BDG SYNTHESIS

Certificate of Analysis

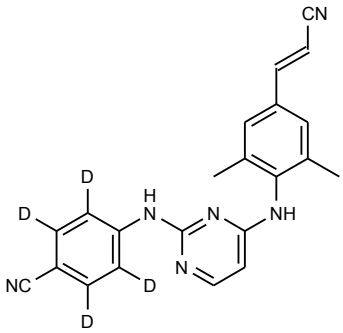
BDG Synthesis certifies that this reference material meets or exceeds the specifications stated herein.

Neil Beare, PhD, Director
9 September 2016

Name: ***E*-Rilpivirine-d_4**

CAS Number: none

Structure:



Molecular Weight: $C_{22}H_{14}D_4N_6$ = 370.44

Lot Number: BDG 16780

Appearance: White, crystalline solid

Purity By HPLC: 97.6 %

Isotopic Purity: Under 0.5 % d_0

Re-test Date: 9 September 2021

Storage and Handling:

Temperature:	refrigerate for prolonged storage; may be handled and shipped at ambient temperature.
Humidity:	not believed to be hygroscopic; may be handled in normal laboratory atmosphere.
Light:	protect from strong sunlight.
Caution:	only experienced laboratory personnel should handle the material.

Mailing:
BDG Synthesis 2014 Limited
PO Box 38627, Wellington Mail Centre,
Wellington 5045, New Zealand.

Shipping:
BDG Synthesis 2014 Limited
Gracefield Research Centre, Building F,
69 Gracefield Rd, Lower Hutt 5010, New Zealand.

Phone: + 64 4 569 0520
Fax: + 64 4 569 0521

info@bdg.co.nz
www.bdg.co.nz

Identity and Purity

Proton NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available.
Isotopic Labelling: signals at the sites of deuteration are greatly diminished, compared with the spectrum of unlabelled material, indicating clean deuteration.
Residual Solvents: no residual solvents are observed.
Impurities: no significant impurities are evident in the spectrum.

Carbon-13 NMR Spectrum

Identity: the signals are consistent with the proposed structure and in accord with literature where available.
Isotopic Labelling: signals at the sites of deuteration have collapsed to small multiplets compared with the spectrum of unlabelled material, indicating clean deuteration.

High-resolution Mass Spectrum (TOF MS ES+)

Found *m/z* 371.1920. $C_{22}H_{15}D_4N_6$ $[M+H]^+$ requires *m/z* 371.1922. The deviation of 0.5 ppm is within normally accepted limits for the establishment of identity by HRMS. No signal for d_0 material was seen (detection limit about 0.5 %).

HPLC

A somewhat broadened, slightly tailing peak is observed (97.6 %). A small peak for *Z*-Rilpivirine is observed (13.16 min). Note: in the absence of reference materials for preparing calibration curves, it is assumed that all peaks have the same detector response. Where possible, the conditions of analysis follow a pharmacopeial or literature method, or have been adapted from same.

Elemental Analysis

	Found:	C 71.19, H 3.81, D 2.18, N 22.93 %
$C_{22}H_{14}D_4N_6$	Requires:	C 71.33, H 3.81, D 2.17, N 22.69 %

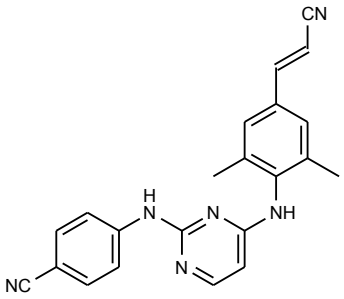
The elemental analyses fall within generally accepted limits for establishing the molecular formula given. The results may also be taken to imply the absence of significant quantities of water or inorganic salts (which have not been elsewhere tested for because of sample size limitations).

The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials often contain higher levels of residual solvents and/or water, and we urge you to use the corrected purity where needed rather than the raw HPLC purity. This compound is intended for use as an analytical reference material and it is not for human administration. Structures are shown with relative stereochemistry unless otherwise specified.

The re-test date is assigned from experience gained with the material in the laboratory and/or on storage. It is not possible to perform formal storage studies because of the small amount of material available.

BDG SYNTHESIS

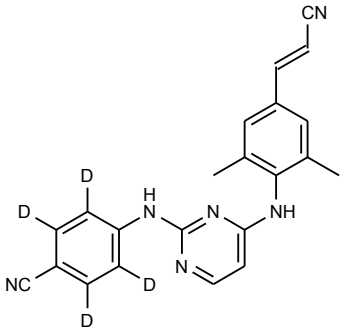
Proton NMR Spectrum of *E*-Rilpivirine (top) and *E*-Rilpivirine-d_4 (bottom) in DMSO-d_6



