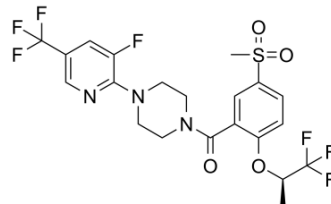


Bitopterin (R enantiomer)

Cat. No.:	HY-10809A		
CAS No.:	845614-12-2		
Molecular Formula:	C ₂₁ H ₂₀ F ₇ N ₃ O ₄ S		
Molecular Weight:	543.46		
Target:	GlyT		
Pathway:	Membrane Transporter/Ion Channel; Neuronal Signaling		
Storage:	Powder	-20°C	3 years
		4°C	2 years
	In solvent	-80°C	6 months
		-20°C	1 month



BIOLOGICAL ACTIVITY

Description	Bitopterin R enantiomer (RG1678 R enantiomer; RO4917838 R enantiomer) is the R-enantiomer of Bitopterin. Bitopterin is a potent, noncompetitive glycine reuptake inhibitor, inhibits glycine uptake at human GlyT1 with a concentration exhibiting IC ₅₀ of 25 nM.
IC₅₀ & Target	IC ₅₀ : 25 nM (GlyT1) ^[1]
In Vitro	<p>Bitopterin (RG1678) competitively blocks [³H]ORG24598 binding sites at human GlyT1b in membranes from Chinese hamster ovary cells. Bitopterin potently inhibits [³H]glycine uptake in cells stably expressing hGlyT1b and mGlyT1b, with IC₅₀ values of 25±2 nM and 22±5 nM, respectively (n=6). Conversely, Bitopterin has no effect on hGlyT2-mediated glycine uptake up to 30 μM concentration. Bitopterin has high affinity for the recombinant hGlyT1b transporter. Under equilibrium conditions (1 h at room temperature), Bitopterin displaces [³H]ORG24598 binding with a K_i of 8.1 nM. In hippocampal CA1 pyramidal cells, Bitopterin enhances NMDA-dependent long-term potentiation at 100 nM but not at 300 nM^[1]. Additional profiling revealed that Bitopterin (RG1678) has an excellent selectivity profile against the GlyT2 isoform (IC₅₀>30 μM) and toward a panel of 86 targets including transmembrane and soluble receptors, enzymes, ion channels, and monoamine transporters (<41% inhibition at 10 μM is measured for all targets)^[2].</p> <p>MCE has not independently confirmed the accuracy of these methods. They are for reference only.</p>
In Vivo	<p>Bitopterin (RG1678) dose-dependently increases cerebrospinal fluid and striatal levels of glycine measured by microdialysis in rats. Additionally Bitopterin attenuates hyperlocomotion induced by the psychostimulant D-amphetamine or the NMDA receptor glycine site antagonist L-687,414 in mice. Bitopterin also prevents the hyper-response to D-amphetamine challenge in rats treated chronically with phencyclidine, an NMDA receptor open-channel blocker. Administration of vehicle has no effect on extracellular levels of striatal glycine, which remained constant throughout the experiment. In contrast, p.o. administration of Bitopterin (1-30 mg/kg) produced a dose-dependent increase in extracellular glycine levels. Bitopterin 30 mg/kg produces glycine levels 2.5 times higher than pretreatment levels. A similar dose-dependent increase in glycine concentration is observed in the CSF of rats treated p.o. with Bitopterin (1-10 mg/kg) compared with vehicle-treated animals, 3 h after drug administration. Interestingly, the level of CSF glycine increase 3 h after Bitopterin dosing is very similar to the increase in the microdialysis experiment at the same time point^[1]. In vivo pharmacokinetic studies in rat and monkey reveals that Bitopterin (RG1678) has, in both species, a low plasma clearance, an intermediate volume of distribution, a good oral bioavailability (78% for rat, 56% for monkey), and a favorable terminal half-life (5.8 h for rat, 6.4 h for monkey). The plasma protein binding is high in the two preclinical species (97%) and in human (98%). The CNS penetration of Bitopterin in rat (brain/plasma=0.7) is better than that in mouse (brain/plasma=0.5)^[2].</p>

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PROTOCOL

Kinase Assay ^[1]

Association and dissociation kinetic analysis of [³H]ORG24598 to hGlyT1 and ratforebrain membranes is performed. [³H]ORG24598 binding experiments are performed using membranes from CHO cells expressing hGlyT1b and also in membranes from mouse, rat, monkey, and dogforebrains. Saturation isotherms are determined by adding [³H]ORG24598 to rat, mouse, monkey, and dog forebrain membranes (40 µg/well) and cell membranes (10 µg/well) in a total volume of 500 µL for 3 h at room temperature. Saturation binding experiments are analyzed by an Excel-based curve-fitting program using the Michaelis-Menten equation derived from the equation of a bimolecular reaction and the law of mass action: $B = (B_{max} * [F]) / (K_d + [F])$, where B is the amount of ligand bound at equilibrium, B_{max} the maximum number of binding sites, [F] the concentration of free ligand, and K_d the ligand dissociation constant. For inhibition experiments, membranes are incubated with 3 nM [³H]ORG24598 and 10 concentrations of Bitopertin for 1 h at room temperature. Schild analysis is performed in the presence of increasing concentrations of [³H]ORG24598 (1-300 nM). IC_{50} values are derived as described above. K_i values are calculated according to the following equation: $K_i = IC_{50} / (1 + [L] / K_d)$ ^[1].

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Animal Administration ^[1]

Mice^[1]

Male NMRI mice (20-30 g) are treated with Bitopertin (0.3, 3, 1, and 10 mg/kg p.o.) or vehicle (p.o.). After 1 min, L-687,414 (50 mg/kg s.c.) or vehicle is given. After 15 min of habituation in the activity chambers, horizontal activity is recorded for 60 min. The time course of Bitopertin effects on L-678,414-induced hyperactivity is also examined; locomotor activity is assessed 2.5, 4.5, and 24 h after administration of Bitopertin (L-678,414 is always given 15 min before the activity procedure). In addition, the effect of subchronic Bitopertin is investigated. Mice receive vehicle or Bitopertin (1 mg/kg p.o.) for 4 consecutive days and L-678,414-induced hyperactivity is evaluated on day 5.

Rats^[1]

Wistar rats receive a 14-day treatment of PCP HC1 (5 mg/kg) or vehicle (NaCl 0.9%, 5 mL/kg i.p.). 24 h following the last injection, rats (6-18 per group) are allowed to individually habituate to the test boxes for 30 min. Rats then received Bitopertin (1, 3, 10 mg/kg p.o.) or vehicle (Polysorbate 80, HEC, Methyl- + Propylparaben pH 6.0; 5 mL/kg p.o.), followed after 1 h by 1 mg/kg D-amphetamine or vehicle i.p. Horizontal activity is recorded directly after the administration of Bitopertin until 120 min after dosing with amphetamine. Data are analyzed by ANOVA supplemented by Fischer's least significant difference post hoc test.

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REFERENCES

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Tel: 609-228-6898

Fax: 609-228-5909

E-mail: tech@MedChemExpress.com

Address: 1 Deer Park Dr, Suite Q, Monmouth Junction, NJ 08852, USA