



## BDG SYNTHESIS

### Certificate of Analysis

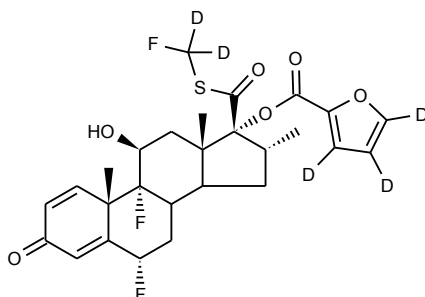
BDG Synthesis certifies that this reference material meets or exceeds the specifications stated herein.

*Barry Dent*

Barry R. Dent, PhD, Director  
8 February 2014

**Name:** Fluticasone Furoate-d<sub>5</sub>  
**CAS Number:** 397864-44-7 (unlabelled)

**Structure:**



**Molecular Weight:** C<sub>27</sub>H<sub>24</sub>D<sub>5</sub>F<sub>3</sub>O<sub>6</sub>S = 543.61  
**Lot Number:** BDG 10885.3  
**Appearance:** White, crystalline solid  
**Corrected Purity:** 99.8 % (HPLC) - 0.4 % (acetone) = 99.4 %  
**Isotopic Purity:** Under 0.5 % d<sub>0</sub>  
**Re-test Date:** 8 February 2019  
**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.

## 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 near complete deuteration. Careful integration of residual signals at the sites of deuteration gave variable values for protium (range = 0.2 - 30 mmol) and is consistent with a small amount of H/D exchange occurring during the synthesis. Material contaminated with  $d_0$  product would have all integrals for protium of equal value.

Residual Solvents: a small amount of acetone (0.4 % 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 (TOF MS ES+)

Found  $m/z$  566.1841.  $C_{27}H_{24}D_5F_3O_6SNa$   $[M+Na]^+$  requires  $m/z$  566.1848. The deviation of 1.2 ppm is within normally accepted limits for the establishment of identity by HRMS. A small signal (0.6 %) in the region of  $d_0$  material was seen (detection limit about 0.5 %). However, the presence of  $d_0$  material is not supported by the NMR evidence discussed above. We conclude that the material contains under 0.5 %  $d_0$ .

### HPLC

A sharp, symmetrical peak is observed (99.8 %). 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 59.48, H 4.31, D 1.80 %
$C_{27}H_{24}D_5F_3O_6S$	Requires:	C 59.66, H 4.45, D 1.85 %

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).

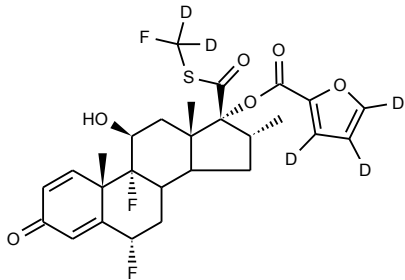
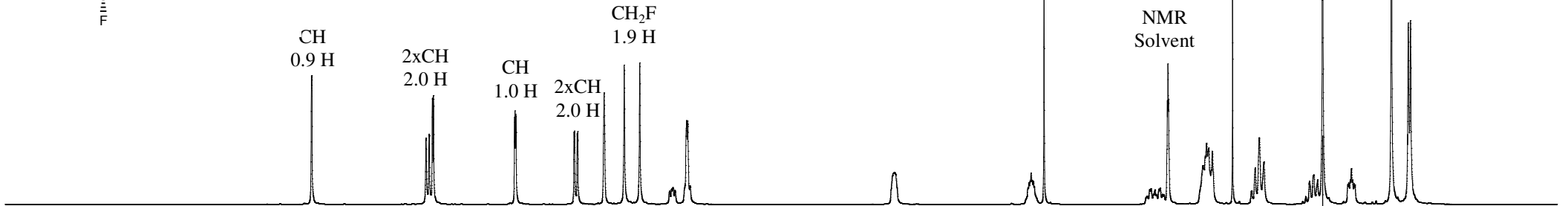
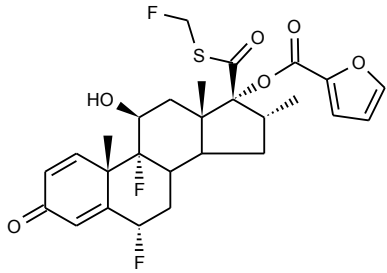
The available quantity of custom-synthesised material is always small, and this limits the extent and type of analytical data which can be obtained. This Certificate is presented in descriptive format for use by analytical chemists who are trained in the use of custom-synthesised materials. Custom materials 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.

