AAV9 Xpress ELISA Manual

Enzyme-linked immunosorbent assay (ELISA) for the quantitative determination of AAV serotype 9 particles in cell culture supernatants and purified virus preparations.

Catalog No.:	PRAAV9XP
Contents:	12 x 8 Determinations
Storage conditions:	2 – 8°C
Version:	02

For research use only.

PROGEN

Table of Contents

1. Introduction

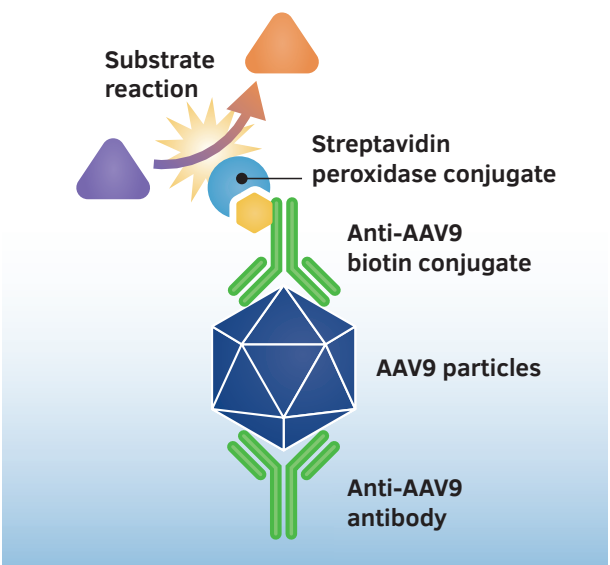
Adeno-associated viruses (AAV) are non-pathogenic ssDNA viruses, which are the subject of many in-depth studies as viral vectors for gene therapy. The virus transduces a variety of dividing and non-dividing cells showing long-term gene expression with low cellular immune response. AAV has been used in several clinical trials (e.g. FIX, CFTR, Parkinson's, Canavan disease) showing no serious adverse vector related effects.

Methods for characterizing AAV preparations currently include titration ELISA, qPCR, ddPCR, DNA dot blot, determination of transducing units, infectious center assay, SDS-PAGE and electron microscopy.

Immunotitration by PROGEN's **AAV9 Xpress ELISA** offers a fast, sensitive and reproducible method for titration of intact AAV9 wild-type virions, AAV9 recombinant virions as well as assembled and intact empty AAV9 capsids.

2. Test Principle

The assay is based on the sandwich ELISA technique (*see figure below*). A monoclonal antibody specific for a conformational epitope on assembled AAV9 capsids is coated onto strips of a microtiter plate and is used to capture AAV9 particles from the specimen. Captured AAV particles are detected in two steps:



1. A biotin-conjugated monoclonal AAV9 antibody is bound to the immune complex.

2. A streptavidin peroxidase conjugate reacts with the biotin molecules.

Adding substrate solution results in a color reaction, which is proportional to the number of specifically bound viral particles. The absorbance is measured photometrically at 450 nm (optional: reference wavelength at 650 nm).

The provided Kit Control contains an AAV9 particle preparation of empty capsids. A two-fold serial dilution of the material results in a typical titration curve. The curve allows the quantitative determination of samples of an unknown particle titer.

3. Required Material

Precision pipettes

Sterile pipette tips

Distilled water

Reaction tubes

Incubator at 37°C and, if necessary, incubator at room temperature (20-26°C)

ELISA Reader (450 nm, optional: reference wavelength at 650 nm)

4. Test Kit Contents

MTP	Microtiter plate, 12 x 8-well-strips, coated with mouse monoclonal antibody against AAV9 in re-sealable aluminum bag with desiccant, 1 plate. Ready-to-use.
KC	Kit Control AAV9 (standard), lyophilized, 3 vials. Reconstitute before use.
ASSB 20x	Assay Buffer 20x, 3 x 20 ml. Dilute before use.
Biotin conc.	Anti-AAV9 Biotin Conjugate 10x, lyophilized, 2 vials. Reconstitute, pool in one of the vials and dilute before use.
Strep-HRP conc.	Streptavidin Peroxidase Conjugate 10x, 1 vial, 1.5 ml. Dilute before use.
TMB	Substrate, TMB (tetramethylbenzidine), 12 ml. Ready-to-use.
STOP	Stop Solution, 13 ml. Ready-to-use.
Adhesive foil	2 pieces.

