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Benzyl-5-[*N*-(*tert*-butoxycarbonyl)amino]-4-oxo-6-phenylhexanoate

Jon Våbenø,[a] Truls Ingebrigtsen,[b] Tore Lejon,[b] Kristina Luthman[a,c] and Lars Kr. Hansen[b]*

[a]Department of Medicinal Chemistry, Institute of Pharmacy, University of Tromsø, 9037 Tromsø, Norway, [b]Department of Chemistry, University of Tromsø, 9037 Tromsø, Norway, and [c]Department of Chemistry, Medicinal Chemistry, Gøteborg University, SE-412 96, Gøteborg, Sweden

Correspondence e-mail: larsk@chem.uit.no

Key indicators

Single-crystal X-ray study
T = 298 K
Mean σ(C–C) = 0.004 Å
Disorder in main residue
R factor = 0.035
wR factor = 0.099
Data-to-parameter ratio = 10.1

For details of how these key indicators were automatically derived from the article, see http://journals.iucr.org/e.

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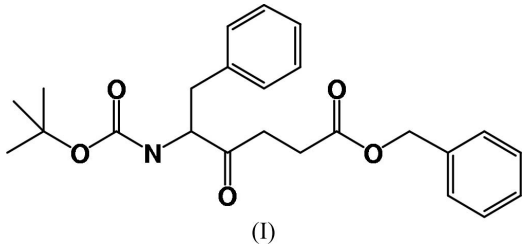
The title compound, $C_{24}H_{29}NO_5$, the benzyl ester of the Phe–Gly dipeptidomimetic containing a ketomethylene motif, was synthesized from the readily available α,β-unsaturated γ-ketoester. The methylene group in the benzyl part of the molecule is disordered. There is an intermolecular N—H···O hydrogen bond linking the molecules in the crystal structure.

Comment

The human peptide transporter hPEPT1 (Fei *et al.*, 1994; Liang *et al.*, 1995) has become of interest owing to its ability to transport a number of peptidomimetic drugs, *e.g.* β-lactam antibiotics (Bretschneider *et al.*, 1999) and also prodrugs based on single amino acids or dipeptide pro-moieties, *e.g.* Gly–Val acyclovir, as shown by Anand *et al.* (2003). In an ongoing project we have established that the ketomethylene isostere is an interesting motif when targeting this transporter, based on a series of Phe–Gly dipeptidomimetics (Våbenø, Lejon *et al.*, 2004). In order to better understand which structural features are necessary for affinity, uptake and overall transepithelial transport by hPEPT1, compounds with benzyl alcohol (model drug) linked to the C-terminus of ketomethylene isosteres have been synthesized (Våbenø, Nielsen *et al.*, 2004).



(I)

The atomic numbering scheme of the title compound, (I), is shown in Fig. 1. The bond lengths are within the normal range of such bonds (Allen *et al.*, 1987). Table 1 gives details of selected geometric parameters. The methylene C atom in the benzyl part of the molecule is disordered (atoms C181 and C182). There is one short intermolecular hydrogen bond contributing to the packing of the molecules in the crystal structure (Taylor & Kennard, 1982), details are given in Table 2.

Experimental

The title compound was synthesised as described by Våbenø, Nielsen *et al.*, 2004). Crystals were dissolved in a small amount of diethyl ether and crystals were grown by evaporation from a diethyl ether solution at room temperature.

Crystal data

$C_{24}H_{29}NO_5$
M_r = 411.48
Monoclinic, $P2_1/a$
a = 9.6080 (19) Å
b = 22.856 (4) Å
c = 10.2908 (17) Å
β = 98.353 (16)°
V = 2235.9 (7) Å^3
Z = 4
D_x = 1.222 Mg m^{-3}
Mo $K\alpha$ radiation
Cell parameters from 25 reflections
θ = 12–20°
μ = 0.09 mm^{-1}
T = 298 (2) K
Block, colourless
0.40 × 0.20 × 0.10 mm

