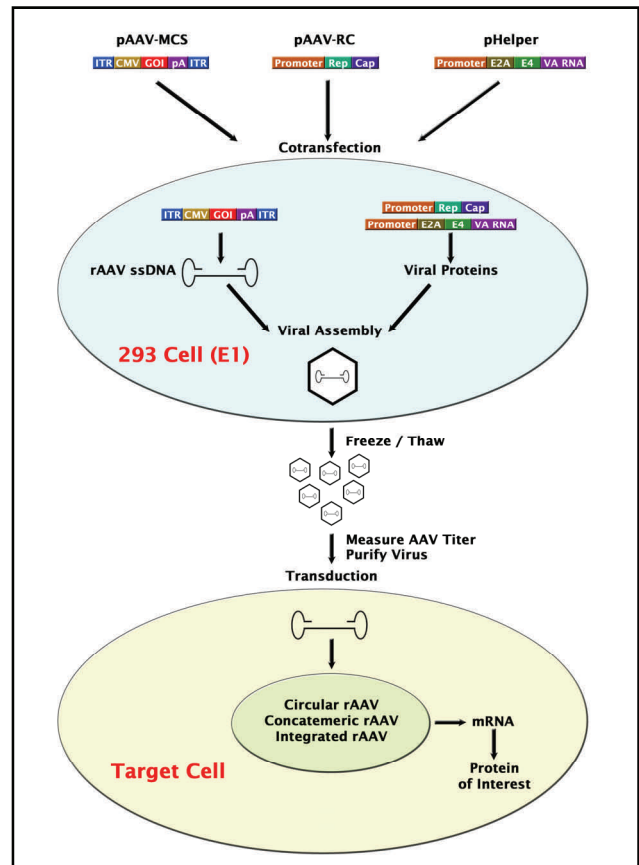
We offer the most comprehensive and flexible line of AAV Helper Free Expression Systems, Packaging Systems, and Expression Vectors commercially available. Choose from 6 native AAV serotypes or our new DJ and DJ/8 systems (see details on following page). In addition, you can buy only the plasmids you need:

- Complete Expression Systems include packaging vectors, an expression vector to clone your gene of interest, and a GFP control vector
- Packaging Systems without the expression vector
- Expression Vectors alone (choice of 6)



Transduction of AAV2-GFP in 293 cells using the AAV Helper Free Expression System.

When packaging your adeno-associated virus, consider our **293AAV Cell Line**. This cell line is derived from the parental HEK 293 cell line, but has been specifically selected for use in AAV expression. You'll see firmer attachment to culture plates, flattened morphology, and a much larger surface area for higher viral yields and superior transfection.



AAV Production and Gene Delivery Procedure using the AAV Helper Free Expression System.

Select your AAV Helper Free Vectors

First determine which plasmids you need to construct your virus, then use the table below.

	AAV Helper Free Expression Systems	AAV Helper Free Packaging Systems	AAV Helper Free Expression Vectors
Expression Vector	X		X
pHelper Vector	X	X	
pRC Vector	X	X	
GFP Control Vector	X	X	
Application	Best value: all the plasmids you need to make a recombinant virus containing your gene of interest	Co-transfect pHelper and pRC plasmids with your own AAV expression vector	Clone your gene of interest here and co-transfect with an AAV packaging system

Select your AAV Serotype

When selecting an **AAV Helper Free Expression System** or **Packaging System**, choose from 8 serotypes:

- Native serotypes AAV-1 through AAV-6
- AAV-DJ, engineered by DNA family shuffling to create a hybrid capsid from 8 native serotypes; AAV-DJ vectors convey significantly higher *in vitro* infectivity rates compared to native serotypes across a broad range of cells and tissues (see table below)
- AAV-DJ/8, a mutant of AAV-DJ that exhibits increased uptake in brain and other tissues *in vivo*, similar to native serotypes 8 and 9

