# Zonisamide

**Cat. No.:** HY-B0124

**CAS No.:** 68291-97-4

**Molecular Formula:** $C_8H_8N_2O_3S$

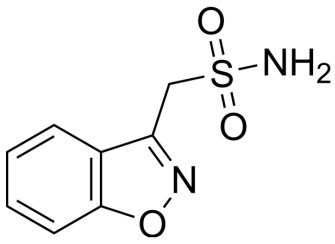
**Molecular Weight:** 212.23

**Target:** Carbonic Anhydrase; Apoptosis

**Pathway:** Metabolic Enzyme/Protease; Apoptosis

**Storage:**

| | | |
|---|---|---|
| Powder | -20°C | 3 years |
| | 4°C | 2 years |
| In solvent | -80°C | 2 years |
| | -20°C | 1 year |



## SOLVENT & SOLUBILITY

**In Vitro**

DMSO : 250 mg/mL (1177.97 mM; Need ultrasonic)

$H_2O$ : 0.67 mg/mL (3.16 mM; Need ultrasonic)

**Preparing Stock Solutions**

| Solvent / Mass / Concentration | 1 mg | 5 mg | 10 mg |
|---|---|---|---|
| 1 mM | 4.7119 mL | 23.5593 mL | 47.1187 mL |
| 5 mM | 0.9424 mL | 4.7119 mL | 9.4237 mL |
| 10 mM | 0.4712 mL | 2.3559 mL | 4.7119 mL |

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: ≥ 2.08 mg/mL (9.80 mM); Clear solution
2. Add each solvent one by one: 10% DMSO >> 90% (20% SBE-β-CD in saline)
   Solubility: ≥ 2.08 mg/mL (9.80 mM); Clear solution
3. Add each solvent one by one: 10% DMSO >> 90% corn oil
   Solubility: ≥ 2.08 mg/mL (9.80 mM); Clear solution
4. Add each solvent one by one: PBS
   Solubility: 1 mg/mL (4.71 mM); Clear solution; Need ultrasonic and warming and heat to 60°C

## BIOLOGICAL ACTIVITY

**Description**

Zonisamide (AD 810) is an orally active carbonic anhydrase inhibitor, with $K_i$s of 35.2 and 20.6 nM for hCA II and hCA V, respectively. Zonisamide exerts neuroprotective effects through anti-apoptosis and upregulating MnSOD levels. Zonisamide also increases the expression of Hrd1, thereby improving cardiac function in AAC rats. Zonisamide can be used in studies of seizure, parkinson's disease and cardiac hypertrophy[1][2][3][4].

| | |
|---|---|
| **$IC_{50}$ & Target** | CA Ⅸ |
| **In Vitro** | Zonisamide (10, 50, 100, 200 μM; 24 h) increases viability of SH-SY5Y cells via an anti-apoptotic effect[1].<br>?Zonisamide (100 μM; 24 h) shows neuroprotective effects in PD-cellular models. (PD: parkinson's disease)[1].<br>?Zonisamide (100 μM; 24 h) reduces levels of proapoptotic molecules, and upregulates levels of MnSOD (MnSOD over-expression attenuates MPTP toxicity and protects cells from apoptosis)[1].<br>?Zonisamide (0.1, 0.3, 1 μM; 24 h) inhibits cardiac hypertrophy and fibrosis in vitro[3].<br>?Zonisamide markedly increases the expression of Hrd1 in Ang II-treated NRCMs[3].<br>MCE has not independently confirmed the accuracy of these methods. They are for reference only. |
| **In Vivo** | Zonisamide (40 mg/kg; i.p.; single daily for 14 days) prevents seizures in $FeCl_3$-induced chronic amygdalar seizures model[2]. |

Cell Viability Assay[1]

