2-PMPA

### Chemical Properties

- **CAS No.:** 173039-10-6
- **Formula:** C₆H₁₁O₇P
- **Molecular Weight:** 226.12
- **Appearance:** N/A
- **Storage:** 0-4°C for short term (days to weeks), or -20°C for long term (months).

### Biological Description

#### Description

2-PMPA is a potent and selective inhibitor of glutamate carboxypeptidase II (GCPII) (IC₅₀=300 pM).

#### Targets (IC₅₀)

<table>
<thead>
<tr>
<th>Target</th>
<th>IC₅₀</th>
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<tbody>
<tr>
<td>GCPII</td>
<td>300pM</td>
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</table>

#### In vitro

2-PMPA is a potent and selective inhibitor of GCPII, an enzyme which catabolizes the abundant neuropeptide N-acetyl-aspartyl-glutamate (NAAG) to N-acetylaspartate (NAA) and glutamate. 2-PMPA demonstrates robust efficacy in numerous animal models of neurological disease. 2-PMPA is a highly polar compound with multiple negative charges causing significant challenges for analysis in biological matrices[1]. 2-PMPA reduces ketamine-induced decrease of cell viability and increase of LDH levels in the mixed cultures but not in the neuronal cultures[2].

#### In vivo

Intraperitoneal administration of 100 mg/kg 2-PMPA results in maximum concentration in plasma of 275 μg/mL at 0.25 h. The half-life, area under the curve, apparent clearance, and volume of distribution are 0.64 h, 210 μg·h/mL, 7.93 mL/min/kg, and 0.44 L/kg, respectively[1]. 2-PMPA at 250 mg/kg, in an anesthetized mouse, after an initial rise, produces a rapid decline and a striking attenuation in BOLD signals in gray matter. The signature of 2-PMPA on brain T₂* signals in gray matter at both 167 and 250 mg/kg includes a significant initial rise lasting several minutes[3]. 2-PMPA has neuroprotective activity in an animal model of stroke and anti-allodynic activity in CCI model. Administration of 2-PMPA (50 mg/kg) produces a mean peak concentration of 2-PMPA of 29.66±8.1 μM. This concentration is about 100,000 fold more than is needed for inhibition of NAAG peptidase, and indicates very good penetration to the brain. Administration of 50 mg/kg 2-PMPA (i.p.) produces a continuously increasing extracellular NAAG concentration, which starts directly after application[4].

#### Cell Research

Neuronal cultures and neuron–glia mixed cultures are treated with ketamine diluted in the culture medium (1, 3, 10, 30, 100, 300, 1000, 2000, 3000 μM) for 24 h to compare neurotoxicity in these two different cell cultures. 2-PMPA is selected to explore the protective effect on ketamine-induced neurotoxicity in these two different cell cultures. Cells are exposed to 2-PMPA (20, 50, 100 μM) half an hour before 10 μM ketamine treatment in neuronal cultures and 2 mM ketamine treatment in neuron–glia mixed cultures for 24 h. Different doses of ketamine chosen in neuronal cultures and neuron–glia mixed cultures are based on the results of cell viability tests[2].

#### Animal Research

Animal Model: Swiss-Webster (SW) mice

### Solubility Information

- **Solubility:**
  - H₂O: 28 mg/mL (123.83 mM)
  - (< 1 mg/ml refers to the product slightly soluble or insoluble)
Preparing Stock Solutions

<table>
<thead>
<tr>
<th></th>
<th>1 mg</th>
<th>5 mg</th>
<th>10 mg</th>
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<tbody>
<tr>
<td>1 mM</td>
<td>4.422 mL</td>
<td>22.112 mL</td>
<td>44.224 mL</td>
</tr>
<tr>
<td>5 mM</td>
<td>0.884 mL</td>
<td>4.422 mL</td>
<td>8.845 mL</td>
</tr>
<tr>
<td>10 mM</td>
<td>0.442 mL</td>
<td>2.211 mL</td>
<td>4.422 mL</td>
</tr>
<tr>
<td>50 mM</td>
<td>0.088 mL</td>
<td>0.442 mL</td>
<td>0.884 mL</td>
</tr>
</tbody>
</table>

Please select the appropriate solvent to prepare the stock solution, according to the solubility of the product in different solvents. The storage conditions and period of the stock solution: - 80 °C for 6 months; - 20 °C for 1 month. Please use it as soon as possible.

Reference