Relative *In Vitro* Infectivity Rates of AAV Serotypes*

Cell Line	AAV-1	AAV-2	AAV-3	AAV-4	AAV-5	AAV-6	AAV-8	AAV-9	AAV-DJ	AAV-DJ/8
Huh-7	13	100	2.5	0.0	0.1	10	0.7	0.0	500	0.2
HEK293	25	100	2.5	0.1	0.1	5	0.7	0.1	500	0.3
HeLa	3	100	2.0	0.1	6.74	1	0.2	0.1	667	0.2
HepG2	3	100	16.7	0.3	1.7	5	0.3	ND	1250	0.5
Hep1A	20	100	0.2	1.0	0.1	1	0.2	0.0	400	0.1
911	17	100	11	0.2	0.1	17	0.1	ND	500	0.0
CHO	100	100	14	1.4	333	50	10	1.0	25000	5.0
COS	33	100	33	3.3	5.0	14	2.0	0.5	500	0.3
MeWo	10	100	20	0.3	6.7	10	1.0	0.2	2857	1.0
NIH3T3	10	100	2.9	2.9	0.3	10	0.3	ND	500	0.1
A549	14	100	20	ND	0.5	10	0.5	0.1	1000	0.1
HT1180	20	100	10	0.1	0.3	33	0.5	0.1	333	0.2
Monocytes	1111	100	ND	ND	125	1429	ND	ND	100	ND
Immature DC	2500	100	ND	ND	222	2857	ND	ND	200	ND
Mature DC	2222	100	ND	ND	333	3333	ND	ND	100	ND

*Normalized to AAV-2 = 100. ND = Not determined.

Need a recombinant AAV with a reporter gene? Choose one of our **Premade AAV-GFP Controls**. These premade viruses have a variety of uses including troubleshooting infectivity issues.

Quantify your AAV in less than 2 hours
using a fluorescence plate reader

QuickTiter™ AAV Quantitation Kit

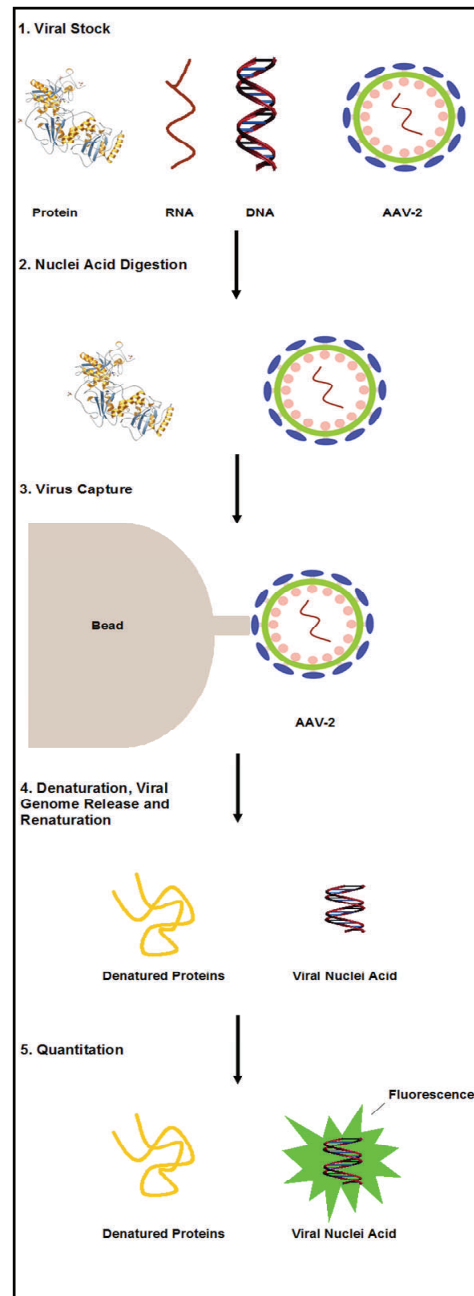
Once you've harvested your AAV you will want to measure the titer of your virus prior to infecting your target cells.

We have developed a quick, easy method to quantify the AAV particles in your viral stock. The QuickTiter™ AAV Quantitation Kit measures the concentration of AAV in genome copies per mL (GC/mL) in less than two hours.

Simply prepare a standard curve using the DNA standard included. The standards are run alongside your samples in any fluorescence plate reader. Compare the relative fluorescence units (RFU) of your sample to the standard curve to determine your AAV titer.

The QuickTiter™ AAV Quantitation Kit will quantify purified AAV of any serotype. If you decide not to purify your AAV, the QuickTiter™ AAV Quantitation Kit works just as well on unpurified AAV-2 and AAV-DJ.

Tip: After purifying your virus, it is a good practice to measure your viral titer again, regardless of the purification method used.



Assay Protocol for the QuickTiter™ AAV Quantitation Kit.

