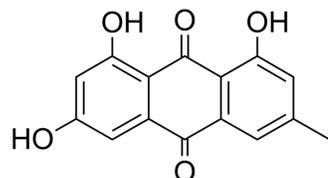


## Emodin

<b>Cat. No.:</b>	HY-14393												
<b>CAS No.:</b>	518-82-1												
<b>Molecular Formula:</b>	C <sub>15</sub> H <sub>10</sub> O <sub>5</sub>												
<b>Molecular Weight:</b>	270.24												
<b>Target:</b>	Casein Kinase; Autophagy; SARS-CoV; 11β-HSD												
<b>Pathway:</b>	Cell Cycle/DNA Damage; Stem Cell/Wnt; Autophagy; Anti-infection; Metabolic Enzyme/Protease												
<b>Storage:</b>	<table border="0"> <tr> <td>Powder</td> <td>-20°C</td> <td>3 years</td> </tr> <tr> <td></td> <td>4°C</td> <td>2 years</td> </tr> <tr> <td>In solvent</td> <td>-80°C</td> <td>1 year</td> </tr> <tr> <td></td> <td>-20°C</td> <td>6 months</td> </tr> </table>	Powder	-20°C	3 years		4°C	2 years	In solvent	-80°C	1 year		-20°C	6 months
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### SOLVENT & SOLUBILITY

#### In Vitro

Acetone : 10.87 mg/mL (40.22 mM; Need ultrasonic)  
 DMSO : 5.41 mg/mL (20.02 mM; Need ultrasonic)  
 Ethanol : < 1 mg/mL (ultrasonic) (insoluble)

Preparing Stock Solutions	Solvent Concentration	Mass		
		1 mg	5 mg	10 mg
	1 mM	3.7004 mL	18.5021 mL	37.0041 mL
	5 mM	0.7401 mL	3.7004 mL	7.4008 mL
	10 mM	0.3700 mL	1.8502 mL	3.7004 mL

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

#### In Vivo

- Add each solvent one by one: 0.5% MC >> 0.5% Tween-80  
 Solubility: 10 mg/mL (37.00 mM); Suspended solution; Need ultrasonic
- Add each solvent one by one: 0.5% CMC-Na/saline water  
 Solubility: 3.33 mg/mL (12.32 mM); Suspended solution; Need ultrasonic

### BIOLOGICAL ACTIVITY

#### Description

Emodin (Frangula emodin), an anthraquinone derivative, is an anti-SARS-CoV compound. Emodin blocks the SARS coronavirus spike protein and angiotensin-converting enzyme 2 (ACE2) interaction<sup>[1]</sup>. Emodin inhibits casein kinase-2 (CK2). Anti-inflammatory and anticancer effects<sup>[2]</sup>. Emodin is a potent selective 11β-HSD1 inhibitor with the IC<sub>50</sub> of 186 and 86 nM for human and mouse 11β-HSD1, respectively. Emodin ameliorates metabolic disorder in diet-induced obese mice<sup>[3]</sup>.