5. Preparation of Reagents

Prior to use, allow kit to reach room temperature (RT, 20 – 26°C).

Preparation and pre-dilution of components:
Dilute required reagent volumes immediately before use.

ASSB 20x (Assay Buffer 20x)

The buffer concentrate may contain salt crystals, which dissolve quickly at 37°C (e.g. in a water bath). Let buffer cool down to RT before use.

1. Dilute **1:20** with distilled water.
2. The diluted component is named **ASSB 1x** (about 30 ml ASSB 1x per strip is needed).

KC (Kit Control)

1. Reconstitute each KC with **500 µl ASSB 1x**.
2. Incubate for 5 min at RT and then mix by rolling for another 5 min. Avoid vortexing.
3. Find the amount of capsids/ml on the label and the lot-specific Quality Control Certificate.

Biotin conc. (Anti-AAV9 Biotin Conjugate 10x)

1. Reconstitute each vial with **750 µl ASSB 1x**.
2. Incubate for 5 min at RT and then mix by rolling for another 5 min. **Pool the 1.5 ml in one of the vials**. Avoid vortexing.
3. Immediately before use, dilute **1:10** with **ASSB 1x**.
4. The diluted component is named **Biotin 1x**.

Strep-HRP conc. (Streptavidin Peroxidase Conjugate 10x)

1. Immediately before use, dilute **1:10** with **ASSB 1x**.
2. The diluted component is named **Strep-HRP 1x**.
3. Store in the dark until use.

6. Storage & Stability

Store the test kit and components at 2 – 8°C. The unopened reagents are stable at 2 – 8°C until the indicated expiry date.

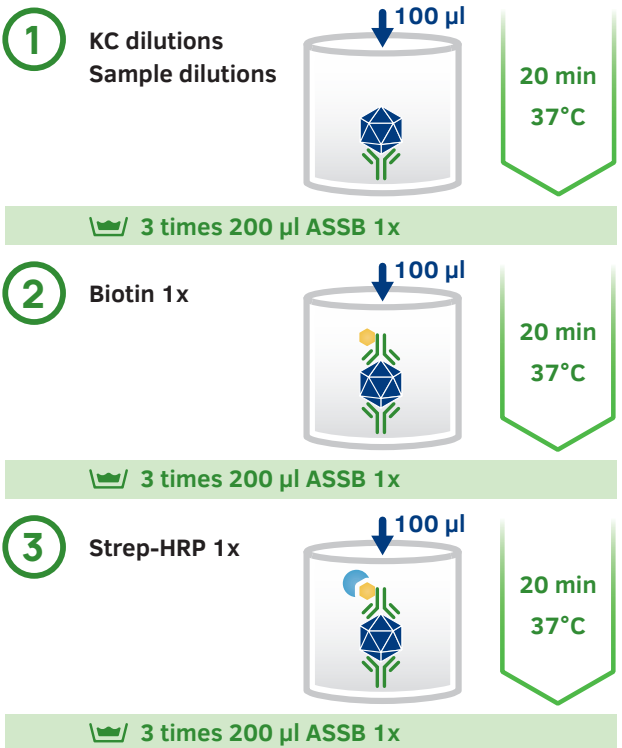
Stability after opening:

