Rapamycin

Cat. No.: HY-10219
CAS No.: 53123-88-9
Molecular Formula: C₅₁H₇₉NO₁₃
Molecular Weight: 914.17
Target: mTOR; FKBP; Autophagy
Pathway: PI3K/Akt/mTOR; Apoptosis; Autophagy; Immunology/Inflammation
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**: 125 mg/mL (136.74 mM; Need ultrasonic)
- **Ethanol**: 50 mg/mL (54.69 mM; Need ultrasonic)
- **H₂O**: < 0.1 mg/mL (insoluble)

<table>
<thead>
<tr>
<th>Preparing Stock Solutions</th>
<th>Solvent Mass</th>
<th>1 mg</th>
<th>5 mg</th>
<th>10 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration</td>
<td>1 mM</td>
<td>5 mM</td>
<td>10 mM</td>
</tr>
<tr>
<td></td>
<td>1 mM</td>
<td>1.0939 mL</td>
<td>5.4694 mL</td>
<td>10.9389 mL</td>
</tr>
<tr>
<td></td>
<td>5 mM</td>
<td>0.2188 mL</td>
<td>1.0939 mL</td>
<td>2.1878 mL</td>
</tr>
<tr>
<td></td>
<td>10 mM</td>
<td>0.1094 mL</td>
<td>0.5469 mL</td>
<td>1.0939 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: ≥ 2.5 mg/mL (2.73 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: 2.5 mg/mL (2.73 mM); Suspended solution; Need ultrasonic and warming
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (2.73 mM); Clear solution
4. Add each solvent one by one: 10% EtOH >> 40% PEG300 >> 5% Tween-80 >> 45% saline
   Solubility: ≥ 2.5 mg/mL (2.73 mM); Suspended solution
5. Add each solvent one by one: 10% EtOH >> 90% (20% SBE-β-CD in saline)
   Solubility: 2.5 mg/mL (2.73 mM); Suspended solution; Need ultrasonic
6. Add each solvent one by one: 10% EtOH >> 90% corn oil
   Solubility: ≥ 2.5 mg/mL (2.73 mM); Suspended solution
## BIOLOGICAL ACTIVITY

### Description
Rapamycin (Sirolimus; AY 22989) is a potent and specific mTOR inhibitor with an IC₅₀ of 0.1 nM in HEK293 cells. Rapamycin binds to FKBP12 and specifically acts as an allosteric inhibitor of mTORC1[1]. Rapamycin is an autophagy activator, an immunosuppressant[2].

<table>
<thead>
<tr>
<th>IC₅₀ &amp; Target</th>
<th>mTOR</th>
<th>Autophagy</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC₅₀ (IC₅₀, in HEK293 cells)</td>
<td>0.1 nM</td>
<td>Autophagy</td>
</tr>
</tbody>
</table>

### In Vitro
Rapamycin (12.5-100 nM; 24 hours) treatment exerts modest inhibitory effect on lung cancer cell proliferation in a dose-dependent manner in all cell lines (A549, SPC-A-1, 95D and NCI-H446 cells) tested, achieving about 30-40% reduction in cell proliferation at 100 nM vs. ~10% reduction at 12.5 nM[3]. Lung cancer cell line 95D cells are exposed to Rapamycin (10 nM, 20 nM) and RP-56976 (1 nM, 10 nM) alone or in combination (Rapamycin 20 nM + RP-56976 10 nM). After 24 hours exposure to Rapamycin or RP-56976 alone does not significantly alter the level of expression or phosphorylation of ERK1/2, whereas cells treated with the combination of Rapamycin with RP-56976 exhibit a marked reduction in the phosphorylation levels of ERK1/2[3].

#### Cell Viability Assay[3]
- **Cell Line:** Lung cancer cell lines A549, SPC-A-1, 95D and NCI-H446
- **Concentration:** 12.5 nM, 25 nM, 50 nM, 100 nM
- **Incubation Time:** 24 hours
- **Result:** Treatment exerted modest inhibitory effect on lung cancer cell proliferation in a dose-dependent manner in all cell lines.

#### Western Blot Analysis[3]
- **Cell Line:** 95D cells
- **Concentration:** 10 nM and 20 nM
- **Incubation Time:** 24 hours
- **Result:** Combination treatment with RP-56976 decreased phosphorylation of ERK.

### In Vivo
Rapamycin (2.0 mg/kg; intraperitoneal injection; every other day; 28 days) alone has a moderate inhibitory effect. However, the combination of Metformin and Rapamycin exerts a significantly increased inhibition of tumor growth compared with the control group, the Rapamycin monotherapy group and the Metformin monotherapy group[4].

#### Animal Model:
24 male nu/nu mice aged 4-5 week old (15-20 g)[4]

#### Dosage:
2.0 mg/kg

#### Administration:
Intraperitoneal injection; every other day; 28 days

#### Result:
Had a moderate inhibitory effect in monotherapy group. The combination with Metformin exerted a significantly increased inhibition of tumor growth.
REFERENCES


