Small Molecules

Valproic Acid

Epigenetic modifier; Inhibits histone deacetylase (HDAC)1

Catalog # 72292

500 mg

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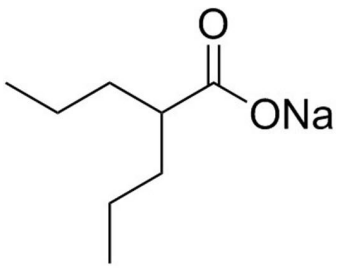
Product Description

Valproic Acid (VPA) is a short-chain fatty acid that acts as an epigenetic modifier by inhibiting histone deacetylases (HDACs) with IC_{50} values ranging from about 0.4 - 3 mM. VPA can also increase γ-aminobutyric acid (GABA) levels via inhibition of succinic semialdehyde dehydrogenase and other enzymes involved in GABA metabolism. Additional effects include depletion of cellular inositol by inhibiting myo-inositol-1-phosphate synthase (Gottlicher et al.; Khan et al.; Phiel et al.; Rosenberg). This product is supplied as a sodium salt of the molecule.

Molecular Name:	Valproic Acid (Sodium Salt)
Alternative Names:	2-Propylvaleric acid; Sodium valproate; VPA
CAS Number:	1069-66-5
Chemical Formula:	$C_8H_{15}O_2 \cdot Na$
Molecular Weight:	166.2 g/mol
Purity:	≥ 95%
Chemical Name:	2-propyl-pentanoic acid, monosodium salt
Structure:	

Properties

Physical Appearance:	A crystalline solid
Storage:	Product stable at -20°C as supplied. Protect from prolonged exposure to light. Stable as supplied for 12 months from date of receipt.
Solubility:	· PBS (pH 7.2) ≤ 60 mM · DMSO ≤ 30 mM · Absolute ethanol ≤ 180 mM For example, to prepare a 10 mM stock solution in PBS, resuspend 100 mg in 60.2 mL of PBS (pH 7.2). Prepare stock solution fresh before use. Information regarding stability of small molecules in solution has rarely been reported, however, as a general guide we recommend storage in DMSO at -20°C. Aliquot into working volumes to avoid repeated freeze-thaw cycles. The effect of storage of stock solution on compound performance should be tested for each application. For use as a cell culture supplement, stock solution should be diluted into culture medium immediately before use. Avoid final DMSO concentration above 0.1% due to potential cell toxicity.

Published Applications

MAINTENANCE AND SELF-RENEWAL
· Mediates ex vivo expansion of cord blood CD34+ hematopoietic stem and progenitor cells (Chaurasia et al.).
· Promotes the proliferation and self-renewal of human and mouse hematopoietic progenitor cells (Bug et al.; De Felice et al.).
REPROGRAMMING
· Enables chemical reprogramming (without genetic factors) of mouse embryonic fibroblasts to induced pluripotent stem (iPS) cells, in combination with CHIR99021 (Catalog 372052), Forskolin (Catalog #72112), Tranylcypromine (Catalog #72272), 3-Deazaneplanocin A (Catalog #72322), and RepSox (Catalog #73792) (Hou et al.).
· Increases the reprogramming efficiency of mouse embryonic fibroblasts to iPS cells (Huangfu et al. 2008a).
· Promotes reprogramming of human fibroblasts to iPS cells using only 2 factors, OCT4 and SOX2 (Huangfu et al. 2008b).
· Direct lineage reprogramming of fibroblasts to mature neurons, in combination with CHIR99021, RepSox, Forskolin, SP600125 (Catalog #72642), Gö6983 (Catalog #72462), and Y-27632 (Catalog #72302) (Hu et al.).
DIFFERENTIATION
· Promotes differentiation of neurons and suppresses differentiation of astrocytes and oligodendrocytes from rat neural progenitor cells (Hsieh et al.; Jung et al.).
· Promotes osteogenic differentiation of human mesenchymal stem cells (Cho et al.).

References

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De Felice L et al. (2005) Histone deacetylase inhibitor valproic acid enhances the cytokine-induced expansion of human hematopoietic stem cells. Cancer Res 65(4): 1505–13.
Göttlicher M et al. (2001) Valproic acid defines a novel class of HDAC inhibitors inducing differentiation of transformed cells. EMBO J 20(24): 6969–78.
Hou P et al. (2013) Pluripotent stem cells induced from mouse somatic cells by small-molecule compounds. Science 341(6146): 651–4.
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Hu W et al. (2015) Direct conversion of normal and Alzheimer's Disease human fibroblasts into neuronal cells by small molecules. Cell Stem Cell 17(2): 204–212.
Huangfu D et al. (2008a) Induction of pluripotent stem cells by defined factors is greatly improved by small-molecule compounds. Nat Biotechnol 26(7): 795–797.
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Jung G-A et al. (2008) Valproic acid induces differentiation and inhibition of proliferation in neural progenitor cells via the beta-catenin-Ras-ERK-p21Cip/WAF1 pathway. BMC Cell Biol 9: 66.
Khan N et al. (2008) Determination of the class and isoform selectivity of small-molecule histone deacetylase inhibitors. Biochem J 409(2): 581–9.
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Rosenberg G. (2007) The mechanisms of action of valproate in neuropsychiatric disorders: can we see the forest for the trees? Cell Mol Life Sci 64(16): 2090–103.

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