Acetylcholinesterase Assay Kit (Green Fluorescence)

Catalog Number KA4131

200 assays

Version: 01

Intended for research use only

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Introduction

Intended Use

This kit uses our outstanding Thiolite Green to quantify the thiocholine produced from the hydrolysis of acetylthiocholine by AChE in blood, in cell extracts, and in other solutions.

Background

Acetylcholinesterase (AChE) is one of the most crucial enzymes for nerve response and function. AChE degrades the neurotransmitter acetylcholine (ACh) into choline and acetic acid. It is mainly found at neuromuscular junctions and cholinergic synapses in the central nervous system, where its activity serves to terminate the synaptic transmission. AChE inhibitors are among the key drugs approved for Alzheimer's disease (AD) and myasthenia gravis.

Principle of the Assay

This kit uses our outstanding Thiolite Green to quantify the thiocholine produced from the hydrolysis of acetylthiocholine by AChE in blood, in cell extracts, and in other solutions. Thiolite Green is not fluorescent until reacted with a thiol group. It has spectral properties similar to those of fluorescein, making this assay compatible with almost every fluorescence instrument. The fluorescence intensity of Thiolite Green is used to measure AChE activity. Compared to the existing thiol probes (e.g., mBBr and bBBr), Thiolite Green is much more sensitive.

Acetylcholinesterase Assay Kit (Green Fluorescence) provides an ultrasensitive fluorometric one- step assay to detect as little as 0.01mU AChE in a 100 µL assay volume (0.1 mU/mL) as shown in Figure 1. The assay can be performed in a convenient 96-well or 384-well microtiter-plate format. Its signal can be easily read by a fluorescence microplate reader at Ex/Em = 490/520 nm. Acetylcholinesterase Assay Kit (Green Fluorescence) provides the most sensitive method for the detection of AChE activity.

✓ Key Features

- Broad Application: Can be used for quantifying acetylcholinesterase in solutions, and in cell extracts.
- Sensitive: Detect as low as 0.01mU of acetylcholinesterase in solution.
- Continuous: Easily adapted to automation without a separation step.
- Convenient: Formulated to have minimal hands-on time.
- Non-Radioactive: No special requirements for waste treatment.

General Information

Materials Supplied

List of component

Component	Amount
Component A: Thiolite Green	1 vial
Component B: Assay Buffer	25 mL
Component C: Acetylthiocholine	1 vial
Component D: Acetylcholinesterase Standard (5 units)	1 vial
Component E: DMSO	100 µL

Storage Instruction

Keep in freezer. Avoid exposure to light

Precautions for Use

- ✓ This kit is For Research Use Only.
- ✓ Avoid exposure to light

Assay Protocol

Reagent Preparation

✓ Prepare stock solutions:

1. 200X Thiolite Green stock solution: Add 50 µL of DMSO (Component E) into the vial of Thiolite Green (Component A) to make 200X Thiolite Green stock solution.
   Note: The unused Thiolite Green stock solution should be divided into single use aliquots. Store at -20 °C and avoid exposure to light.
2. 500X acetylthiocholine stock solution: Add 0.6 mL of ddH_2O into the vial of acetylthiocholine (Component C).
   Note: The unused acetylthiocholine stock solution should be divided into single use aliquots and stored at -20 °C.
3. Acetylcholinesterase standard stock solution: Add 100 µL of ddH_2O with 0.1% BSA into the vial of acetylcholinesterase standard (Component D) to make a 50 units/mL acetylcholinesterase standard stock solution.
   Note: The unused acetylcholinesterase standard stock solution should be divided into single use aliquots and stored at -20 °C.

✓ Prepare acetylthiocholine reaction mixture:

Note: the acetylthiocholine reaction mixture is not stable, need be used within 30 min.

Prepare the acetylthiocholine reaction mixture according to the following table and keep from light.

Table 1. Acetylthiocholine reaction mixture for one 96-well plate

Components	Volume
Assay buffer (Component B)	5 mL
Thiolite Green stock solution (200X, from Prepare stock solutions Step 1)	25 µL
Acetylthiocholine stock solution (500X, from Prepare stock solutions Step 2)	10 µL
Total volume	5.03 mL

Sample Preparation

✓ Prepare serially diluted acetylcholinesterase standards (0 to100 mU/mL):

1. Add 20 µL of 50 units/mL acetylcholinesterase standard stock solution (from Prepare stock solutions Step 3) to 980 µL assay buffer (Component C) to generate 1000 mU/mL acetylcholinesterase standard solution.
   Note: Diluted acetylcholinesterase standard solution is unstable and should be used within 4 hours.
2. Take 200 µL of 1000 mU/mL acetylcholinesterase standard solution to perform 1:10 and 1:3 serial dilutions to get 100, 30, 10, 3, 1, 0.3, 0.1 and 0 mU/mL serially diluted acetylcholinesterase standards.
3. Add serially diluted acetylcholinesterase standards and/or acetylcholinesterase-containing test samples

into a solid black 96-well microplate as described in Plate Layout and Table 1.

Note: Treat cells or tissue samples as desired.

