Full wwPDB NMR Structure Validation Report (i)

Mar 8, 2026 – 03:50 AM UTC

PDB ID	:	1HOD / pdb_00001hod
Title	:	NMR STRUCTURE OF D130I MUTANT T3-I2, A 32 RESIDUE PEPTIDE FROM THE ALPHA 2A ADRENERGIC RECEPTOR
Authors	:	Chung, D.A.; Zuiderweg, E.R.; Neubig, R.R.
Deposited on	:	2000-12-10

This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/NMRValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (i)) were used in the production of this report:

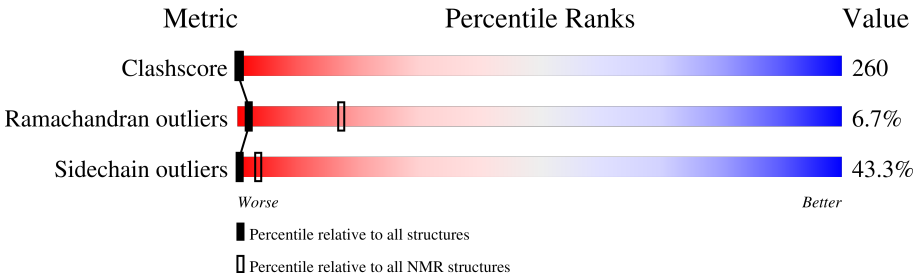
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	NMR archive (#Entries)
Clashscore	229148	14424
Ramachandran outliers	224038	12848
Sidechain outliers	223484	12823

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and a grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	32	9% 50% 41%

2 Ensemble composition and analysis (i)

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 547 atoms, of which 281 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called ALPHA-2A ADRENERGIC RECEPTOR.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	32	547	170	281	50	45	1	0

There is a discrepancy between the modelled and reference sequences:

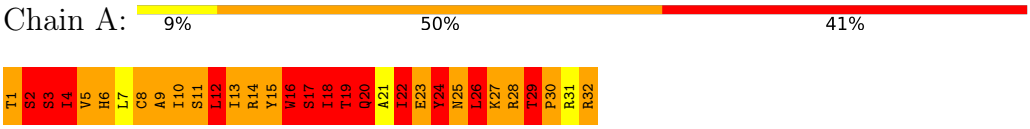
Chain	Residue	Modelled	Actual	Comment	Reference
A	13	ILE	ASP	conflict	UNP P08913

4 Residue-property plots (i)

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: ALPHA-2A ADRENERGIC RECEPTOR

Chain A:



5 Refinement protocol and experimental data overview

The models were refined using the following method: *SIMULATED ANNEALING IN TORSION ANGLE SPACE*.

Of the ? calculated structures, 1 were deposited, based on the following criterion: *?*.

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
DYANA	structure solution	
DYANA	refinement	

No chemical shift data was provided.

6 Model quality (i)

6.1 Standard geometry (i)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the (average) root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#Z>5	RMSZ	#Z>5
1	A	29.08	207/271 (76.4%)	12.45	120/367 (32.7%)
All	All	29.08	207/271 (76.4%)	12.45	120/367 (32.7%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	Chirality	Planarity
1	A	6	0
All	All	6	0

All bond outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	31	ARG	NE-CZ	-95.63	0.27	1.33
1	A	32	ARG	NE-CZ	-89.06	0.35	1.33
1	A	14	ARG	CZ-NH1	-86.96	0.11	1.32
1	A	30	PRO	CA-CB	-86.05	0.41	1.53
1	A	31	ARG	CA-C	-79.74	0.56	1.52
1	A	31	ARG	CA-CB	-79.72	0.32	1.53
1	A	30	PRO	C-O	-78.64	0.34	1.23
1	A	29	THR	C-N	-73.00	0.48	1.33
1	A	31	ARG	C-O	-72.13	0.36	1.24
1	A	30	PRO	N-CD	-69.38	0.50	1.47
1	A	32	ARG	CA-CB	-65.36	0.22	1.53
1	A	32	ARG	CD-NE	-65.23	0.55	1.46
1	A	32	ARG	CZ-NH2	-63.87	0.50	1.33
1	A	32	ARG	CZ-NH1	-63.68	0.43	1.32
1	A	29	THR	C-O	-62.68	0.44	1.24
1	A	31	ARG	CZ-NH1	-62.41	0.45	1.32
1	A	29	THR	CB-OG1	-58.81	0.49	1.43
1	A	23	GLU	CD-OE1	-58.55	0.14	1.25