Purify your AAV quickly and easily
for superior infection efficiency

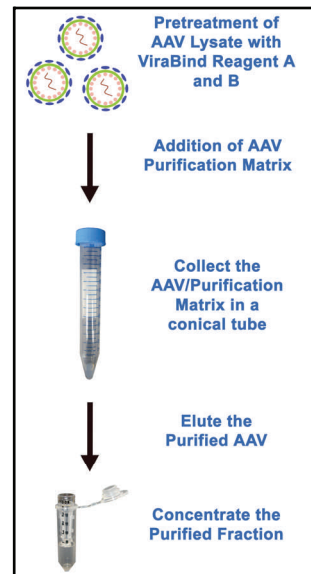
ViraBind™ AAV Purification Kits

Purification of your AAV is important in obtaining good results, but the thought of time-consuming ultracentrifugation might tempt you to skip this crucial step.

ViraBind™ AAV Purification Kits use a one-step proprietary matrix followed by further purification and concentration using a centrifugal concentrator. The result is a higher AAV yield with higher purity in a fraction of the time.

ViraBind™ Purification Kits are available in two sizes:

- The standard kit can process 1 x 15cm dish or 2 x 10cm dishes per prep
- The mega kit can process 10 x 15cm dishes per prep



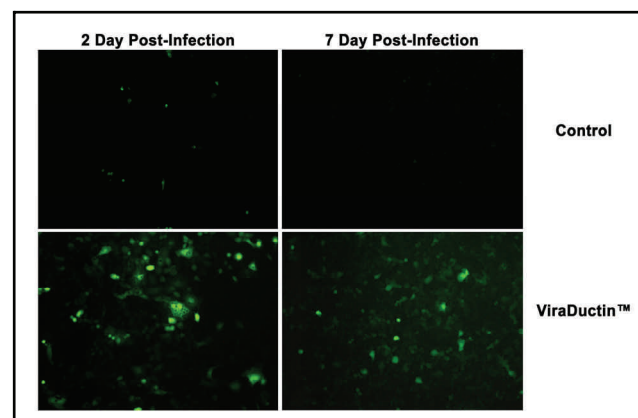
Procedure for the
ViraBind™ AAV
Purification Kit.

Easily increase AAV infection efficiency
in your target cells

ViraDuctin™ AAV Transduction Kit

After you've determined the titer of your purified AAV, it is time to infect your target cells. Successful gene expression studies using AAV depend on high transduction efficiencies, but infection rates tend to be highest in S-phase cells which can account for a very small percentage of a cell population.

ViraDuctin™ AAV Transduction Kit can significantly increase the transduction efficiency of AAV vectors in both dividing and non-dividing cells. Efficiency increases are greatest in non-dividing cells compared to transductions without the ViraDuctin™ kit. However, noticeable increases are still seen even in S-phase cells.



Increased transduction efficiency of AAV2-GFP with the
ViraDuctin™ AAV Transduction Kit.

Ordering Information and Published Citations

AAV Helper Free Expression Systems

Each of these complete expression systems contains 4 individual plasmids: pHelper, pRC (serotype-specific), an expression vector, and a GFP control vector.

Product Name	Size / Qty	Catalog Number
AAV-1 Helper Free Expression System	1 Kit	VPK-410-SER1
AAV-1 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-SER1
AAV-1 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-SER1
AAV-1 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-SER1
AAV-1 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-SER1
AAV-1 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-SER1
AAV-2 Helper Free Expression System	1 Kit	VPK-410-SER2
AAV-2 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-SER2
AAV-2 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-SER2
AAV-2 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-SER2
AAV-2 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-SER2
AAV-2 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-SER2
AAV-3 Helper Free Expression System	1 Kit	VPK-410-SER3
AAV-3 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-SER3
AAV-3 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-SER3
AAV-3 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-SER3
AAV-3 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-SER3
AAV-3 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-SER3
AAV-4 Helper Free Expression System	1 Kit	VPK-410-SER4
AAV-4 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-SER4
AAV-4 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-SER4
AAV-4 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-SER4
AAV-4 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-SER4
AAV-4 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-SER4
AAV-5 Helper Free Expression System	1 Kit	VPK-410-SER5
AAV-5 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-SER5
AAV-5 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-SER5
AAV-5 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-SER5
AAV-5 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-SER5
AAV-5 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-SER5
AAV-6 Helper Free Expression System	1 Kit	VPK-410-SER6
AAV-6 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-SER6
AAV-6 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-SER6
AAV-6 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-SER6
AAV-6 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-SER6
AAV-6 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-SER6

Ordering Information and Published Citations

AAV Helper Free Expression Systems (continued)

Each of these complete expression systems contains 4 individual plasmids: pHelper, pRC (serotype-specific), an expression vector, and a GFP control vector.