Data collection

Enraf–Nonius CAD-4 diffractometer
ω–2θ scans
Absorption correction: ψ scan (*ABSCALC* in *OSCAIL*; McArdle & Daly, 1999; North *et al.*, 1968)
T_{min} = 0.967, T_{max} = 0.992
4262 measured reflections
3941 independent reflections
1759 reflections with $I > 2\sigma(I)$
R_{int} = 0.010
θ_{max} = 25.0°
$h = 0 \rightarrow 11$
$k = 0 \rightarrow 27$
$l = -12 \rightarrow 12$
3 standard reflections
frequency: 120 min
intensity decay: 2%

Refinement

Refinement on F^2
$R[F^2 > 2\sigma(F^2)]$ = 0.035
$wR(F^2)$ = 0.099
S = 0.91
3941 reflections
389 parameters
H atoms treated by a mixture of independent and constrained refinement
$w = 1/[\sigma^2(F_o^2) + (0.0484P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max}$ = 0.001
$\Delta\rho_{max}$ = 0.15 e Å^{-3}
$\Delta\rho_{min}$ = −0.14 e Å^{-3}
Extinction correction: *SHELXL*
Extinction coefficient: 0.0041 (8)

Table 1
Selected geometric parameters (Å, °).

O1—C5	1.338 (2)	O4—C17	1.197 (3)
O1—C1	1.475 (2)	C6—C14	1.514 (3)
N1—C5	1.343 (2)	C14—C15	1.504 (3)
N1—C6	1.446 (3)	C15—C16	1.516 (3)
O3—C14	1.208 (2)	C16—C17	1.491 (3)
O5—C17	1.313 (3)		
N1—C6—C14	112.55 (16)	C17—C16—C15	112.0 (2)
O3—C14—C15	121.60 (19)	O4—C17—O5	122.3 (2)
O3—C14—C6	121.25 (18)	O4—C17—C16	124.7 (2)
C15—C14—C6	117.15 (19)	O5—C17—C16	113.0 (2)
C14—C15—C16	114.96 (19)		

Table 2
Hydrogen-bonding geometry (Å, °).

D—H···A	D—H	H···A	D···A	D—H···A
N1—H1···O3^{i}	0.84 (2)	2.295 (17)	3.133 (1)	172 (2)

Symmetry code: (i) $2-x, 1-y, -z$.

All H atoms except for the disordered C181/C182 H atoms were found in a difference map and were refined independently and assigned occupancies of 0.5, even though the quality of the data gives a large variation in the U_{iso} values of the refined H atoms.

Data collection: *CAD-4-PC Software* (Enraf–Nonius, 1992); cell refinement: *CELDIM* in *CAD-4-PC Software*; data reduction: *XCAD* (McArdle & Higgins, 1995); program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *ORTEX* (McArdle, 1995); software used to prepare material for publication: *OSCAIL* (Version 9; McArdle, 1993).

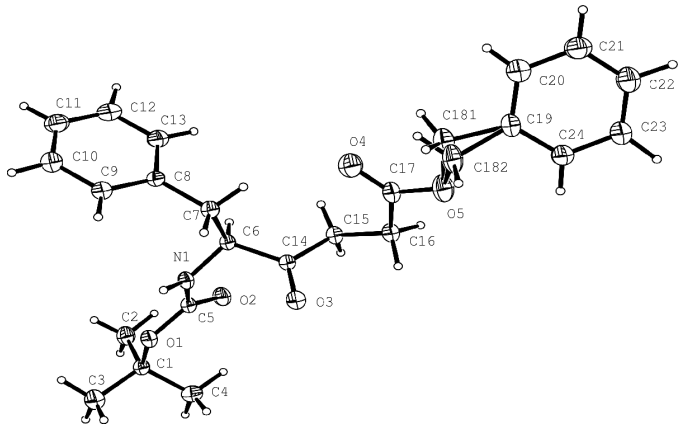


Figure 1
A view of the title compound with the atomic numbering scheme. Displacement ellipsoids are drawn at the 20% probability level. Both disorder components are shown.

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