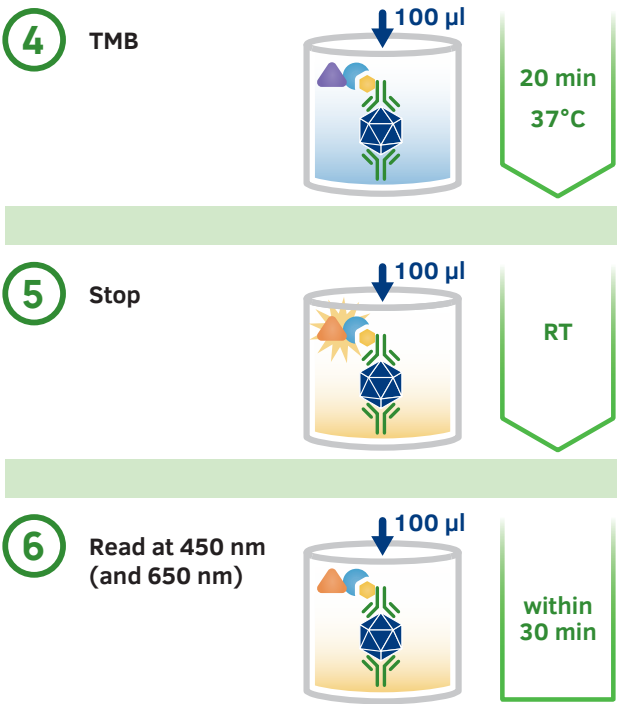
4 weeks at 2 – 8°C: ASSB 20x, Strep-HRP conc., TMB, STOP

4 weeks after reconstitution at 2 – 8°C: KC, Biotin conc.

4 weeks in the re-sealable aluminum bag with desiccant at 2 – 8°C: MTP

7. Short Protocol




4
TMB
100 µl
20 min
37°C
5
Stop
100 µl
RT
6
Read at 450 nm
(and 650 nm)
100 µl
within
30 min

8. Kit Control and Specimen Dilution

We recommend diluting the reconstituted Kit Control (**KC**) in **ASSB 1x** in steps of 1:2:

Undiluted → (1:2) 1:2 → (1:2) 1:4 → (1:2) 1:8 → (1:2) 1:16 → (1:2) 1:32 → (1:2) 1:64

An example for dilutions is provided in Table 1 on the lot-specific Example Curve document. Please find the lot-specific titer of the Kit Control on the vial and on the Quality Control Certificate. Both the Example Curve document and the Quality Control Certificate, are provided with the kit.

Pre-dilute your **specimen** containing AAV9 particles in **ASSB 1x** in serial dilution steps to reach a concentration within the recommended quantification range of the ELISA (*please see section 10*).

It might be necessary to perform a pre-experiment to determine the approximate titer of the unknown specimen before analyzing further dilutions.

See page 13 for an example of a plate layout.

Example for a plate layout:

	1	2	3	4	5	6	7	8
A	**KC0**	**KC0**	Sp1	Sp1				
B	**KC1**	**KC1**	Sp2	Sp2				
C	**KC2**	**KC2**	etc.	etc.				
D	**KC3**	**KC3**						
E	**KC4**	**KC4**						
F	**KC5**	**KC5**						
G	**KC6**	**KC6**						
H	**KC7**	**KC7**						

Sp1 = Specimen dilution 1 | Sp2 = Specimen dilution 2

Prepare dilutions:	
KC0	ASSB 1x
KC1	reconstituted Kit Control
KC2	250 µl **KC1** + 250 µl ASSB 1x
KC3	250 µl **KC2** + 250 µl ASSB 1x
etc.	

9. Test Procedure

1. Pipette 100 µl of ASSB 1x (KC0), Kit Control serial dilutions and specimen (**both in ASSB 1x**) in duplicates into the corresponding wells of the microtiter strips. Seal strips with adhesive foil and incubate for **20 min at 37°C**.

2. Discard content of microtiter strips. For washing, pipette 200 µl of **ASSB 1x** into each well, incubate approximately 5 sec, discard and tap inverted plate onto absorbent paper. Carry out **three** washing steps in total.

3. Prepare Biotin 1x. Pipette 100 µl of **Biotin 1x** into each well. Seal strips with adhesive foil and incubate for **20 min at 37°C**.

4. Repeat washing as described in step 2.

5. Prepare Strep-HRP 1x. Pipette 100 µl of **Strep-HRP 1x** into each well. Seal strips with adhesive foil and incubate for **20 min at 37°C**.