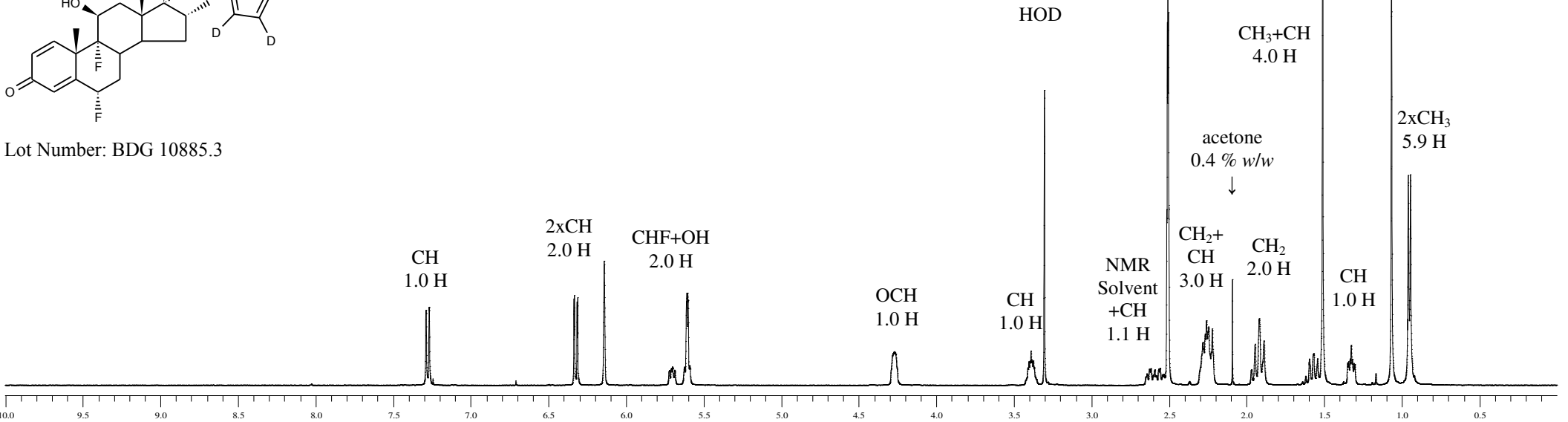


Proton NMR Spectrum of Fluticasone Furoate (top) and Fluticasone Furoate-d<sub>5</sub> (bottom) in DMSO-d<sub>6</sub>