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	27	LYS	C-O	-57.87	0.53	1.23
1	A	28	ARG	NE-CZ	-57.65	0.69	1.33
1	A	32	ARG	C-O	-57.24	0.09	1.23
1	A	31	ARG	CD-NE	-56.24	0.67	1.46
1	A	30	PRO	CA-C	-56.16	0.87	1.52
1	A	28	ARG	CZ-NH1	-54.83	0.56	1.32
1	A	31	ARG	CZ-NH2	-54.78	0.62	1.33
1	A	28	ARG	CZ-NH2	-53.90	0.63	1.33
1	A	32	ARG	CA-C	-53.69	0.40	1.52
1	A	28	ARG	CD-NE	-53.60	0.71	1.46
1	A	20	GLN	CD-OE1	-52.62	0.23	1.23
1	A	31	ARG	C-N	-52.05	0.60	1.33
1	A	30	PRO	C-N	-50.33	0.67	1.33
1	A	31	ARG	N-CA	-49.83	0.85	1.46
1	A	29	THR	CA-CB	-49.21	0.75	1.53
1	A	6	HIS	CE1-NE2	-48.21	0.84	1.32
1	A	28	ARG	CA-C	-47.91	0.94	1.52
1	A	27	LYS	C-N	-47.60	0.65	1.33
1	A	26	LEU	C-O	-47.58	0.63	1.24
1	A	32	ARG	N-CA	-46.98	0.56	1.46
1	A	32	ARG	CG-CD	-46.69	0.12	1.52
1	A	30	PRO	N-CA	-46.05	0.91	1.47
1	A	29	THR	CA-C	-45.06	0.96	1.52
1	A	16	TRP	C-O	-44.71	0.67	1.24
1	A	27	LYS	CA-CB	-44.57	0.92	1.52
1	A	14	ARG	NE-CZ	-44.33	0.84	1.33
1	A	14	ARG	CZ-NH2	-41.62	0.79	1.33
1	A	28	ARG	C-O	-40.96	0.71	1.24
1	A	23	GLU	CD-OE2	-40.12	0.49	1.25
1	A	20	GLN	CD-NE2	-39.83	0.49	1.33
1	A	6	HIS	CG-CD2	-39.38	0.92	1.35
1	A	14	ARG	CD-NE	-39.22	0.91	1.46
1	A	29	THR	N-CA	-38.63	0.91	1.46
1	A	27	LYS	CE-NZ	-38.38	0.34	1.49
1	A	26	LEU	C-N	-36.75	0.81	1.33
1	A	31	ARG	CG-CD	-35.37	0.46	1.52
1	A	15	TYR	CG-CD2	-35.17	0.65	1.39
1	A	21	ALA	C-O	-34.56	0.80	1.24
1	A	15	TYR	CG-CD1	-34.53	0.66	1.39
1	A	16	TRP	C-N	-34.11	0.85	1.33
1	A	24	TYR	CG-CD2	-33.92	0.68	1.39
1	A	2	SER	CB-OG	-33.34	0.75	1.42

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	24	TYR	CG-CD1	-32.81	0.70	1.39
1	A	7	LEU	CB-CG	-32.17	0.89	1.53
1	A	19	THR	CB-OG1	-32.09	0.92	1.43
1	A	15	TYR	CE1-CZ	-31.86	0.61	1.38
1	A	32	ARG	CB-CG	-31.55	0.57	1.52
1	A	15	TYR	CE2-CZ	-31.33	0.63	1.38
1	A	23	GLU	CG-CD	-31.12	0.74	1.52
1	A	27	LYS	CA-C	-30.86	1.21	1.53
1	A	20	GLN	CG-CD	-30.51	0.75	1.52
1	A	24	TYR	CE1-CZ	-30.40	0.65	1.38
1	A	27	LYS	CD-CE	-29.96	0.62	1.52
1	A	6	HIS	CG-ND1	-29.59	1.05	1.38
1	A	24	TYR	CE2-CZ	-29.50	0.67	1.38
1	A	26	LEU	CG-CD2	-29.48	0.55	1.52
1	A	31	ARG	CB-CG	-28.96	0.65	1.52
1	A	28	ARG	CA-CB	-28.22	0.89	1.53
1	A	25	ASN	C-O	-27.42	0.92	1.24
1	A	7	LEU	C-O	-26.91	0.90	1.24
1	A	28	ARG	CG-CD	-26.10	0.74	1.52
1	A	7	LEU	C-N	-25.87	1.02	1.33
1	A	28	ARG	CB-CG	-25.86	0.74	1.52
1	A	27	LYS	N-CA	-25.46	1.14	1.46
1	A	29	THR	CB-CG2	-25.23	0.69	1.52
1	A	26	LEU	CG-CD1	-25.07	0.69	1.52
1	A	28	ARG	N-CA	-24.52	1.15	1.46
1	A	21	ALA	C-N	-24.43	0.98	1.33
1	A	27	LYS	CG-CD	-24.43	0.79	1.52
1	A	26	LEU	CA-C	-23.89	1.19	1.52
1	A	26	LEU	CB-CG	-23.48	1.06	1.53
1	A	30	PRO	CG-CD	-23.48	0.70	1.50
1	A	23	GLU	CB-CG	-23.32	0.82	1.52
1	A	4	ILE	CG1-CD1	-23.18	0.61	1.51
1	A	6	HIS	ND1-CE1	-22.08	1.10	1.32
1	A	25	ASN	CA-C	-21.85	1.25	1.52
1	A	26	LEU	CA-CB	-21.64	1.14	1.53
1	A	18	ILE	CG1-CD1	-21.53	0.67	1.51
1	A	14	ARG	CG-CD	-21.48	0.88	1.52
1	A	11	SER	C-O	-21.20	0.92	1.24
1	A	11	SER	C-N	-20.81	1.07	1.33
1	A	27	LYS	CB-CG	-20.70	0.90	1.52
1	A	7	LEU	CG-CD2	-20.47	0.85	1.52
1	A	12	LEU	CG-CD2	-20.29	0.85	1.52

