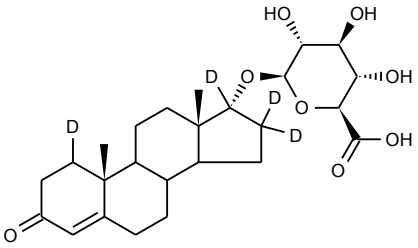
BDG SYNTHESIS

Certificate of Analysis

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

Barry Dent

Barry R. Dent, PhD, Director
22 June 2013

Name:	**Epitestosterone-1,16,16,17-d_4 Glucuronide**
CAS Number:	16996-33-1 (unlabelled)
Structure:	
Molecular Weight:	$C_{25}H_{32}D_4O_8$ = 468.57
Lot Number:	BDG 12785.2
Appearance:	White, crystalline solid
Corrected Purity:	99.4 % (HPLC) - 5.5 % (methanol) - 0.5 % (water) = 93.4 %
Isotopic Purity:	Under 0.5 % d_0
Re-test Date:	22 June 2018

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.

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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 absent, compared with the spectrum of unlabelled material, indicating clean deuteration.
Residual Solvents: a small amount of methanol (5.5 % *w/w*) is 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 (ESI+)

Found *m/z* 491.2562. $C_{25}H_{32}D_4NaO_8$ $[M+Na]^+$ requires *m/z* 491.2559. The deviation of 0.6 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 sharp, symmetrical peak is observed (99.4 %). 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 62.30, H 7.49, D 1.69 %
$C_{25}H_{32}D_4O_8 \cdot 0.1H_2O \cdot 0.85CH_3OH$	Requires:	C 63.84, H 6.90, D 1.71 %, CH_3OH 5.5%.
$C_{25}H_{32}D_4O_8$	Requires:	C 64.08, H 6.88, D 1.72 %

The elemental analyses fall somewhat outside those expected for anhydrous material; the presence of water and methanol is reasonably expected from the method of purification and/or the type of material, and the “best-fit” molecular formula is given.

Karl-Fischer Analysis

	Found:	H_2O 0.5 %
$C_{25}H_{32}D_4O_8 \cdot 0.1H_2O$	Requires:	H_2O 0.4 %

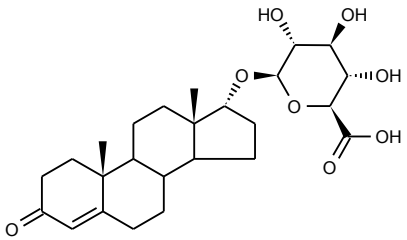
Of necessity, only a small sample could be used and only a single or duplicate analysis performed. We are unable to state what the errors in the reported water content are, but recommend that the result be used, as the best available, when determining corrected purity.

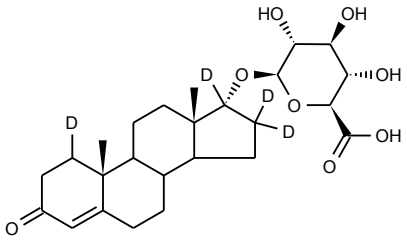
The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials 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 Epitestosterone Glucuronide (top) and Epitestosterone-1,16,16,17-d_4 Glucuronide (bottom) in DMSO-d_6

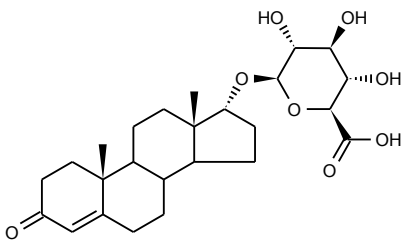


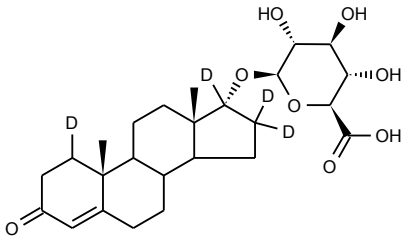


Lot Number: BDG 12785.2

BDG SYNTHESIS

Carbon-13 NMR Spectrum of Epitestosterone Glucuronide (top) and Epitestosterone-1,16,16,17-d_4 Glucuronide (bottom) in DMSO-d_6