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|---|---|
| Cell Line: | SH-SY5Y cells |
| Concentration: | 10, 50, 100, 200 μM |
| Incubation Time: | 24 h |
| Result: | Induced an increase of cell viability, and with the greatest effect being at 100 μM.<br>Exhibited neuroprotective effect on SH-SY5Y cells (PD-cellular models) when at 100 μM. |

Apoptosis Analysis[1]

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|---|---|
| Cell Line: | SH-SY5Y cells |
| Concentration: | 100 μM |
| Incubation Time: | 24 h |
| Result: | Showed an effect of anti-apoptotic. |

RT-PCR[3]

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|---|---|
| Cell Line: | NRCMs and cardiac fibroblasts (expose to Ang II for cardiomyocyte hypertrophy and fibrosis model) |
| Concentration: | 0.1, 0.3, 1 μM |
| Incubation Time: | 24 h |
| Result: | Decreased the expression of atrial natriuretic factor (ANF) and cardiomyosin heavy chain β (β-MHC) but increased the expression of cardiac myosin heavy chain α (α-MHC) in NRCMs.<br>Decreased cardiac expression of the fibrosis-related gene Collagen 1A1 (Col1A1) in cardiac fibroblasts. |

Western Blot Analysis[1]

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| Cell Line: | SH-SY5Y cells |
| Concentration: | 100 μM |
| Incubation Time: | 24 h |
| Result: | Reduced the proapoptotic molecules levels of cleaved caspase-9, -3, and p-JNK, and blocked the activation of proapoptotic molecules in SH-SY5Y cells.Induced an increase in MnSOD levels.(MnSOD over-expression attenuates MPTP toxicity and protects cells from apoptosis). |

?Zonisamide (14, 28, 56 mg/kg; i.p.; single daily for 6 weeks) alleviates cardiac hypertrophy and improved cardiac function in rats subjected to AAC (abdominal aortic constriction)[3].

?Zonisamide (14, 28, 56 mg/kg; i.p.; single daily for 6 weeks) upregulates Hrd1 expression and accelerates ERAD in the hearts of AAC rats[3].

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

| | |
|---|---|
| Animal Model: | Male Wistar rats (200-250 g; $FeCl_3$-induced chronic amygdalar seizures)[2]. |
| Dosage: | 40 mg/kg |
| Administration: | Intraperitoneal injection; single daily for 14 days. |
| Result: | Showed activity of anti-seizures.<br>Significantly down-regulated GABA transporters GAT-1 in the hippocampus. |

| | |
|---|---|
| Animal Model: | Adult male Sprague-Dawley rats (100-120 g; cardiac hypertrophy model)[3]. |
| Dosage: | 14, 28, 56 mg/kg |
| Administration: | Intraperitoneal injection; single daily for 6 weeks. |
| Result: | Significantly attenuated cardiac hypertrophy and fibrosis.<br>Increased LV ejection fraction (EF), fractional shortening (FS) and E/A ratio.<br>Markedly increased the expression of Hrd1 in the hearts of AAC rats. |

## REFERENCES


[1]. Kawajiri S, et al. Zonisamide reduces cell death in SH-SY5Y cells via an anti-apoptotic effect and by upregulating MnSOD. Neurosci Lett. 2010 Sep 6;481(2):88-91.

[2]. Ueda Y, et al. Effect of zonisamide on molecular regulation of glutamate and GABA transporter proteins during epileptogenesis in rats with hippocampal seizures. Brain Res Mol Brain Res. 2003 Aug 19;116(1-2):1-6.

[3]. Wu Q, et al. Zonisamide alleviates cardiac hypertrophy in rats by increasing Hrd1 expression and inhibiting endoplasmic reticulum stress. Acta Pharmacol Sin. 2021 Oct;42(10):1587-1597.

[4]. De Simone G, et al. Carbonic anhydrase inhibitors. Zonisamide is an effective inhibitor of the cytosolic isozyme II and mitochondrial isozyme V: solution and X-ray crystallographic studies. Bioorg Med Chem Lett. 2005 May 2;15(9):2315-20.



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



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