6. Repeat washing as described in step 2.

7. Pipette 100 µl of ready-to-use **TMB** into each well. Seal strips with adhesive foil and incubate for **20 min at 37°C**.

8. Stop color reaction by adding 100 µl of **STOP** into each well.

9. Make sure no air bubbles are in the wells. **Within 30 min**, measure color intensity with a photometer at a wavelength of 450 nm (optional: reference wavelength at 650 nm).

10. Calculation of Results

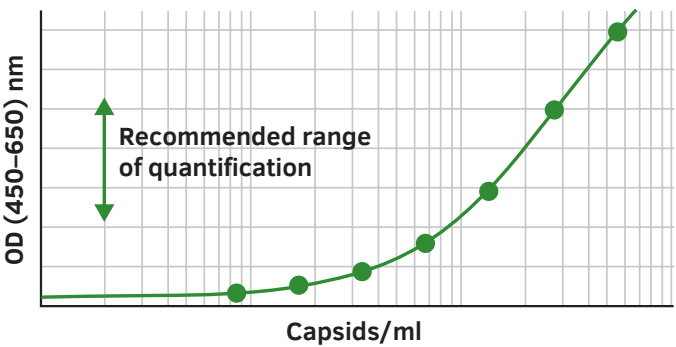
If applicable, subtract values measured at 650 nm reference wavelength from values at 450 nm. The test is also valid if you use OD values at 450 nm only.

Calculate the average absorbance values for each duplicate set of Kit Control dilutions and specimen dilutions.

Create a standard curve by plotting the mean absorbance value of each Kit Control dilution (y-axis, linear scale) against the corresponding concentration (x-axis, logarithmic scale recommended).

Use a best fit curve for calculating the results. We suggest using a suitable computer program for the calculation. A 4-parameter logistic fit (4PL) is recommended. Calculate the particle titer of your specimens.

The kit is quantitative over the whole range of Kit Control dilutions. For highest accuracy, the OD values of unknown samples should ideally be in the recommended range for quantification:



Multiply the value obtained by the dilution factor to determine the amount of capsids/ml in the sample.

Please note:
The Kit Control curve needs to be determined for each experiment individually. For further guidance take a look at the lot-specific Example Curve provided with the kit.

11. Test Validity

The absorbance value of the undiluted Kit Control should be > 1.5.

The absorbance value of the Blank should be < 0.4.

12. Test Characteristics

The Kit Control has been calibrated on an internally established reference standard. The internal reference standard is a preparation of full capsids, which has been characterized by qPCR and ddPCR (DNA quantification) and TEM (ratio of full to empty capsids).

13. General Information

For professional use.

Release notes

The instruction manual is only valid in combination with the lot-specific documents (➔ *Example Curve and Quality Control Certificate*), which are enclosed in each kit.

Please make sure to use the instruction manual with the version number that corresponds to the number on the lot-specific documents!

Precautions

All liquid components except TMB and STOP contain a preservative. Do not swallow. Avoid any contact with skin or mucous epithelia!

STOP (sulphuric acid) and TMB may cause skin or eye irritation. In the event of eye contact, rinse out immediately with plenty of water and consult a physician!

Safety data sheet is available on request.

Disposal

Product: Chemicals and biological materials must be disposed of in compliance with the respective national regulations.

Packaging: Packaging must be disposed of in compliance with the respective national regulations. Handle contaminated packaging in the same way as the product itself. If not officially specified otherwise, non-contaminated packaging may be treated like household waste or may be recycled.

Transport damages

If a kit is considerably damaged, please contact the manufacturer or local distributor. Do not use damaged components for test procedure. Such components or kits should be stored at 2 – 8°C until the complaint is handled.

14. References

Mietzsch, M. *et al.* OneBac: platform for scalable and high-titer production of adeno-associated virus serotype 1 – 12 vectors for gene therapy. Hum. Gene Ther. 25, 212 – 22 (2014).

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