7xCH
6.9 H

CH
1.0 H

NMR
Solvent



Lot Number: BDG 16780

2xCH
2.0 H

HOD

2xCH$_3$
6.0H

NH+CH
2.0 H

CH
1.0 H

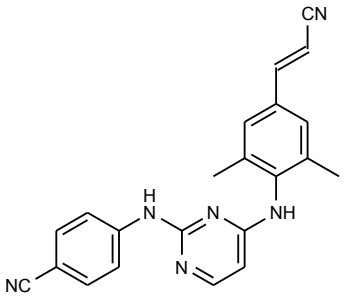
CH
1.0 H

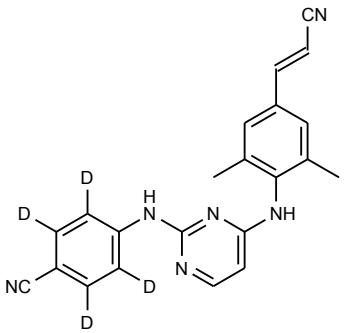
CH+NH
1.6 H

NMR
Solvent

BDG SYNTHESIS

Carbon-13 NMR Spectrum of *E*-Rilpivirine (top) and *E*-Rilpivirine-d_4 (bottom) in DMSO-d_6





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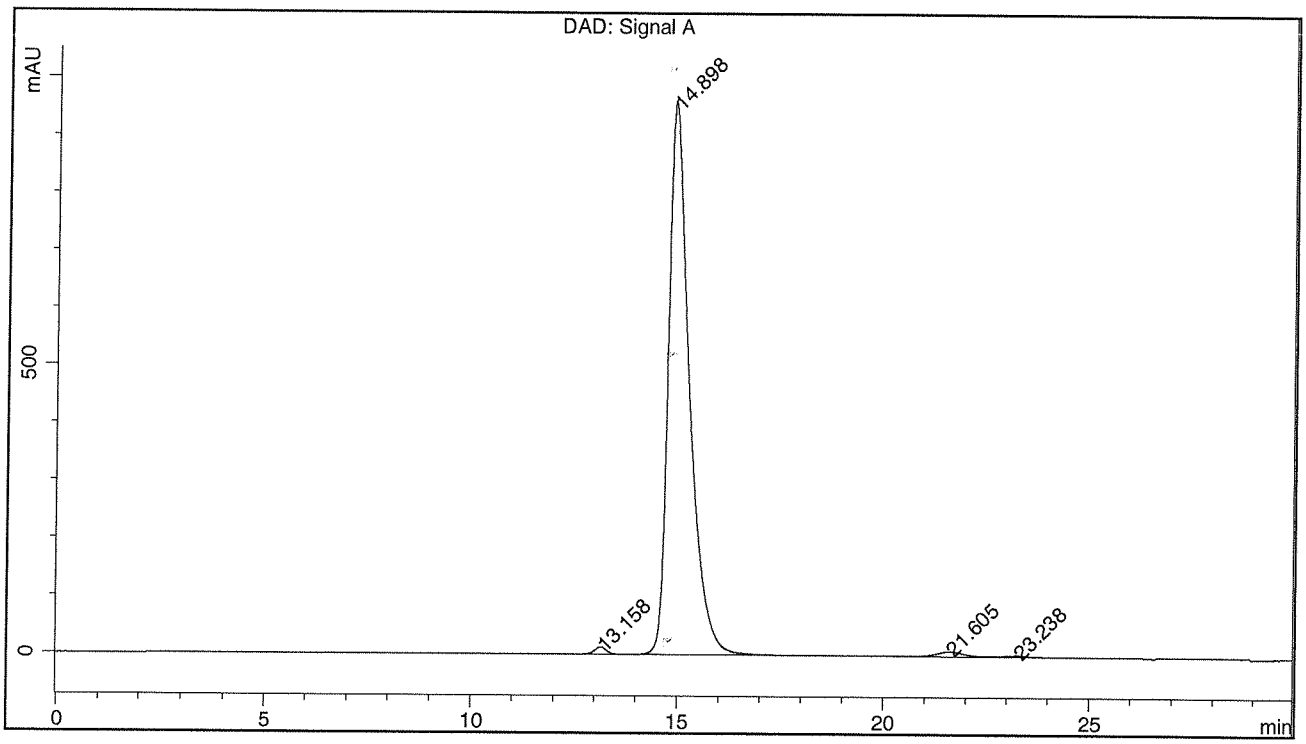
BDG - Analysis of E-Rilpivirine

Column : Phenomenex Luna C18(2) 5um 250 x 4.6 mm
Guard : Phenomenex Security Guard C18 RP 4 x 3 mm
Mobile Phase : 50:50:0.05 Water : Methanol : Trifluoroacetic Acid
Column Temperature : 30 C . . . . . Flow Rate : 1.0 mL/min . . . . . Injection Volume : 10 uL
Sample Solvent : 1:1 Water : Methanol . . . . . Detection : UV 290 nm

Sample Name	BDG 16780	Instrument	AnalyticalLC01
Acquisition	09/09/2016, 16:04:08	Method (rev.)	LC10678c (10)
Sequence	BDG_09Sep2016c - Reprocessed	Vial Position	46
Operator	solvation010\cerityadmin	Injection	1 of 1



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	13.16 min	12.8454	292.4940	0.3457 min	0.845 %
2	14.90 min	956.9956	33801.0622	0.5161 min	97.622 %
3	21.60 min	8.7052	412.1879	0.7284 min	1.190 %
4	23.24 min	2.5499	118.5919	0.6626 min	0.343 %