# Fentanyls



Reference materials 2017



LGC Quality ISO 9001 ISO/IEC 17025 ISO Guide 34 GMP/GLP ISO 13485 ISO/IEC 17043

#### Science for a safer world

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The emergence of fentanyls as drugs of abuse represents the greatest challenge to forensic toxicology since the appearance of the synthetic cannabinoids. The many fentanyl variants available and the low levels of material present in biological samples mean that investigation of overdose cases now has to be particularly thorough in order to establish whether fentanyls are involved.

Ric Treble Scientific Advisor LGC

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There is significant evidence from a small number of postmortem results of recent drug user deaths and from police seizures that some heroin may contain fentanyl or carfentanyl added by dealers. These are highly potent synthetic opiods and very small amounts can cause severe or even fatal toxicity.

Professor Paul Cosford, Director for Health Protection & Medical Director The chemical structure of Fentanyl:



#### LGC offers the most extensive and up-todate range of fentanyls reference materials.

As legislation has been deployed to control named fentanyls, a range of 'designer' versions have been produced to circumvent control.

#### The challenge

The illicit use of synthetic opioids, and particularly fentanyls, has become an increasing cause for concern, particularly in North America and Europe. These materials produce their effects via the mu-opioid receptors which respond to morphine, but fentanyls have a significantly greater potency, so that overdose and death by respiratory arrest is a serious risk. Where fentanyls have entered the opioid misuse market, deaths by overdose have increased significantly.

Although encountered as diverted pharmaceuticals, fentanyls are also being illicitly synthesised. As well as being sold as heroin replacements or 'boosters', fentanyls have increasingly been seen in the form of counterfeit pharmaceuticals. usually intended to have the appearance of tablets containing oxycodone or hydrocodone, such as Vicodin or Oxycontin. In North America, where a significant population of abusers of prescription opioids already existed, circulation and use of fentanyl-containing tablets have become widespread, with many deaths resulting, to the extent that a 'health emergency' has recently been declared in British Columbia (Canada).

The potency of fentanyls means that seizures suspected to contain them should be handled with caution, and personal protective equipment is advisable to prevent accidental ingestion or contamination. It also means that there are usually only very low levels of material to be found in biological samples, so that they may be overlooked, particularly if other 'traditional' opiates are present. The US Centre for Disease Control (CDC) has issued a Health Advisory notice advising that, where there is a local increase in opiate overdoses, or if fentanyls have been identified in local drug seizures, fentanyls should be looked for in toxicology testing. Similarly, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) has warned of a risk of under-reporting of fentanyls and called for enhanced forensic identification.

LGC has expert toxicologists who constantly monitor the market to identify new fentanyl substances on the market.

#### The LGC response

In response to the increasing problem of fentanyls and 'designer' versions, a range of reference materials have been produced for these materials, their precursors and their major metabolites.

LGC Standards provides the widest range of reference materials available from any single supplier. We work closely with leading manufacturers to provide improved access to reference materials, with an increasingly large range of parameters, for laboratories worldwide. LGC Standards has both extensive reference material sales experience and technical expertise that allows us to work in successful partnership with our customers.

#### Currently available reference standards for fentanyls include:

Ref no:	Fentanyls
<b>1.0</b> 1.1 1.2 1.3 1.4 1.5 1.6 1.7	Precursors and impurities 4-Anilopiperadine 4-Anilino-1-benzylpiperidine N-Phenethyl-4-piperidone (NPP) Despropionylfentanyl (4-ANPP) Despropionylfentanyl-D5 Despropionyl-ortho-fluorofentanyl Despropionyl-para-fluorofentany
<b>2.0</b> 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.10 2.11 2.12 2.13 2.14 2.15 2.16 2.17 2.18 2.19 2.20 2.21 2.22 2.21 2.22 2.23 2.24 2.25 2.26 2.27	Fentanyls Fentanyl Fentanyl-D5 para-Chlorofentanyl ortho-Fluorofentanyl meta-Fluorofentanyl para-Fluorofentanyl-D3 para-Fluorofentanyl-D5 beta-Hydroxyfentanyl-D5 beta-Hydroxyfentanyl-D3 omega-Hydroxyfentanyl-D3 omega-Hydroxyfentanyl-D5 omega-1-Hydroxyfentanyl-D5 omega-1-Hydroxyfentanyl-D5 2-Hydroxyfentanyl 2-Hydroxyfentanyl alpha-Methylfentanyl alpha-Methylfentanyl jara-Methylfentanyl 3-Methylfentanyl 2-Mydroxyfentanyl 2-Mydroxyfentanyl alpha-Methylfentanyl jara-Methylfentanyl jara-Methylfentanyl 2-Mydroxyfentanyl 2-Mydroxyfentanyl 2-Mydroxyfentanyl 2-Mydroxyfentanyl 2-Mydroxyfentanyl 2-Oxofentanyl 2-Oxofentanyl-D5
<b>3.0</b> 3.1 3.2 3.3 3.4	Acetyl fentanyls Acetyl fentanyl Acetyl fentanyl-D5 Acetyl fentanyl -13C6 Acetyl fentanyl, 4-Me (on phenylethyl) analogue
3.6 3.7	analogue-D5 alpha-Methylacetylfentanyl alpha-Methylacetylfentanyl-D3
<b>4.0</b> 4.1 4.2	Acrylfentanyls Acrylfentanyl para-Fluoro acrylfentanyl