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	28	ARG	C-N	-20.12	0.92	1.33
1	A	26	LEU	N-CA	-20.05	1.20	1.46
1	A	25	ASN	N-CA	-19.36	1.23	1.46
1	A	6	HIS	CD2-NE2	-19.33	1.16	1.37
1	A	12	LEU	CG-CD1	-18.89	0.90	1.52
1	A	25	ASN	C-N	-18.17	1.09	1.33
1	A	24	TYR	CA-C	-17.08	1.29	1.52
1	A	1	THR	CB-OG1	-16.84	1.16	1.43
1	A	2	SER	C-O	-15.54	1.03	1.24
1	A	23	GLU	C-O	-15.18	1.05	1.24
1	A	3	SER	CB-OG	-15.17	1.11	1.42
1	A	22	ILE	CA-CB	-15.02	1.41	1.55
1	A	30	PRO	CB-CG	-14.44	0.77	1.49
1	A	23	GLU	C-N	-14.24	1.15	1.33
1	A	3	SER	C-N	-14.20	1.15	1.33
1	A	23	GLU	CA-CB	-14.19	1.30	1.53
1	A	11	SER	CB-OG	-13.98	1.14	1.42
1	A	19	THR	CB-CG2	-13.56	1.07	1.52
1	A	1	THR	C-N	-13.46	1.13	1.33
1	A	18	ILE	CB-CG1	-13.46	1.26	1.53
1	A	3	SER	C-O	-13.36	1.06	1.24
1	A	1	THR	N-CA	-13.22	1.21	1.46
1	A	6	HIS	CB-CG	-13.20	1.31	1.50
1	A	2	SER	N-CA	-13.10	1.28	1.46
1	A	24	TYR	CA-CB	-12.79	1.33	1.53
1	A	2	SER	C-N	-11.57	1.16	1.33
1	A	23	GLU	N-CA	-11.57	1.31	1.46
1	A	8	CYS	CB-SG	-11.49	1.43	1.81
1	A	7	LEU	CG-CD1	-11.29	1.15	1.52
1	A	20	GLN	CB-CG	-11.20	1.18	1.52
1	A	24	TYR	CZ-OH	-10.84	1.15	1.38
1	A	22	ILE	C-O	-10.68	1.11	1.23
1	A	6	HIS	N-CA	-10.62	1.33	1.46
1	A	5	VAL	C-O	-10.62	1.12	1.24
1	A	12	LEU	C-N	-10.52	1.21	1.33
1	A	1	THR	CB-CG2	-10.46	1.18	1.52
1	A	3	SER	N-CA	-10.15	1.32	1.46
1	A	2	SER	CA-C	-10.10	1.38	1.52
1	A	22	ILE	C-N	-10.08	1.19	1.33
1	A	24	TYR	C-O	-10.04	1.12	1.24
1	A	24	TYR	CB-CG	-10.01	1.29	1.51
1	A	5	VAL	CA-C	-9.95	1.40	1.52