**BDG SYNTHESIS**



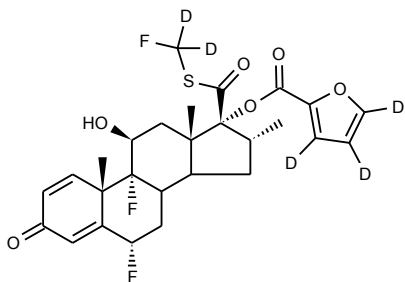
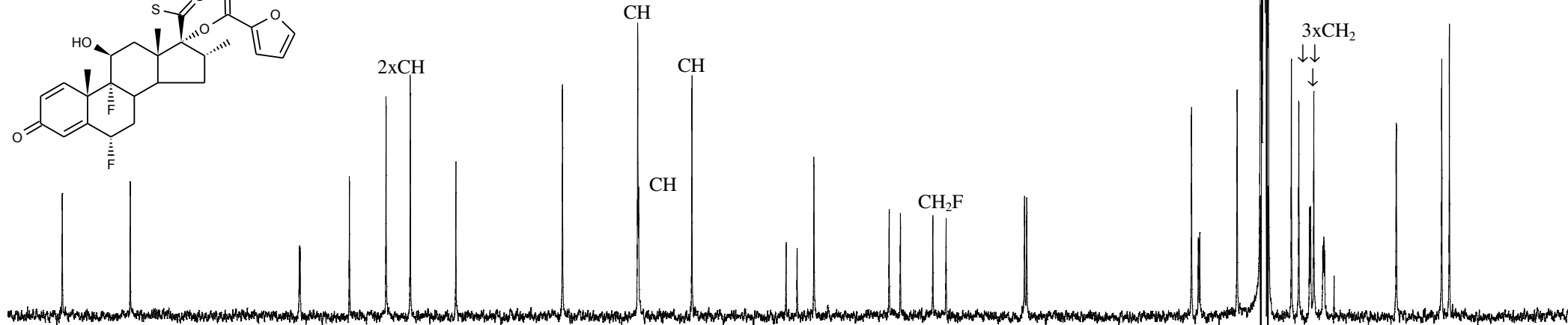
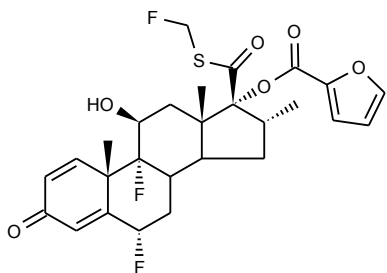
Lot Number: BDG 10885.3



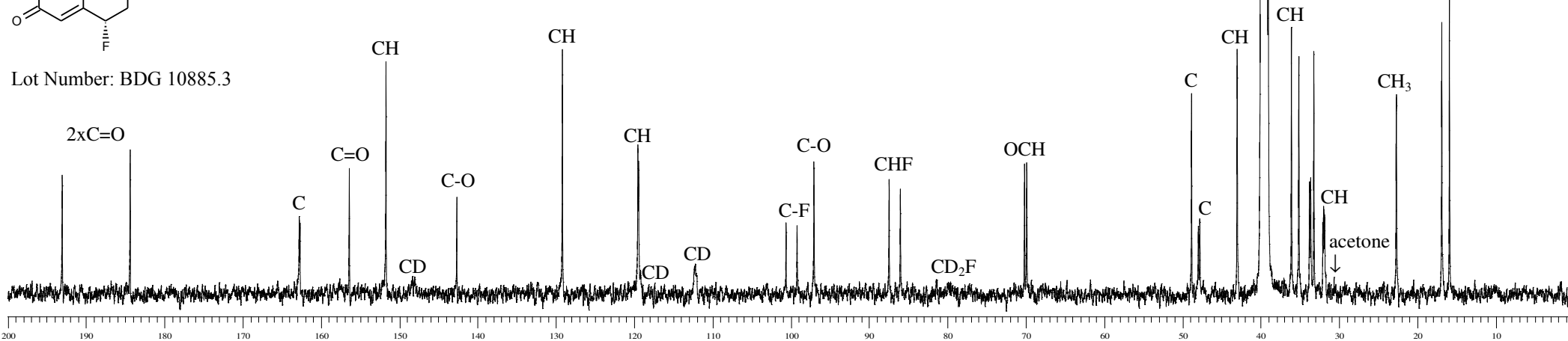


Carbon-13 NMR Spectrum of Fluticasone Furoate (top) and Fluticasone Furoate-d<sub>5</sub> (bottom) in DMSO-d<sub>6</sub>