Ref no:	Fentanyls
<b>5.0</b>	Alfentanils
5.1	Alfetanil
5.2	Alfetanil-D3
<b>6.0</b>	Benzodioxole fentanyls
6.1	Benzodioxole fentanyl
<b>7.0</b>	<b>Benzyl fentanyls</b>
7.1	Benzyl fentanyl
7.2	Benzyl fentanyl-D3
8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10	Butyryl fentanyls Butyryl fentanyl-D5 a-Methyl-butyryl fentanyl cis-3-Methyl-butyryl fentanyl 4-MeO-butyryl fentanyl 4-MeO-butyryl fentanyl-D7 ortho-Fluorobutyrylfentanyl meta-Fluorobutyrylfentanyl para-Fluorobutyrylfentanyl-D7
<b>9.0</b>	<b>Isobutyryl fentanyls</b>
9.1	Isobutyryl fentanyl
9.2	Isobutyryl fentanyl-D5
9.3	para-Chloroisobutyrylfentanyl
9.4	para-Fluoroisobutyrylfentanyl
<b>10.0</b>	<b>Carfentanyls</b>
10.1	Carfentanil
10.2	Carfentanil-D5
10.3	N-Me carfentanil
10.4	Benzyl carfentanil
<b>11.0</b>	Cyclopentyl fentanyls
11.1	Cyclopentyl fentanyl
<b>12.0</b> 12.1 12.2 12.3	Furanyl fentanyls Furanyl fentanyl Furanyl fentanyl-D5 3-Furanyl fentanyl (3-furan positional isomer)
<b>13.0</b> 13.1	Furanylethylfentanyls (Furanylethyl replaces phenethyl) Furanylethylfentanyl
<b>14.0</b>	Lofentanils
14.1	Lofentanil
14.2	Lofentanil-D3
<b>15.0</b>	Methoxyacetylfentanyls
15.1	Methoxyacetylfentanyl
<b>16.0</b>	Ocfentanils
16.1	Ocfentanil
16.2	Ocfentanil-D5

Ref no:	Fentanyls
<b>17.0</b>	<b>Ohmefentanyls</b>
17.1	Ohmefentanyl
17.2	Ohmefentanyl-D3
<b>18.0</b>	<b>Remifentanils</b>
18.1	Remifentanil
18.2	Remifentanil-13C6
<b>19.0</b>	Sufentanils
19.1	Sufentanil
19.2	Sufentanil-D3
19.3	Sufentanil-D5
<b>20.0</b>	Thienyl fentanyls
20.1	Thienyl fentanyl
20.2	Thienyl fentanyl-D3
<b>21.0</b> 21.1	<b>Tertahydrofuran fentanyls</b> Tertahydrofuran fentanyl
<b>22.0</b>	Thiofentanyls
22.1	Thiofentanyl
22.2	Thiofentanyl-D3
22.3	beta-Hydroxythiofentanyl-D3
22.4	beta-Hydroxythiofentanyl-D3
22.5	beta-Hydroxythiofentanyl-D5
22.6	alpha-Methylthiofentanyl
22.7	3-Methylthiofentanyl
22.8	3-Methylthiofentanyl-D3
<b>23.0</b>	<b>Valerylfentanyls</b>
23.1	Valerylfentanyl
23.2	Valerylfentanyl-D5
<b>24.0</b> 24.1 24.2 42.3 42.4 24.5 24.6 24.7 24.8 24.9 24.10 24.11 24.12 24.13 24.14 24.15 24.16 24.17	Norfentanyl metabolites Acetyl norfentanyl Acetyl norfentanyl-D5 Acetyl norfentanyl-D5 Butyryl norfentanyl Furanyl norfentanyl omega-1-Hydroxynorfentanyl-D5 Norcarfentanil Norfentanyl-D3 Norfentanyl-D5 Norlofentanil Norfentanil-D3 Normethylfentanyl Normethylfentanyl-D3 Norsulfentanil Norsulfentanil-D3
<b>25.0</b>	Other metabolites
25.1	Butyryl fentanyl carboxy metabolite

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