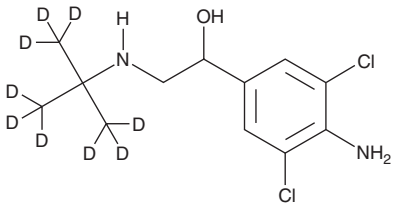
# PRODUCT INFORMATION

## Clenbuterol-$d_9$

*Item No. 40816*

**CAS Registry No.:** 129138-58-5
**Formal Name:** 4-amino-3,5-dichloro-α-[[[1,1-di(methyl-$d_3$)ethyl-2,2,2-$d_3$]amino]methyl]-benzenemethanol
**Synonym:** NAB 365-$d_9$
**MF:** $C_{12}H_9Cl_2D_9N_2O$
**FW:** 286.2
**Chemical Purity:** ≥98% (clenbuterol)
**Deuterium Incorporation:** ≥99% deuterated forms ($d_1$-$d_9$); ≤1% $d_0$
**Supplied as:** A solid
**Storage:** -20°C
**Stability:** ≥4 years




*Information represents the product specifications. Batch specific analytical results are provided on each certificate of analysis.*

### Laboratory Procedures

Clenbuterol-$d_9$ is intended for use as an internal standard for the quantification of clenbuterol (Item No. 14985) by GC- or LC-MS. The accuracy of the sample weight in this vial is between 5% over and 2% under the amount shown on the vial. If better precision is required, the deuterated standard should be quantitated against a more precisely weighed unlabeled standard by constructing a standard curve of peak intensity ratios (deuterated *versus* unlabeled).

Clenbuterol-$d_9$ is supplied as a solid. A stock solution may be made by dissolving the clenbuterol-$d_9$ in the solvent of choice, which should be purged with an inert gas. Clenbuterol-$d_9$ is slightly soluble in methanol and DMSO.

### Description

Clenbuterol is an agonist of $\beta_2$-adrenergic receptors ($\beta_2$-ARs).[1] It induces relaxation of equine tracheal muscle strips ($EC_{50}$ = 2.1 nM). Clenbuterol (300 nM) increases the number of autophagosomes and autophagic flux in HepG2 cells.[2] It increases blood flow to adipose tissue and induces weight gain in rats when administered at a dose of 2 mg/kg, as well as induces relaxation of bovine uterus.[3,4] Clenbuterol also inhibits infection of MDCK cells by an H1N1 influenza isolate *in vitro* ($EC_{50}$ = 9.4 µM).[5] Formulations containing clenbuterol have been used in the treatment of airway obstruction in horses.

### References


1. Törneke, K., Larsson, C.I., and Appelgren, L.E. A comparison between clenbuterol, salbutamol and terbutaline in relation to receptor binding and *in vitro* relaxation of equine tracheal muscle. *J. Vet. Pharmacol. Ther.* **21(5)**, 388-392 (1998).
2. Farah, B.L., Sinha, R.A., Wu, Y., *et al.* β-Adrenergic agonist and antagonist regulation of autophagy in HepG2 cells, primary mouse hepatocytes, and mouse liver. *PLoS One* **9(6)**, (2014).
3. Rothwell, N.J., Stock, M.J., and Sudera, D.K. Changes in tissue blood flow and β-receptor density of skeletal muscle in rats treated with the $\beta_2$-adrenoceptor agonist clenbuterol. *Br. J. Pharmacol.* **90(3)**, 601-607 (1987).
4. Denooij, P.P. The use of clenbuterol for obstetrical procedures in forty cows and one horse. *Can. Vet. J.* **25(9)**, 357-359 (1984).
5. Jang, Y., Shin, J.S., Lee, J.-Y., *et al.* In vitro and in vivo antiviral activity of nylidrin by targeting the hemagglutinin 2-mediated membrane fusion of influenza A virus. *Viruses* **12(5)**, 581 (2020).





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