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	4	ILE	CA-CB	-9.85	1.41	1.54
1	A	22	ILE	CA-C	-9.68	1.39	1.53
1	A	25	ASN	CG-OD1	-9.58	1.05	1.23
1	A	22	ILE	CB-CG1	-9.49	1.34	1.53
1	A	5	VAL	CA-CB	-9.40	1.44	1.54
1	A	25	ASN	CA-CB	-9.25	1.39	1.53
1	A	24	TYR	C-N	-9.21	1.22	1.33
1	A	14	ARG	CB-CG	-9.12	1.25	1.52
1	A	25	ASN	CG-ND2	-9.10	1.14	1.33
1	A	24	TYR	N-CA	-9.01	1.35	1.46
1	A	6	HIS	C-O	-8.97	1.13	1.24
1	A	25	ASN	CB-CG	-8.95	1.29	1.52
1	A	1	THR	CA-CB	-8.72	1.30	1.54
1	A	21	ALA	CA-C	-8.58	1.41	1.52
1	A	12	LEU	C-O	-8.35	1.14	1.23
1	A	5	VAL	C-N	-8.30	1.24	1.33
1	A	6	HIS	C-N	-8.22	1.23	1.34
1	A	23	GLU	CA-C	-8.18	1.42	1.52
1	A	15	TYR	C-O	-8.16	1.13	1.24
1	A	16	TRP	NE1-CE2	-8.11	1.28	1.37
1	A	15	TYR	C-N	-8.10	1.22	1.33
1	A	22	ILE	N-CA	-8.04	1.35	1.46
1	A	16	TRP	CD2-CE2	-7.89	1.27	1.41
1	A	1	THR	CA-C	-7.87	1.36	1.52
1	A	18	ILE	CB-CG2	-7.69	1.27	1.52
1	A	19	THR	C-N	-7.57	1.24	1.34
1	A	20	GLN	C-N	-7.42	1.23	1.33
1	A	4	ILE	C-N	-7.28	1.25	1.33
1	A	5	VAL	N-CA	-7.09	1.38	1.46
1	A	4	ILE	N-CA	-6.82	1.38	1.46
1	A	1	THR	C-O	-6.63	1.10	1.23
1	A	21	ALA	CA-CB	-6.49	1.42	1.53
1	A	2	SER	CA-CB	-6.36	1.42	1.53
1	A	12	LEU	CB-CG	-6.34	1.40	1.53
1	A	16	TRP	CD2-CE3	-6.32	1.30	1.40
1	A	7	LEU	N-CA	-6.30	1.38	1.46
1	A	15	TYR	CA-CB	-6.26	1.44	1.53
1	A	10	ILE	C-O	-6.18	1.17	1.24
1	A	10	ILE	CG1-CD1	-6.12	1.27	1.51
1	A	10	ILE	N-CA	-6.10	1.39	1.46
1	A	4	ILE	C-O	-6.02	1.17	1.24
1	A	17	SER	C-O	-5.99	1.16	1.24

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	13	ILE	CA-CB	-5.98	1.47	1.54
1	A	17	SER	C-N	-5.95	1.25	1.33
1	A	16	TRP	CG-CD2	-5.67	1.33	1.43
1	A	6	HIS	CA-C	-5.66	1.45	1.52
1	A	24	TYR	CD1-CE1	-5.55	1.22	1.38
1	A	3	SER	CA-CB	-5.52	1.43	1.53
1	A	24	TYR	CD2-CE2	-5.52	1.22	1.38
1	A	15	TYR	CZ-OH	-5.51	1.26	1.38
1	A	14	ARG	C-N	-5.45	1.27	1.33
1	A	5	VAL	CB-CG2	-5.36	1.34	1.52
1	A	4	ILE	CA-C	-5.32	1.46	1.52
1	A	3	SER	CA-C	-5.31	1.45	1.52
1	A	10	ILE	C-N	-5.30	1.25	1.33
1	A	10	ILE	CB-CG1	-5.29	1.42	1.53
1	A	22	ILE	CB-CG2	-5.28	1.35	1.52
1	A	17	SER	CB-OG	-5.25	1.31	1.42
1	A	15	TYR	N-CA	-5.15	1.40	1.46
1	A	16	TRP	CG-CD1	-5.12	1.24	1.36
1	A	9	ALA	C-N	-5.11	1.27	1.33
1	A	10	ILE	CA-CB	-5.09	1.48	1.54
1	A	21	ALA	N-CA	-5.06	1.39	1.46

All angle outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	15	TYR	CD1-CG-CD2	-61.29	26.16	118.10
1	A	14	ARG	NE-CZ-NH2	60.41	173.57	119.20
1	A	31	ARG	NE-CZ-NH1	-56.52	64.98	121.50
1	A	20	GLN	OE1-CD-NE2	-52.71	69.89	122.60
1	A	32	ARG	CB-CA-C	-49.67	15.73	110.10
1	A	15	TYR	CE1-CZ-CE2	-46.34	27.62	120.30
1	A	29	THR	O-C-N	-45.63	68.84	121.32
1	A	27	LYS	O-C-N	-44.50	73.11	123.40
1	A	14	ARG	NH1-CZ-NH2	-41.83	64.92	119.30
1	A	24	TYR	CD1-CG-CD2	-35.84	64.33	118.10
1	A	14	ARG	CD-NE-CZ	35.52	174.13	124.40
1	A	16	TRP	O-C-N	-31.11	81.21	122.59
1	A	30	PRO	N-CD-CG	-31.04	56.64	103.20
1	A	15	TYR	CB-CG-CD1	30.84	167.06	120.80
1	A	15	TYR	CB-CG-CD2	30.65	166.78	120.80
1	A	15	TYR	CG-CD1-CE1	30.56	167.04	121.20
1	A	15	TYR	CG-CD2-CE2	30.36	166.74	121.20

