Product Data Sheet

Product Name: Lixisenatide
Cat. No.: GC31334

Chemical Properties

Cas. No.	320367-13-3		
SMILES	His-Gly-Glu-Gly-Thr-Phe-Thr-Ser-Asp-Leu-Ser-Lys-Gln-Met-Glu-Glu-Glu-Ala-Val-Arg-Leu-Phe-Ile-Glu-Trp-Leu-Lys-Asn-Gly-Gly-Pro-Ser-Ser-Gly-Ala-Pro-Pro-Ser-Lys-Lys-Lys-Lys-Lys-Lys-NH2		
Formula	$C_{215}H_{347}N_{61}O_{65}S$	M.Wt	4858.49
Solubility	Water : 106 mg/mL (21.82 mM)	Storage	Store at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		

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

HGEGTFTSDLSKQMEEEAVRLFIEWLKNGGPSSGAPPSKKKKKK-NH_2

Protocol

Cell experiment [1]:

Cell lines	HUVECs (Human Umbilical Vein Endothelial Cells)
Preparation Method	HUVECs were maintained in EGM-2 medium supplemented with 2% fetal bovine serum (FBS) at 37°C, 5% CO_2. For pretreatment, HUVECs were treated with Lixisenatide (5, 10, 20nM) for 6 hours prior to Oxygen-Glucose Deprivation/Reperfusion (OGD/R) injury. OGD/R was induced by transferring cells to glucose-free medium and placing them in an anaerobic chamber (95% N_2/5% CO_2) for 6 hours, followed by reperfusion with complete medium for 24 hours.

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Reaction Conditions	5-20mM; 6h pretreatment
Applications	Lixisenatide pretreatment significantly protected HUVECs from OGD/R-induced cytotoxicity and improved cell viability. Lixisenatide ameliorated OGD/R-induced ROS accumulation and restored impaired endothelial tube formation.

Animal experiment [2]:

Animal models	High-fat fed Swiss NIH mice
Preparation Method	Mice were fed a high-fat diet (45% fat) for 4 months to establish obesity, insulin resistance and impaired cognition. Animals then received twice-daily subcutaneous injections of Lixisenatide (50nmol/kg) or saline vehicle for 40 days.
Dosage form	50nmol/kg; s.c.
Applications	Lixisenatide treatment significantly improved recognition memory during novel object recognition tasks, enhanced hippocampal progenitor cell proliferation, increased immature neuron numbers. Lixisenatide improved glycemic control, insulin sensitivity, and pancreatic insulin content without affecting body weight or food intake.

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References:
[1] Xiao M, Lu D, Tian J, et al. The protective effects of GLP-1 receptor agonist lixisenatide on oxygen-glucose deprivation/reperfusion (OGD/R)-induced deregulation of endothelial tube formation. RSC Adv. 2020 Mar 10;10(17):10245-10253.
[2] Lennox R, Flatt PR, Gault VA. Lixisenatide improves recognition memory and exerts neuroprotective actions in high-fat fed mice. Peptides. 2014 Nov;61:38-47.

Background

Lixisenatide is a glucagon-like peptide-1 receptor (GLP-1 receptor) agonist that can be used for the treatment of type 2 diabetes[1]. Lixisenatide enhances insulin secretion in a glucose-dependent manner, inhibits glucagon release, and delays gastric emptying to reduce food intake, thereby exerting hypoglycemic and weight-loss-promoting effects[2]. Lixisenatide can also inhibit inflammatory responses by downregulating pro-inflammatory cytokines and blocking cellular signaling pathways[3]. Lixisenatide can slow the progression of motor disorders in early Parkinson's disease patients[4].

In vitro, pretreatment of human umbilical vein endothelial cells (HUVECs) with Lixisenatide (5-20nM) for 6 hours, followed by oxygen-glucose deprivation/reperfusion (OGD/R) to simulate ischemia-reperfusion injury, significantly improved cell viability, inhibited the accumulation of reactive oxygen species (ROS), and alleviated the impairment of endothelial cell tube formation ability induced by OGD/R. Lixisenatide also enhanced eNOS phosphorylation and nitric oxide (NO) production by activating the PI3K/Akt pathway[5]. Pretreatment of HEK-293 cells stably expressing GFP-labeled α-synuclein A53T (α-Syn-HEK-293 cells) and SH-SY5Y cells with Lixisenatide (10-20nM) for 6 hours, followed by stimulation with α-synuclein preformed fibrils (α-Syn PFFs, 3μg/mL) for 48 hours, significantly inhibited the phosphorylation (pS129) and aggregation of α-synuclein, reduced cell apoptosis and mitochondrial dysfunction, and improved cell viability[6].

In vivo, continuous treatment of high-fat diet-induced obese insulin-resistant mice with Lixisenatide (50nmol/kg; subcutaneous injection twice daily) for 40 days significantly improved insulin sensitivity in the mice, enhanced glucose tolerance and insulin secretion, and significantly improved the mice's novel object recognition memory ability[7]. Treatment of rats that had experienced transient ischemia-

reperfusion injury with Lixisenatide (10μg/kg/day; subcutaneous injection) for 10 weeks improved left ventricular end-diastolic pressure and relaxation time and prevented pulmonary congestion[8].

References:

[1] Nauck MA, Quast DR, Wefers J, et al. GLP-1 receptor agonists in the treatment of type 2 diabetes - state-of-the-art. Mol Metab. 2021 Apr;46:101102.
[2] Baker DE, Levien TL. Lixisenatide. Hosp Pharm. 2017 Jan;52(1):65-80.
[3] Pfeffer MA, Claggett B, Diaz R, et al. Lixisenatide in Patients with Type 2 Diabetes and Acute Coronary Syndrome. N Engl J Med. 2015 Dec 3;373(23):2247-57.
[4] Meissner WG, Remy P, Giordana C, et al. LIXIPARK Study Group. Trial of Lixisenatide in Early Parkinson's Disease. N Engl J Med. 2024 Apr 4;390(13):1176-1185.
[5] Xiao M, Lu D, Tian J, et al. The protective effects of GLP-1 receptor agonist lixisenatide on oxygen-glucose deprivation/reperfusion (OGD/R)-induced deregulation of endothelial tube formation. RSC Adv. 2020 Mar 10;10(17):10245-10253.
[6] Xu L, Chen G, Zhang L, et al. Lixisenatide ameliorated lipopolysaccharide (LPS)-induced expression of mucin and inflammation in bronchial epithelial cells. J Biochem Mol Toxicol. 2024 Jan;38(1):e23618.
[7] Lennox R, Flatt PR, Gault VA. Lixisenatide improves recognition memory and exerts neuroprotective actions in high-fat fed mice. Peptides. 2014 Nov;61:38-47.
[8] Wohlfart P, Linz W, Hübschle T, et al. Cardioprotective effects of lixisenatide in rat myocardial ischemia-reperfusion injury studies. J Transl Med. 2013 Mar 28;11:84. doi: 10.1186/1479-5876-11-84.

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