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>Solvent &amp; Mass</th>
<th>1 mg</th>
<th>5 mg</th>
<th>10 mg</th>
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</thead>
</table>
| Preparing Stock Solutions  
1 mM          | 4.1370 mL | 20.6851 mL | 41.3702 mL |
| 5 mM          | 0.8274 mL | 4.1370 mL | 8.2740 mL |
| 10 mM         | 0.4137 mL | 2.0685 mL | 4.1370 mL |

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

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

2. 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

3. 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

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
activity⁴. 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 KLuc mice following long-term treatment⁵. 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⁺-ATPase⁴. 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 mice³.

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**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 resupended (NH₄)₂SO₄ pellet is determined using the Bradford method.

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

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**REFERENCES**