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	29	THR	CA-CB-OG1	-29.29	65.67	109.60
1	A	31	ARG	NH1-CZ-NH2	28.54	156.40	119.30
1	A	20	GLN	CG-CD-NE2	26.66	156.40	116.40
1	A	24	TYR	CE1-CZ-CE2	-26.40	67.49	120.30
1	A	32	ARG	CA-C-O	26.39	165.66	120.80
1	A	15	TYR	CZ-CE2-CD2	25.97	166.35	119.60
1	A	15	TYR	CD1-CE1-CZ	25.83	166.09	119.60
1	A	29	THR	CA-C-N	25.48	146.66	119.90
1	A	29	THR	C-N-CA	25.48	146.66	119.90
1	A	32	ARG	N-CA-CB	24.87	152.78	110.50
1	A	31	ARG	CA-C-O	-24.10	94.11	120.38
1	A	28	ARG	CG-CD-NE	22.69	161.92	112.00
1	A	30	PRO	CA-N-CD	21.97	142.76	112.00
1	A	30	PRO	O-C-N	-21.95	98.51	123.10
1	A	23	GLU	OE1-CD-OE2	-21.93	70.27	122.90
1	A	31	ARG	NE-CZ-NH2	21.59	138.63	119.20
1	A	23	GLU	CG-CD-OE2	20.88	166.43	118.40
1	A	32	ARG	NE-CZ-NH1	-20.57	100.93	121.50
1	A	30	PRO	CA-C-N	20.02	150.63	123.00
1	A	30	PRO	C-N-CA	20.02	150.63	123.00
1	A	6	HIS	ND1-CG-CD2	-19.76	86.34	106.10
1	A	30	PRO	N-CA-C	19.52	140.27	110.80
1	A	29	THR	CA-C-O	19.43	146.78	120.16
1	A	31	ARG	N-CA-C	19.28	140.10	109.07
1	A	24	TYR	CB-CG-CD1	18.38	148.37	120.80
1	A	18	ILE	CB-CG1-CD1	18.34	152.31	113.80
1	A	24	TYR	CG-CD1-CE1	18.12	148.38	121.20
1	A	24	TYR	CB-CG-CD2	17.67	147.30	120.80
1	A	27	LYS	CA-C-O	17.42	141.87	120.27
1	A	24	TYR	CG-CD2-CE2	17.38	147.27	121.20
1	A	26	LEU	O-C-N	-17.22	100.00	122.39
1	A	4	ILE	CB-CG1-CD1	17.17	149.86	113.80
1	A	26	LEU	CD1-CG-CD2	-16.36	74.81	110.80
1	A	27	LYS	CA-C-N	16.27	147.35	122.94
1	A	27	LYS	C-N-CA	16.27	147.35	122.94
1	A	15	TYR	OH-CZ-CE2	15.47	166.31	119.90
1	A	15	TYR	CE1-CZ-OH	15.39	166.07	119.90
1	A	24	TYR	CZ-CE2-CD2	15.16	146.88	119.60
1	A	24	TYR	CD1-CE1-CZ	14.47	145.64	119.60
1	A	20	GLN	CB-CG-CD	14.30	136.91	112.60
1	A	31	ARG	CB-CA-C	-14.17	85.21	109.72
1	A	7	LEU	O-C-N	-13.98	105.87	122.22