**BDG SYNTHESIS**



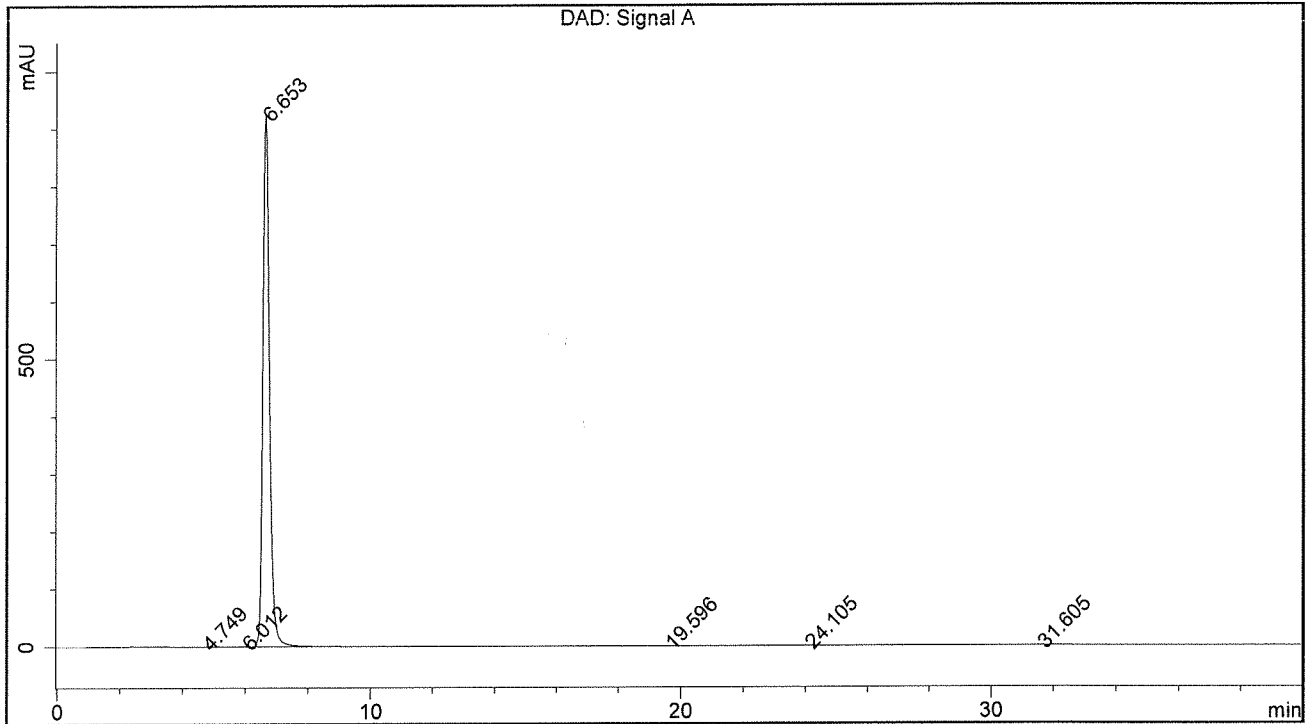
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BDG - Analysis of Fluticasone Furoate-d5

Column : Phenomenex Luna C18 5um 250 x 4.6 mm  
 Guard : Phenomenex Security Guard C18 4 x 3 mm  
 Mobile Phase : 30:70 Water : Acetonitrile . . . . . Flow Rate : 1.0 mL/min  
 Sample Solvent : Mobile Phase . . . . . Injection Volume : 10 uL  
 Column Temperature : 30C . . . . . Detection : UV at 241 nm

<b>Sample Name</b>	BDG 10885.3	<b>Instrument</b>	AnalyticalLC01
<b>Acquisition</b>	08/02/2014, 14:33:58	<b>Method (rev.)</b>	LC10394c ( 7 )
<b>Sequence</b>	BDG_08Feb2014a - Reprocessed	<b>Vial Position</b>	1
<b>Operator</b>	solvation010\cerityadmin	<b>Injection</b>	2 of 2



Area Percent Report

Peak#	RT	Peak Height	Peak Area	Width	Area %
1	4.75 min	0.1551	2.5841	0.2224 min	0.019 %
2	6.01 min	0.6124	7.6933	0.1906 min	0.057 %
3	6.65 min	919.7602	13536.1353	0.2277 min	99.767 %
4	19.60 min	0.1722	6.4944	0.4601 min	0.048 %
5	24.10 min	0.2806	11.4445	0.5159 min	0.084 %
6	31.60 min	0.1065	3.3307	0.3849 min	0.025 %