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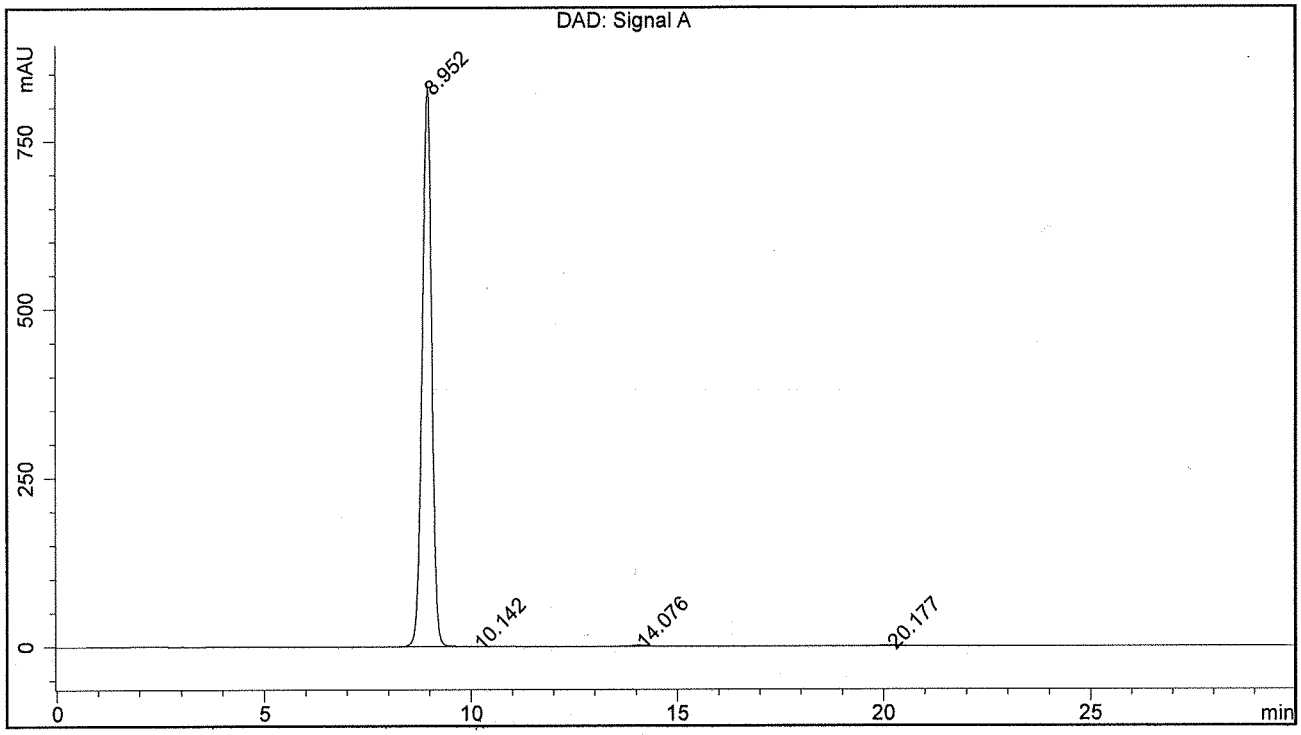
BDG - Analysis of Epitestosterone-1,16,16,17-d4 Glucuronide

Column : Phenomenex Luna C18(2) 5um 250 x 4.6 mm
Guard : Phenomenex Security Guard C18 RP 4 x 3 mm
Mobile Phase : 64:36:0.1 Water : Acetonitrile : Trifluoroacetic Acid
Flow Rate : 1.0 mL/min
Sample Solvent : Mobile Phase
Column Temperature : 20C
Injection Volume : 10 uL
Detection : UV at 244 nm

Sample Name	BDG 12785.2	**Instrument**	AnalyticalLC01
Acquisition	22/06/2013, 10:49:26	**Method (rev.)**	LC10573d (4)
Sequence	BDG_22Jun2013b - Reprocessed	**Vial Position**	1
Operator	solvation010\cerityadmin	**Injection**	1 of 1



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	8.95 min	825.7347	13270.0065	0.2495 min	99.435 %
2	10.14 min	0.1892	3.5007	0.2279 min	0.026 %
3	14.08 min	1.6448	38.9895	0.3446 min	0.292 %
4	20.18 min	0.9708	32.9531	0.4240 min	0.247 %