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	21	ALA	O-C-N	-13.94	104.05	122.59
1	A	6	HIS	CG-CD2-NE2	13.76	120.96	107.20
1	A	32	ARG	NH1-CZ-NH2	13.59	136.96	119.30
1	A	29	THR	C-N-CD	-13.27	70.58	125.00
1	A	32	ARG	N-CA-C	13.25	148.11	111.00
1	A	30	PRO	CB-CG-CD	13.03	147.81	106.10
1	A	14	ARG	CG-CD-NE	12.91	140.41	112.00
1	A	23	GLU	CB-CG-CD	12.85	134.45	112.60
1	A	28	ARG	NE-CZ-NH2	12.74	130.67	119.20
1	A	6	HIS	ND1-CE1-NE2	-12.36	96.04	108.40
1	A	21	ALA	CA-C-N	12.32	135.04	122.97
1	A	21	ALA	C-N-CA	12.32	135.04	122.97
1	A	16	TRP	CA-C-N	12.22	144.88	121.54
1	A	16	TRP	C-N-CA	12.22	144.88	121.54
1	A	32	ARG	CA-CB-CG	11.93	137.95	114.10
1	A	14	ARG	CB-CG-CD	11.40	137.52	111.30
1	A	26	LEU	CB-CG-CD1	11.38	144.83	110.70
1	A	31	ARG	CA-C-N	11.34	142.10	121.70
1	A	31	ARG	C-N-CA	11.34	142.10	121.70
1	A	29	THR	CA-CB-CG2	11.29	129.69	110.50
1	A	16	TRP	CA-C-O	11.26	136.60	120.51
1	A	31	ARG	CD-NE-CZ	11.21	140.09	124.40
1	A	32	ARG	CB-CG-CD	11.10	136.83	111.30
1	A	26	LEU	CA-C-N	10.77	138.30	121.72
1	A	26	LEU	C-N-CA	10.77	138.30	121.72
1	A	28	ARG	CA-C-O	-10.53	109.33	120.70
1	A	27	LYS	N-CA-C	10.42	124.64	107.23
1	A	6	HIS	CG-ND1-CE1	10.16	126.58	109.30
1	A	30	PRO	CA-CB-CG	-10.04	85.43	104.50
1	A	12	LEU	CD1-CG-CD2	-9.93	88.95	110.80
1	A	6	HIS	CB-CG-ND1	9.65	137.18	122.70
1	A	28	ARG	CA-CB-CG	9.15	132.41	114.10
1	A	24	TYR	OH-CZ-CE2	8.99	146.86	119.90
1	A	7	LEU	CA-CB-CG	8.62	146.48	116.30
1	A	24	TYR	CE1-CZ-OH	8.58	145.64	119.90
1	A	11	SER	O-C-N	-8.40	108.89	122.42
1	A	29	THR	N-CA-C	8.26	128.06	109.81
1	A	26	LEU	CB-CG-CD2	8.14	135.12	110.70
1	A	28	ARG	NH1-CZ-NH2	-8.02	108.88	119.30
1	A	2	SER	CA-CB-OG	8.01	127.12	111.10
1	A	7	LEU	CA-C-N	7.92	131.11	120.65
1	A	7	LEU	C-N-CA	7.92	131.11	120.65

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	31	ARG	CB-CG-CD	7.67	128.94	111.30
1	A	7	LEU	CD1-CG-CD2	-7.65	93.96	110.80
1	A	31	ARG	CG-CD-NE	7.46	128.41	112.00
1	A	32	ARG	CG-CD-NE	7.31	128.09	112.00
1	A	28	ARG	CD-NE-CZ	7.19	134.47	124.40
1	A	24	TYR	O-C-N	6.49	129.00	122.12
1	A	20	GLN	CG-CD-OE1	6.46	133.71	120.80
1	A	12	LEU	CB-CG-CD1	6.30	129.59	110.70
1	A	7	LEU	CA-C-O	6.29	127.20	120.10
1	A	30	PRO	CA-C-O	-6.27	113.88	121.03
1	A	27	LYS	CG-CD-CE	6.16	125.47	111.30
1	A	28	ARG	N-CA-C	5.89	118.99	109.40
1	A	19	THR	CA-CB-CG2	5.85	120.45	110.50
1	A	3	SER	CA-CB-OG	5.67	122.43	111.10
1	A	11	SER	CA-C-N	5.52	130.98	122.42
1	A	11	SER	C-N-CA	5.52	130.98	122.42
1	A	27	LYS	CD-CE-NZ	5.24	128.68	111.90
1	A	15	TYR	N-CA-CB	-5.12	102.81	110.91
1	A	30	PRO	CB-CA-C	-5.04	105.37	111.46

All chiral outliers are listed below.

Mol	Chain	Res	Type	Atoms
1	A	28	ARG	CA
1	A	29	THR	CA,CB
1	A	30	PRO	CA
1	A	31	ARG	CA
1	A	32	ARG	CA

There are no planarity outliers.

6.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in each chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	266	281	264	138
All	All	266	281	264	138

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 260.

All clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:14:ARG:CZ	1:A:14:ARG:CD	1.63	1.75
1:A:24:TYR:CZ	1:A:24:TYR:CD1	1.62	1.79
1:A:24:TYR:CG	1:A:24:TYR:CE2	1.62	1.82
1:A:24:TYR:CZ	1:A:24:TYR:CD2	1.60	1.82
1:A:24:TYR:CG	1:A:24:TYR:CE1	1.59	1.85
1:A:15:TYR:CZ	1:A:15:TYR:CD1	1.56	1.94
1:A:23:GLU:CG	1:A:23:GLU:CA	1.54	1.83
1:A:15:TYR:CZ	1:A:15:TYR:CD2	1.52	1.95
1:A:15:TYR:CG	1:A:15:TYR:CE2	1.52	1.97
1:A:24:TYR:CD2	1:A:24:TYR:CB	1.51	1.90
1:A:20:GLN:CD	1:A:20:GLN:CB	1.50	1.81
1:A:15:TYR:CG	1:A:15:TYR:CE1	1.49	1.99
1:A:26:LEU:C	1:A:27:LYS:CA	1.46	1.83
1:A:14:ARG:CG	1:A:14:ARG:NE	1.46	1.68
1:A:26:LEU:O	1:A:26:LEU:CA	1.44	1.63
1:A:14:ARG:NE	1:A:14:ARG:NH2	1.44	1.62
1:A:24:TYR:CD1	1:A:24:TYR:CB	1.44	1.92
1:A:12:LEU:CD2	1:A:12:LEU:CB	1.39	2.01
1:A:15:TYR:CD2	1:A:15:TYR:CB	1.39	2.06
1:A:14:ARG:CD	1:A:14:ARG:CB	1.38	1.98
1:A:26:LEU:CA	1:A:27:LYS:N	1.35	1.85
1:A:24:TYR:CE1	1:A:24:TYR:OH	1.29	1.72
1:A:15:TYR:CD1	1:A:15:TYR:CB	1.28	2.07
1:A:15:TYR:CE1	1:A:15:TYR:OH	1.28	1.86
1:A:12:LEU:CB	1:A:12:LEU:CD1	1.23	2.09
1:A:24:TYR:CE2	1:A:24:TYR:OH	1.18	1.75
1:A:16:TRP:C	1:A:17:SER:CA	1.16	2.18
1:A:2:SER:OG	1:A:2:SER:HB3	1.12	1.37
1:A:2:SER:OG	1:A:2:SER:CA	1.12	1.97
1:A:26:LEU:C	1:A:27:LYS:CB	1.11	2.24
1:A:15:TYR:CE2	1:A:15:TYR:OH	1.10	1.87
1:A:16:TRP:O	1:A:16:TRP:CA	1.05	2.03
1:A:2:SER:OG	1:A:2:SER:CB	1.04	0.75
1:A:2:SER:OG	1:A:2:SER:HB2	1.02	1.37
1:A:16:TRP:CA	1:A:17:SER:N	1.01	2.22
1:A:12:LEU:CD2	1:A:12:LEU:HG	0.99	1.62
1:A:12:LEU:CG	1:A:12:LEU:HD13	0.98	1.53
1:A:12:LEU:CG	1:A:12:LEU:HD11	0.96	1.53
1:A:12:LEU:CD1	1:A:12:LEU:HG	0.96	1.60

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:12:LEU:CG	1:A:12:LEU:HD12	0.95	1.53
1:A:12:LEU:CG	1:A:12:LEU:HD22	0.94	1.49
1:A:12:LEU:CG	1:A:12:LEU:HD23	0.93	1.49
1:A:12:LEU:CG	1:A:12:LEU:HD21	0.92	1.49
1:A:23:GLU:CG	1:A:23:GLU:HB3	0.92	1.45
1:A:26:LEU:C	1:A:27:LYS:HB2	0.91	1.89
1:A:23:GLU:CG	1:A:23:GLU:HB2	0.91	1.45
1:A:14:ARG:CD	1:A:14:ARG:HG3	0.91	1.44
1:A:26:LEU:N	1:A:27:LYS:N	0.90	2.19
1:A:12:LEU:CD1	1:A:12:LEU:CG	0.90	0.90
1:A:14:ARG:CD	1:A:14:ARG:HG2	0.89	1.44
1:A:14:ARG:CG	1:A:14:ARG:HD2	0.88	1.43
1:A:14:ARG:CG	1:A:14:ARG:HD3	0.88	1.43
1:A:14:ARG:CD	1:A:14:ARG:CG	0.87	0.88
1:A:20:GLN:CD	1:A:20:GLN:HG3	0.87	1.35
1:A:26:LEU:O	1:A:26:LEU:CB	0.86	2.21
1:A:12:LEU:CD2	1:A:12:LEU:CG	0.85	0.85
1:A:20:GLN:CD	1:A:20:GLN:HG2	0.85	1.35
1:A:14:ARG:CG	1:A:14:ARG:HE	0.84	1.66
1:A:14:ARG:NH1	1:A:14:ARG:HH21	0.84	1.44
1:A:14:ARG:NH2	1:A:14:ARG:HH11	0.84	1.47
1:A:23:GLU:CD	1:A:23:GLU:HG2	0.83	1.35
1:A:23:GLU:CG	1:A:23:GLU:CB	0.82	0.82
1:A:28:ARG:CB	1:A:28:ARG:HG3	0.81	1.38
1:A:23:GLU:CB	1:A:23:GLU:HG3	0.80	1.41
1:A:14:ARG:CZ	1:A:14:ARG:NH2	0.80	0.79
1:A:23:GLU:HG2	1:A:23:GLU:CB	0.79	1.41
1:A:20:GLN:CD	1:A:20:GLN:CG	0.79	0.75
1:A:28:ARG:CG	1:A:28:ARG:HB3	0.78	1.36
1:A:28:ARG:CG	1:A:28:ARG:HB2	0.78	1.36
1:A:14:ARG:HH21	1:A:14:ARG:HH12	0.75	0.97
1:A:26:LEU:C	1:A:27:LYS:HA	0.75	2.04
1:A:16:TRP:C	1:A:17:SER:N	0.73	0.85
1:A:24:TYR:CD1	1:A:24:TYR:CA	0.73	2.70
1:A:14:ARG:CZ	1:A:14:ARG:HH22	0.73	1.43
1:A:14:ARG:CZ	1:A:14:ARG:HH21	0.72	1.43
1:A:23:GLU:CD	1:A:23:GLU:HG3	0.72	1.35
1:A:16:TRP:C	1:A:16:TRP:O	0.71	0.67
1:A:25:ASN:C	1:A:27:LYS:N	0.69	2.49
1:A:23:GLU:CG	1:A:23:GLU:HA	0.69	2.08
1:A:26:LEU:C	1:A:27:LYS:N	0.69	0.81
1:A:23:GLU:CG	1:A:23:GLU:C	0.67	2.65

