## α-Lipoic Acid

**Cat. No.:** HY-N0492  
**CAS No.:** 1077-28-7  
**Molecular Formula:** C₈H₁₄O₂S₂  
**Molecular Weight:** 206.33  
**Target:** NF-κB; HIV; Mitochondrial Metabolism; Endogenous Metabolite; Apoptosis  
**Pathway:** NF-κB; Anti-infection; Metabolic Enzyme/Protease; Apoptosis  
**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**: ≥ 100 mg/mL (484.66 mM)  
- **H₂O**: < 0.1 mg/mL (insoluble)

*"≥" means soluble, but saturation unknown.*

<table>
<thead>
<tr>
<th>Preparing Stock Solutions</th>
<th>Mass</th>
<th>1 mg</th>
<th>5 mg</th>
<th>10 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvent Mass Concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 mM</td>
<td>4.8466 mL</td>
<td>24.2330 mL</td>
<td>48.4660 mL</td>
<td></td>
</tr>
<tr>
<td>5 mM</td>
<td>0.9693 mL</td>
<td>4.8466 mL</td>
<td>9.6932 mL</td>
<td></td>
</tr>
<tr>
<td>10 mM</td>
<td>0.4847 mL</td>
<td>2.4233 mL</td>
<td>4.8466 mL</td>
<td></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: ≥ 2.5 mg/mL (12.12 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)  
   Solubility: ≥ 2.5 mg/mL (12.12 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% corn oil  
   Solubility: ≥ 2.5 mg/mL (12.12 mM); Clear solution

### BIOLOGICAL ACTIVITY

**Description**
- α-Lipoic Acid is an antioxidant, which is an essential cofactor of mitochondrial enzyme complexes. α-Lipoic Acid inhibits NF-κB-dependent HIV-1 LTR activation\(^1\)[\(^2\)][\(^3\)]. α-Lipoic Acid induces endoplasmic reticulum (ER) stress-mediated apoptosis in hepatoma cells\(^4\).
IC₅₀ & Target | NF-κB | Human Endogenous Metabolite | HIV | Mitochondrial bioenergetics
--- | --- | --- | --- | ---
**In Vitro** | The long terminal repeat (LTR) of HIV-1 is the target of cellular transcription factors such as NF-κB, and serves as the promoter-enhancer for the viral genome when integrated in host DNA[1]. α-Lipoic Acid (Alpha-Lipoic acid, ALA), a naturally occurring dithiol compound, plays an essential role in mitochondrial bioenergetics. α-Lipoic Acid reduces lipid accumulation in the liver by regulating the transcriptional factors SREBP-1, FoxO1, and Nrf2, and their downstream lipogenic targets via the activation of the SIRT1/LKB1/AMPK pathway. Treatment of cells with α-Lipoic Acid (250, 500 and 1000 μM) significantly increases the NAD⁺/NADH ratio in HepG2 cells (P<0.05 or P<0.01). Treatment with α-Lipoic Acid (50, 125, 250 and 500 μM) increases SIRT1 activity in HepG2 cells. α-Lipoic Acid (50, 125, 250, 500 and 1000 μM) increases phosphorylation of AMPK and acetyl-CoA carboxylase (ACC) in HepG2 cells in a dose-dependent fashion[1].

**In Vivo** | C57BL/6J mice, divided into four groups, are fed an high-fat diet (HFD) for 24 weeks to induce nonalcoholic fatty liver disease (NAFLD) followed by daily administration of α-Lipoic Acid. Then, the effects of α-Lipoic Acid on hepatic lipid accumulation in long-term HFD-fed mice are assessed. Administration of α-Lipoic Acid (100 mg/kg or 200 mg/kg) markedly reduces visceral fat mass in mice. In addition, α-Lipoic Acid (100 mg/kg or 200 mg/kg) treatment inhibits the appetite and causes a dramatic weight loss (all P<0.05)[1].

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**PROTOCOL**

**Cell Assay**[1] | The human hepatocellular carcinoma (HepG2) cell line is cultured in Dulbecco’s modified Eagle’s medium containing 10% fetal bovine serum at 37°C and 5% CO₂. HepG2 cells are treated with AMPK inhibitor (CC, 20 μM, 0.5 h), SIRT1 inhibitor (NA, 10 mM, 12 or 24 h), and AMPK activator (AICAR, 2 mM, 1 h), Palmitate (PA, 125 μM, 12 h) and α-Lipoic Acid (250 μM, 6 or 12 h)[1]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

**Animal Administration**[1] | Mice[1] Male C57BL/6J mice (6-week-old; body weight: 22-24 g) are allowed ad libitum access to normal diet and water for 2 weeks before dividing into four groups (n=8): normal diet (ND) (10% energy from fat), high-fat diet (HFD) (60% energy from fat) and HFD plus α-Lipoic Acid (100 mg/kg or 200 mg/kg). After 24 weeks of treatment, blood samples are collected after the eyeballs of the mice are extracted for serum preparation by centrifugation at 2000×g for 10 min at 4°C. The liver tissues are harvested in liquid nitrogen and stored at -80°C. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

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**REFERENCES**


[2]. Yang Y, et al. Alpha-lipoic acid improves high-fat diet-induced hepatic steatosis by modulating the transcription factors SREBP-1, FoxO1 and Nrf2 via the