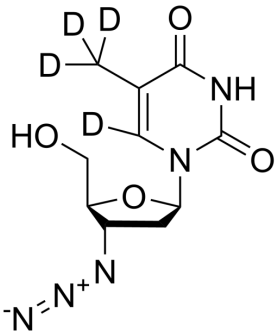
Zidovudine-d_4

Cat. No.:	HY-17413S2
Molecular Formula:	$C_{10}H_9D_4N_5O_4$
Molecular Weight:	271.27
Target:	CRISPR/Cas9; HIV; Isotope-Labeled Compounds
Pathway:	Cell Cycle/DNA Damage; Anti-infection; Others
Storage:	Please store the product under the recommended conditions in the Certificate of Analysis.



BIOLOGICAL ACTIVITY

Description	Zidovudine-d_4 is deuterated labeled Zidovudine (HY-17413). Zidovudine is a nucleoside reverse transcriptase inhibitor (NRTI), widely used to treat HIV infection. Zidovudine increases CRISPR/Cas9-mediated editing frequency.
In Vitro	Stable heavy isotopes of hydrogen, carbon, and other elements have been incorporated into drug molecules, largely as tracers for quantitation during the drug development process. Deuteration has gained attention because of its potential to affect the pharmacokinetic and metabolic profiles of drugs[1]. Zidovudine inhibits SVG, Primary human fetal astrocytes (PFA), peripheral blood mononuclear cells (PBMC), and monocyte-derived macrophages (MDM) with EC_{50} of 17, 1311, 8, and 5 nM, respectively. Zidovudine inhibits SVG, PFA, PBMC, and MDM with EC_{90} of 0.205 μM, 44.157 μM, 0.481 μM, and 0.219 μM, respectively[2]. Genome editing via CRISPR/Cas9 has become an efficient and reliable way to make precise, targeted changes to the genome of living cells. CXCR4 is a co-receptor for the human immunodeficiency virus type 1 (HIV-1) infection and has been considered as an important therapeutic target for AIDS. CXCR4 mediates viral entry into human $CD4^+$ cells by binding to envelope protein, gp120. Human CXCR4 gene is efficiently disrupted by CRISPR/Cas9-mediated genome editing, leading to HIV-1 resistance of human primary $CD4^+$ T cells. The Cas9-mediated ablation of CXCR4 demonstrated high specificity and negligible off-target effects without affecting cell division and propagation[3]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.
In Vivo	Intravitrous injection of the NRTIs Lamivudine (3TC), Zidovudine (AZT), or Abacavir (ABC) suppresses the laser-induced choroidal neovascularization (CNV) in wild-type mice compared to PBS vehicle. The mean level of VEGF-A in the RPE/choroid, which peaks on day 3 after laser injury, is significantly reduced in 3TC-, AZT- and ABC-treated eyes compared with control eyes in wild-type mice, but not inP2rx7$^{-/-}$ mice[4]. MCE has not independently confirmed the accuracy of these methods. They are for reference only.

REFERENCES

[1]. Gray LR, et al. The NRTIs lamivudine, stavudine and zidovudine have reduced HIV-1 inhibitory activity in astrocytes. PLoS One. 2013 Apr 16;8(4):e62196.

[2]. Mizutani T, et al. Nucleoside Reverse Transcriptase Inhibitors Suppress Laser-Induced Choroidal Neovascularization in Mice. Invest Ophthalmol Vis Sci. 2015 Nov;56(12):7122-9.

[3]. Hou P, et al. Genome editing of CXCR4 by CRISPR/cas9 confers cells resistant to HIV-1 infection. Sci Rep. 2015 Oct 20;5:15577.

[4]. Russak EM, et al. Impact of Deuterium Substitution on the Pharmacokinetics of Pharmaceuticals. Ann Pharmacother. 2019 Feb;53(2):211-216.

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

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