#### IC<sub>50</sub> & Target

SARS-CoV	CK2α Wild-type 1.4 μM (IC <sub>50</sub> , at ATP)	CK2α Wild-type 5.9 μM (IC <sub>50</sub> , at ATP)	mouse 11β-HSD1 86 nM (IC <sub>50</sub> )
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	concentration is 10 $\mu$ M)	concentration is 50 $\mu$ M)																	
	human 11 $\beta$ -HSD1 186 nM (IC <sub>50</sub> )																		
<b>In Vitro</b>	<p>Emodin (10-400 <math>\mu</math>M) blocks the binding of S protein to ACE2 in a dose-dependent manner with the IC<sub>50</sub> value of 200 <math>\mu</math>M<sup>[1]</sup>. Emodin (5-50 <math>\mu</math>M) inhibits the S protein-pseudotyped retrovirus infectivity in a dose-dependent manner. Emodin blocks the SARS-CoV S protein binding to Vero E6 cells<sup>[1]</sup>.</p> <p>Emodin inhibits casein kinase-2 (CK2) with IC<sub>50</sub>s of 5.9, 30.0, and 7.1 <math>\mu</math>M for CK2<math>\alpha</math> Wild-type, Ile174Ala mutant, and His160Ala mutant at ATP concentration is 50 <math>\mu</math>M, respectively. The IC<sub>50</sub>s are 1.40 and 38.00 <math>\mu</math>M for CK2<math>\alpha</math> Wild-type, and Val66Ala mutant at ATP concentration is 10 <math>\mu</math>M<sup>[2]</sup>.</p> <p>Emodin exhibits low inhibitory activity against mouse and human 11<math>\beta</math>-hydroxysteroid dehydrogenase type 2 (11<math>\beta</math>-HSD2), with an IC<sub>50</sub> higher than 1 mM, indicating that Emodin is more than 5000-fold selective for the human and mouse 11<math>\beta</math>-HSD1 enzymes over the type 2 isoenzyme<sup>[3]</sup>.</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p> <p>Cell Viability Assay<sup>[1]</sup></p> <table border="1"> <tr> <td>Cell Line:</td> <td>Vero E6 cells transfected with the plasmid encoding ACE2</td> </tr> <tr> <td>Concentration:</td> <td>0, 5, 25, 50 <math>\mu</math>M</td> </tr> <tr> <td>Incubation Time:</td> <td>24 hours</td> </tr> <tr> <td>Result:</td> <td>Vero cells treated with 50 <math>\mu</math>M remained 82.4<math>\pm</math>3.8% viability, the anti-SARS-CoV activity was not due to toxicity.</td> </tr> </table>			Cell Line:	Vero E6 cells transfected with the plasmid encoding ACE2	Concentration:	0, 5, 25, 50 $\mu$ M	Incubation Time:	24 hours	Result:	Vero cells treated with 50 $\mu$ M remained 82.4 $\pm$ 3.8% viability, the anti-SARS-CoV activity was not due to toxicity.								
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<b>In Vivo</b>	<p>Emodin (single oral administration of 100 or 200 mg/kg) inhibits 11<math>\beta</math>-HSD1 activity in normal C57BL/6J male mice<sup>[3]</sup>. Emodin (100 mg/kg; oral administration; b.i.d.) improves insulin sensitivity and lipid metabolism, and lowers blood glucose and hepatic PEPCK, and glucose-6-phosphatase mRNA in diet-induced obese (DIO) mice<sup>[3]</sup>.</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p> <table border="1"> <tr> <td>Animal Model:</td> <td>C57BL/6J male mice<sup>[3]</sup></td> </tr> <tr> <td>Dosage:</td> <td>100 or 200 mg/kg</td> </tr> <tr> <td>Administration:</td> <td>Acute administered p.o. ; Two hours later, the mice were killed by cervical dislocation,</td> </tr> <tr> <td>Result:</td> <td>Significantly inhibited liver 11<math>\beta</math>-HSD1 enzymatic activity by 17.6 and 31.3% and mesenteric fat 11<math>\beta</math>-HSD1 enzymatic activity by 21.5 and 46.7% at 100 or 200 mg/kg, respectively.</td> </tr> </table> <table border="1"> <tr> <td>Animal Model:</td> <td>DIO mice (C57BL/6J male mice were fed a formulated research diet)<sup>[3]</sup></td> </tr> <tr> <td>Dosage:</td> <td>100 mg/kg</td> </tr> <tr> <td>Administration:</td> <td>Oral gavage; twice per day; for 35 days</td> </tr> <tr> <td>Result:</td> <td>Reduced fasting glucose concentrations to 77.2% of the vehicle control mice after 7 days of treatment, and these remained significantly lower throughout the treatment period. Exhibited a significant reduction in blood glucose levels at all time-points following oral glucose challenge after 24 days of treatment. Evoked a significantly greater reduction in blood glucose values 40 and 90 min after insulin injection after 28 days of treatment. The serum insulin level was also significantly reduced, to 66.2% of control mice, after 35 days of treatment.</td> </tr> </table>			Animal Model:	C57BL/6J male mice <sup>[3]</sup>	Dosage:	100 or 200 mg/kg	Administration:	Acute administered p.o. ; Two hours later, the mice were killed by cervical dislocation,	Result:	Significantly inhibited liver 11 $\beta$ -HSD1 enzymatic activity by 17.6 and 31.3% and mesenteric fat 11 $\beta$ -HSD1 enzymatic activity by 21.5 and 46.7% at 100 or 200 mg/kg, respectively.	Animal Model:	DIO mice (C57BL/6J male mice were fed a formulated research diet) <sup>[3]</sup>	Dosage:	100 mg/kg	Administration:	Oral gavage; twice per day; for 35 days	Result:	Reduced fasting glucose concentrations to 77.2% of the vehicle control mice after 7 days of treatment, and these remained significantly lower throughout the treatment period. Exhibited a significant reduction in blood glucose levels at all time-points following oral glucose challenge after 24 days of treatment. Evoked a significantly greater reduction in blood glucose values 40 and 90 min after insulin injection after 28 days of treatment. The serum insulin level was also significantly reduced, to 66.2% of control mice, after 35 days of treatment.
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Improved the lipid profiles. The serum triglyceride and total cholesterol levels were significantly reduced by 19.3 and 12.5% after 35 days of treatment, respectively. Caused a 22.7% reduction of non-esterified free fatty acid (NEFA) level. Lowered body weight and appetite from day 18 of the treatment; their body weights were reduced by 13.9% at the end of treatment.

## CUSTOMER VALIDATION

- Nucleic Acids Res. 2021 Jan 8;49(D1):D1113-D1121.
- Acta Pharmacol Sin. 2021 Jan;42(1):108-114.
- Phytother Res. 2024 Jan 10.
- Fertil Steril. 2020 May;113(5):1067-1079.e5.
- Int Immunopharmacol. 2020 Dec 23;91:107277.

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## REFERENCES

- [1]. Tin-Yun Ho, et al. Emodin blocks the SARS coronavirus spike protein and angiotensin-converting enzyme 2 interaction. Antiviral Res. 2007 May;74(2):92-101.
- [2]. Ying Feng, et al. Emodin, a natural product, selectively inhibits 11beta-hydroxysteroid dehydrogenase type 1 and ameliorates metabolic disorder in diet-induced obese mice. Br J Pharmacol. 2010 Sep;161(1):113-26.
- [3]. Stefania Sarno, et al. Toward the rational design of protein kinase casein kinase-2 inhibitors. Pharmacol Ther. Feb-Mar 2002;93(2-3):159-68.

**Caution: Product has not been fully validated for medical applications. For research use only.**

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