L-Leucine

Cat. No.: HY-N0486

CAS No.: 61-90-5

Molecular Formula: $C_6H_{13}NO_2$

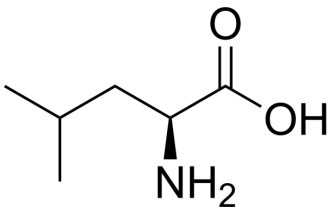
Molecular Weight: 131.17

Target: mTOR; Endogenous Metabolite

Pathway: PI3K/Akt/mTOR; Metabolic Enzyme/Protease

Storage:

Powder	-20°C	3 years
	4°C	2 years
In solvent	-80°C	6 months
	-20°C	1 month



SOLVENT & SOLUBILITY

In Vitro

H_2O : 8.33 mg/mL (63.51 mM; Need ultrasonic)

Preparing Stock Solutions	Solvent / Mass / Concentration	1 mg	5 mg	10 mg
	1 mM	7.6237 mL	38.1185 mL	76.2369 mL
	5 mM	1.5247 mL	7.6237 mL	15.2474 mL
	10 mM	0.7624 mL	3.8118 mL	7.6237 mL

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

In Vivo

1. Add each solvent one by one: PBS
   Solubility: 6.25 mg/mL (47.65 mM); Suspended solution; Need ultrasonic and warming and heat to 60°C

BIOLOGICAL ACTIVITY

Description

L-Leucine is an essential branched-chain amino acid (BCAA), which activates the mTOR signaling pathway[1].

IC_{50} & Target			
	mTORC1	Human Endogenous Metabolite	Microbial Metabolite

In Vitro

L-Leucine (10 mM) treatment impairs endocrine progenitor cell development[1].
In E13.5 rat pancreatic explants, in absence of added L-Leucine, Ngn3 mRNA levels increased after 1 day of culture, peaked on day 3, and then decreased. When L-Leucine is added, a dramatic decrease is observed in Ngn3 mRNA levels. This decrease in Ngn3 mRNA levels was paralleled by a decrease in the number of Ngn3-expressing cells (4728±408 vs. 959±28; P<0.01). Finally, L-Leucine also caused a dose-dependent repressive effect on the mRNA levels of the three genes, namely Ngn3, its target Insm1, and insulin[1].
Leucine stimulates protein synthesis in skeletal muscle of neonatal pigs by enhancing mTORC1 activation. L-Leucine

	increases intracellular HIF-1α levels and activates the HIF-1α signaling pathway, and these two effects are mediated by the mTOR signaling pathway. This process results in Ngn3 repression and, consequently, decreases β-cell differentiation[1]. L-leucine stimulates mTORC1 by through a mechanism that involves the leucyl tRNA synthase promoting the activity of GTP activating proteins that act on mTORC1[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	L-Leucine (24 g/kg diet) combined with Resveratrol (12.5 mg/kg diet) to diet-induced obese (DIO) mice increases adipose Sirt1 activity[2]. Combination results in significant reductions in body weight, weight gain, visceral adipose tissue mass, fat oxidation and heat production in mice[2]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

Animal Model:	Six-week-old male c57/BL6 mice (fed a high-fat diet with fat to induce obesity)[1]
Dosage:	24 g/kg diet; Resveratrol (low dose; 12.5 mg/kg diet)
Administration:	6 weeks
Result:	Treatment in combination with Resveratrol (low dose; 12.5 mg/kg diet) resulted in significant reductions in body weight, weight gain, visceral adipose tissue mass, fat oxidation and heat production, and an associated decrease in respiratory exchange ratio (RER), especially in the dark (feeding) cycle.

CUSTOMER VALIDATION

- Pharmacol Res. 2021 Jul 31;105796.
- Exp Neurol. 2022 Dec 28;114315.
- FASEB J. 2021 May;35(5):e21526.
- J Mol Med (Berl). 2022 Jul 25.
- Research Square Preprint. 2021 Jul.

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REFERENCES

[1]. Baoshan Xu, et al. Stimulation of mTORC1 with L-leucine rescues defects associated with Roberts syndrome. PLoS Genet. 2013;9(10):e1003857.

[2]. Bruckbauer A, et al. Synergistic effects of leucine and resveratrol on insulin sensitivity and fat metabolism in adipocytes and mice. Nutr Metab (Lond). 2012 Aug 22;9(1):77.

[3]. Rachdi L, et al. L-leucine alters pancreatic β-cell differentiation and function via the mTor signaling pathway. Diabetes. 2012 Feb;61(2):409-17.

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