Monoamine Oxidase Assay Kit

Catalog Number KA1632
100 assays
Version: 03

Intended for research use only
Introduction

Intended Use

- **Application**
  - MAO-A/B activity determination in biological samples.
  - Evaluation and screening for MAO inhibitors.

- **Features:**
  - Safe: Non-radioactive assay.
  - Sensitive and accurate: As low as 0.01 U/L MAO activity can be quantified.
  - Homogeneous and convenient: "Mix-incubate-measure" type assay. No wash and reagent transfer steps are involved.
  - Robust and amenable to HTS: can be readily automated on HTS liquid handling systems for processing thousands of samples per day.

Background

MONOAMINE OXIDASES (MAO, EC 1.4.3.4) are a family of mitochondrial enzymes that catalyze the oxidative deamination of monoamines. MAO dysfunction is thought to be responsible for a number of neurological disorders. Unusually high or low levels of MAOs in the body have been associated with depression, schizophrenia, substance abuse, attention deficit disorder, migraines, and irregular sexual maturation. MAO inhibitors are one of the major classes of drug prescribed for the treatment of depression.

Principle of the Assay

Monoamine Oxidase Assay Kit provides a convenient fluorimetric means to measure MAO enzyme activity. In the assay, MAO reacts with p-tyramine, a substrate for both MAO-A and MAO-B, resulting in the formation of $H_2O_2$, which is determined by a fluorimetric method ($\lambda_{em/ex} = 585/530$nm). The assay is simple, sensitive, stable and high-throughput adaptable.
General Information

Materials Supplied

List of component

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assay Buffer (pH 7.4)</td>
<td>12 mL</td>
</tr>
<tr>
<td>p-Tyramine</td>
<td>120 μL</td>
</tr>
<tr>
<td>Pargyline (20 mM)</td>
<td>50 μL</td>
</tr>
<tr>
<td>HRP Enzyme</td>
<td>120 μL</td>
</tr>
<tr>
<td>Clorgyline (20 mM)</td>
<td>50 μL</td>
</tr>
<tr>
<td>Dye Reagent</td>
<td>120 μL</td>
</tr>
<tr>
<td>Hydrogen Peroxide (3% H$_2$O$_2$)</td>
<td>100 μL</td>
</tr>
</tbody>
</table>

Storage Instruction

Store all components at -20°C. Shelf life: 6 months after receipt.

Materials Required but Not Supplied

Pipetting devices, centrifuge tubes, black flat bottom 96-well plate (e.g. Corning Costar).

Precautions for Use

- Precautions
  
    ✓ Reagents are for research use only. Normal precautions for laboratory reagents should be exercised while using the reagents.
Assay Protocol

Assay Procedure

Note:
1. Thiols (β-mercaptoethanol, dithioerythritol etc) at > 10 μM interfere with this assay and should be avoided in sample preparation.
2. Samples should be free of particle or precipitates. MAO can be extracted from a tissue by homogenization and differential centrifugation, e.g. Biochem. J. (1968) 108: 95. Store sample at -80°C.
3. Prior to assay, concentrations of protein, inhibitor, substrate and incubation time may need to be established for a given sample.

Use black flat-bottom plates. Prior to assay, bring all components to room temperature, briefly centrifuge tubes before opening.

Dilute the 20 mM inhibitors with H₂O to 10 μM (e.g. mix 5 μL 20 mM inhibitor with 10 mL H₂O).

1. To determine MAO-A activity, use 1 mM p-tyramine substrate and include a control with 0.5 μM MAO-A inhibitor clorgyline.
   Samples: dilute sample in Assay Buffer. Transfer 45 μL of each sample into two separate wells. Add 5 μL H₂O (SAMPLE) and 5 μL 10 μM clorgyline (CONTROL). Mix and incubate for 10 min at room temperature for the inhibitor to block MAO-A activity.

2. Calibrator. Mix 5 μL H₂O₂ with 1400 μL H₂O. Further dilute 5 μL of the resulting H₂O₂ in 780 μL H₂O to give 20 μM H₂O₂. Dilute calibrator with H₂O to give 20, 10, 5 and 0 μM H₂O₂.
   Transfer 50 μL calibrators into separate wells of the assay plate.

3. Prepare enough Working Reagent for all sample and calibrator wells. For each well, mix: 50 μL Assay Buffer, 1 μL p-tyramine, 1 μL Dye Reagent and 1 μL HRP Enzyme. Transfer 50 μL Working Reagent to all wells. Briefly tap plate to mix.

4. Incubate for 20 min in the dark. Read fluorescence intensity at λ_exc = 530 nm and λ_em = 585 nm.

To measure MAO-B activity, use 1 mM p-tyramine and include a control with 0.5 μM pargyline (MAO-B inhibitor). Procedure is the same as for MAO-A determination.

To screen for MAO inhibitors or characterize inhibitor potency (IC₅₀), mix 5 μL inhibitor with 45 μL sample and incubate for at least 10 min to allow the inhibitor to interact with the enzyme, prior to adding the Working Reagent.
Data Analysis

Calculation of Results

Plot H₂O₂ calibration curve and determine its Slope (μM⁻¹). MAO enzyme activity in the sample is calculated as

\[
\text{MAO Activity} = \frac{\text{RFU}_{\text{SAMPLE}} - \text{RFU}_{\text{CONTROL}}}{\text{Slope} \times t} \text{(U/L)}
\]

where \(\text{RFU}_{\text{SAMPLE}}\) and \(\text{RFU}_{\text{CONTROL}}\) are the measured fluorescence values of the sample and sample control (i.e., in the presence of the respective inhibitor pargyline or clorgyline). \(t\) is the incubation time (20 min).

Unit definition: one unit of MAO catalyzes the formation of 1 μmole H₂O₂ per min under the assay conditions.
Resources

References