Product Name	Size / Qty	Catalog Number
AAV-DJ Helper Free Expression System	1 Kit	VPK-410-DJ
AAV-DJ Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-DJ
AAV-DJ Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-DJ
AAV-DJ Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-DJ
AAV-DJ Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-DJ
AAV-DJ Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-DJ
AAV-DJ/8 Helper Free Expression System	1 Kit	VPK-410-DJ-8
AAV-DJ/8 Helper Free Bicistronic Expression System (Puro)	1 Kit	VPK-415-DJ-8
AAV-DJ/8 Helper Free Bicistronic Expression System (Neo)	1 Kit	VPK-416-DJ-8
AAV-DJ/8 Helper Free Bicistronic Expression System (Hygro)	1 Kit	VPK-417-DJ-8
AAV-DJ/8 Helper Free Bicistronic Expression System (GFP)	1 Kit	VPK-418-DJ-8
AAV-DJ/8 Helper Free Bicistronic Expression System (Blasticidin)	1 Kit	VPK-419-DJ-8

AAV Helper-Free Packaging Systems

Each of our packaging systems contains 3 individual plasmids: pHelper, pRC (serotype-specific), and a GFP control vector.

Product Name	Size / Qty	Catalog Number
AAV-1 Helper Free Packaging System	1 Kit	VPK-401
AAV-2 Helper Free Packaging System	1 Kit	VPK-402
AAV-3 Helper Free Packaging System	1 Kit	VPK-403
AAV-4 Helper Free Packaging System	1 Kit	VPK-404
AAV-5 Helper Free Packaging System	1 Kit	VPK-405
AAV-6 Helper Free Packaging System	1 Kit	VPK-406
AAV-DJ Helper Free Packaging System	1 Kit	VPK-400-DJ
AAV-DJ/8 Helper Free Packaging System	1 Kit	VPK-400-DJ-8

AAV Expression Vectors

Product Name	Size / Qty	Catalog Number
pAAV-MCS Expression Vector	10 µg	VPK-410
pAAV-IRES-Puro Expression Vector	10 µg	VPK-415
pAAV-IRES-Neo Expression Vector	10 µg	VPK-416
pAAV-IRES-Hygro Expression Vector	10 µg	VPK-417
pAAV-IRES-GFP Expression Vector	10 µg	VPK-418
pAAV-IRES-Bsd Expression Vector	10 µg	VPK-419

Ordering Information and Published Citations

AAV Control Plasmids

Product Name	Size / Qty	Catalog Number
pAAV-Cre Control Vector	10 µg	AAV-401
pAAV-GFP Control Vector	10 µg	AAV-400
pAAV-LacZ Control Vector	10 µg	AAV-402

AAV Cell Line

Product Name	Size / Qty	Catalog Number
293AAV Cell Line	10 ⁶ cells	AAV-100

Premade Reporter AAV Controls

Product Name	Concentration	Size / Qty	Catalog Number
AAV1-GFP Control Virus	1 x 10 ¹² GC/mL	50 µL	AAV-301
AAV2-GFP Control Virus	1 x 10 ¹² GC/mL	50 µL	AAV-302
AAV3-GFP Control Virus	1 x 10 ¹² GC/mL	50 µL	AAV-303
AAV5-GFP Control Virus	1 x 10 ¹² GC/mL	50 µL	AAV-305
AAV6-GFP Control Virus	1 x 10 ¹² GC/mL	50 µL	AAV-306

AAV Quantitation Kit

Product Name	Detection	Size / Qty	Catalog Number
QuickTiter™ AAV Quantitation Kit	Fluorometric	20 Assays	VPK-145

AAV Purification Kits

Product Name	Capacity/Prep	Size / Qty	Catalog Number
ViraBind™ AAV Purification Kit	2 x 10cm dishes	10 Preps	VPK-140
ViraBind™ AAV Purification Mega Kit	10 x 15cm dishes	2 Preps	VPK-141
		10 Preps	VPK-141-5

Recent Product Citation

Uchida, S. et al. (2010). Early life stress enhances behavioral vulnerability to stress through the activation of REST4-mediated gene transcription in the medial prefrontal cortex of rodents. *J. Neurosci.* **30**:15007-15018. (VPK-140)

AAV Transduction Kits

Product Name	Size / Qty*	Catalog Number
ViraDuctin™ AAV Transduction Kit	10 Transductions	AAV-200
	50 Transductions	AAV-201

*Based on use in a 35 mm culture dish. The kit may also be used with other formats. See product insert for details.

Trademark Information

QuickTiter, ViraBind, and ViraDuctin are trademarks of Cell Biolabs, Inc.



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