✓ Reagent composition for each well

Acetylcholinesterase Standards	Blank Control	Test Sample
Serial Dilutions*: 50 µL	Assay Buffer: 50 µL	50 µL

**Note: Add the serially diluted acetylcholinesterase standards from 0.01 to100 mU/mL into wells from AS1 to AS7 in duplicate.*

Assay Procedure

✓ Run acetylcholinesterase assay:

1. Add 50 µL of acetylthiocholine reaction mixture (from Prepare acetylthiocholine reaction mixture Step 1) into each well of the acetylcholinesterase standard, blank control, and test samples (see Prepare serially diluted acetylcholinesterase standards Step 3) to make the total acetylcholinesterase assay volume of 100 µL/well.

   Note: For a 384-well plate, add 25 µL of sample and 25 µL of acetylthiocholine reaction mixture into each well.
2. Incubate the reaction at room temperature for 10 to 30 minutes, protected from light.
3. Monitor the fluorescence increase with a fluorescence microplate reader at Ex/Em = 490/520 nm.

✓ Summary

1. Prepare ACh reaction mixture (50 µL)
2. Add AChE standards and/or AChE test samples (50 µL)
3. Incubate at room temperature for 10-30 minutes
4. Monitor fluorescence intensity at Ex/Em = 490/520 nm

   Note: Thaw all the kit components at room temperature before starting the experiment.

Data Analysis

Calculation of Results

The fluorescence in blank wells (with the assay buffer only) is used as a control, and subtracted from the values for those wells with the acetylcholinesterase reactions. An acetylcholinesterase standard curve is shown in Figure 1.

Note: The fluorescence background increases with time, thus it is important to subtract the fluorescence intensity value of the blank wells for each data point.

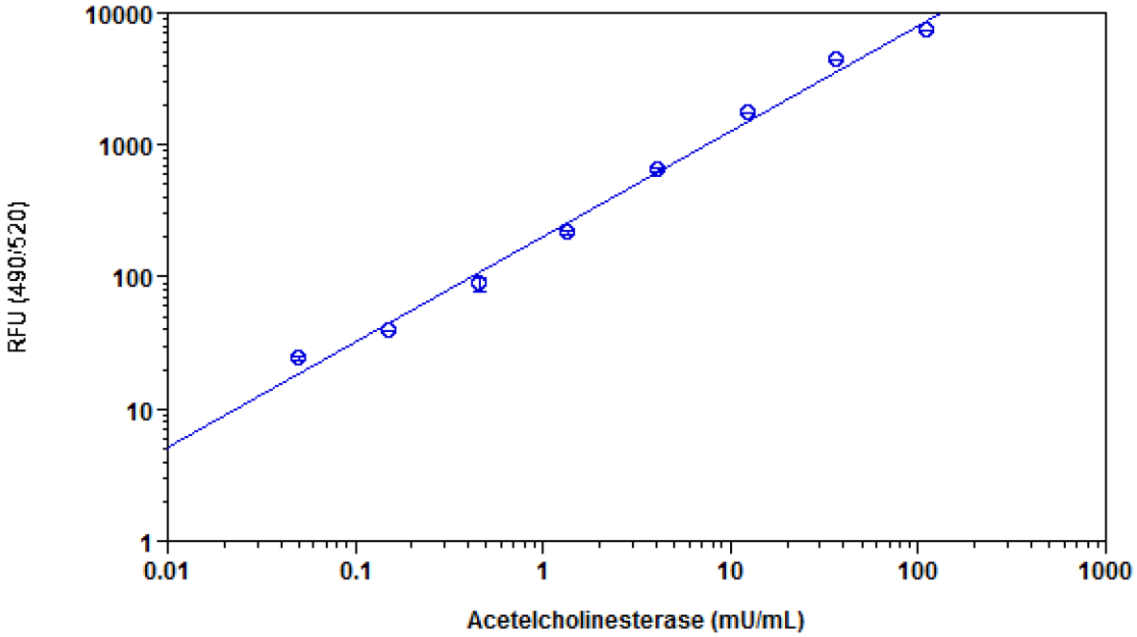

Figure 1. Acetylcholinesterase dose response was measured in a solid black 96-well plate with Acetylcholinesterase Assay Kit (Green Fluorescence) using a Gemini fluorescence microplate reader (Molecular devices). As low as 0.01 mU/well of acetylcholinesterase can be detected with 20 minutes incubation (n=3).

Resources

References

1. Kovarik, Z et al. (2003). Acetylcholinesterase active centre and gorge conformations analysed by combinatorial mutations and enantiomeric phosphonates. Biochem. J. (2003) 373, 33–40.
2. Ordentlich, A. et al. (1996). The Architecture of Human Acetylcholinesterase Active Center Probed by Interactions withSelected Organophosphate Inhibitors. J. Biol. Chem. 271 (20):11953–11962.
3. Magnottl, RA. et al. (1987). Measurement of Acetylcholinesterase in Erythrocytes in the Field. Clin. Chem. 33/10, 1731-1 735.

Plate Layout

	1	2	3	4	5	6	7	8	9	10	11	12
A	BL	BL	TS	TS								
B	AS1	AS1										
C	AS2	AS2										
D	AS3	AS3										
E	AS4	AS4										
F	AS5	AS5										
G	AS6	AS6										
H	AS7	AS7										

AS= Acetylcholinesterase Standards

BL=Blank Control

TS=Test Samples.