**Phenformin hydrochloride**

Cat. No.: HY-16397A  
CAS No.: 834-28-6  
Molecular Formula: C₁₀H₁₆ClN₅  
Molecular Weight: 241.72  
Target: AMPK  
Pathway: Epigenetics; PI3K/Akt/mTOR  
Storage: Powder -20°C 3 years  
4°C 2 years  
In solvent -80°C 6 months  
-20°C 1 month

**Solvent & Solubility**

**In Vitro**  
DMSO: < 1 mg/mL (insoluble or slightly soluble)

<table>
<thead>
<tr>
<th>Preparing Stock Solutions</th>
<th>Solvent</th>
<th>Mass</th>
<th>1 mg</th>
<th>5 mg</th>
<th>10 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 mM</td>
<td>4.1370 mL</td>
<td>20.6851 mL</td>
<td>41.3702 mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 mM</td>
<td>0.8274 mL</td>
<td>4.1370 mL</td>
<td>8.2740 mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mM</td>
<td>0.4137 mL</td>
<td>2.0685 mL</td>
<td>4.1370 mL</td>
</tr>
</tbody>
</table>

Please refer to the solubility information to select the appropriate solvent.

**In Vivo**

1. Add each solvent one by one: **10% DMSO >> 40% PEG300 >> 5% Tween-80 >> 45% saline**  
   Solubility: ≥ 0.6 mg/mL (2.48 mM); Clear solution

2. Add each solvent one by one: **10% DMSO >> 90% (20% SBE-β-CD in saline)**  
   Solubility: ≥ 0.6 mg/mL (2.48 mM); Clear solution

3. Add each solvent one by one: **10% DMSO >> 90% corn oil**  
   Solubility: ≥ 0.6 mg/mL (2.48 mM); Clear solution

**BIOLOGICAL ACTIVITY**

**Description**
Phenformin (hydrochloride) is a hydrochloride salt of phenformin that is an anti-diabetic drug from the biguanide class, can activate **AMPK** activity.

**IC₅₀ & Target**
AMPK

**In Vitro**
Phenformin stimulates the phosphorylation and activation of AMPKalpha1 and AMPKalpha2 without altering LKB1
Phenformin increases AMPK activity and phosphorylation in the isolated heart, the increase in AMPK activity is always preceded by and correlated with increased cytosolic [AMP][2]. Phenformin is a 50-fold more potent inhibitor of mitochondrial complex I than metformin. Phenformin robustly induces apoptosis in LKB1 deficient NSCLC cell lines. Phenformin at 2 mM similarly induces AMPK signaling as shown by increased P-AMPK and P-Raptor levels. Phenformin induces higher levels of cellular stress, triggering induction of P-Ser51 eIF2α and its downstream target CHOP, and markers of apoptosis at later times. Phenformin induces a significant increase in survival and therapeutic response in KLluc mice following long-term treatment[3]. Phenformin and AICAR increases AMPK activity in H441 cells in a dose-dependent fashion, stimulating the kinase maximally at 5-10 mm and 2 mm, respectively. Phenformin significantly decreases basal ion transport (measured as short circuit current) across H441 monolayers by approximately 50% compared with that of controls. Phenformin and AICAR significantly reduce amiloride-sensitive transepithelial Na+ transport compared with controls. Phenformin and AICAR suppress amiloride-sensitive Na+ transport across H441 cells via a pathway that includes activation of AMPK and inhibition of both apical Na+ entry through ENaC and basolateral Na+ extrusion via the Na+,K+-ATPase[4]. Phenformin-treated rats reveals a tendency towards a decrease in blood insulin level (radioimmunoassay)[5].

In Vivo

Phenformin increases levels of P-eIF2α and its target BiP/Grp78 in normal lung as well as in lung tumors of mice[3].

PROTOCOL

Kinase Assay[2]

Total AMPK activity is measured using the method of Dagher et al. AMPK activity is quantified in the resuspended pellet as incorporation of 32P from [γ-32P]ATP (10 GBq/mmol) into a synthetic peptide with the specific target sequence for AMPK, the SAMS peptide. Radioactivity is measured using a liquid scintillation counter. Protein content in the solution containing the resuspended (NH₄)₂SO₄ pellet is determined using the Bradford method.

MCE has not independently confirmed the accuracy of these methods. They are for reference only.

REFERENCES