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:16:TRP:O	1:A:18:ILE:N	0.67	2.21
1:A:24:TYR:CD1	1:A:24:TYR:CG	0.65	0.70
1:A:14:ARG:HH12	1:A:14:ARG:HH22	0.64	0.66
1:A:24:TYR:CD2	1:A:24:TYR:CA	0.63	2.72
1:A:20:GLN:CD	1:A:20:GLN:HB3	0.61	2.09
1:A:12:LEU:CD2	1:A:12:LEU:HB3	0.61	2.20
1:A:14:ARG:NH2	1:A:14:ARG:HH12	0.60	0.20
1:A:2:SER:CB	1:A:2:SER:HG	0.60	1.30
1:A:24:TYR:CG	1:A:24:TYR:CD2	0.60	0.68
1:A:14:ARG:NH2	1:A:14:ARG:NH1	0.59	0.75
1:A:28:ARG:CB	1:A:28:ARG:HG2	0.59	1.38
1:A:14:ARG:CZ	1:A:14:ARG:HD2	0.59	2.14
1:A:24:TYR:CZ	1:A:24:TYR:CE1	0.58	0.65
1:A:24:TYR:CZ	1:A:24:TYR:CE2	0.58	0.67
1:A:28:ARG:HG2	1:A:30:PRO:HD3	0.58	1.57
1:A:23:GLU:O	1:A:24:TYR:C	0.57	2.37
1:A:23:GLU:HG2	1:A:23:GLU:C	0.56	2.26
1:A:26:LEU:C	1:A:26:LEU:O	0.55	0.63
1:A:24:TYR:CG	1:A:24:TYR:HD1	0.55	1.31
1:A:23:GLU:O	1:A:26:LEU:N	0.53	2.41
1:A:24:TYR:CZ	1:A:24:TYR:HE2	0.53	1.29
1:A:24:TYR:CG	1:A:24:TYR:HD2	0.53	1.29
1:A:14:ARG:CZ	1:A:14:ARG:HE	0.53	1.23
1:A:24:TYR:CZ	1:A:24:TYR:HE1	0.53	1.28
1:A:14:ARG:NH1	1:A:14:ARG:HH22	0.53	1.34
1:A:15:TYR:CD1	1:A:15:TYR:CG	0.53	0.66
1:A:20:GLN:CD	1:A:20:GLN:HE22	0.52	1.18
1:A:22:ILE:HG22	1:A:23:GLU:N	0.52	2.19
1:A:19:THR:HA	1:A:22:ILE:HD12	0.52	1.82
1:A:20:GLN:CD	1:A:20:GLN:HE21	0.52	1.18
1:A:15:TYR:CD2	1:A:15:TYR:CG	0.50	0.65
1:A:13:ILE:O	1:A:16:TRP:HB3	0.50	2.06
1:A:25:ASN:O	1:A:27:LYS:N	0.50	2.45
1:A:23:GLU:CA	1:A:23:GLU:HG3	0.49	1.94
1:A:15:TYR:CZ	1:A:15:TYR:CE2	0.49	0.63
1:A:16:TRP:CG	1:A:17:SER:N	0.48	2.81
1:A:24:TYR:O	1:A:27:LYS:C	0.48	2.57
1:A:23:GLU:CA	1:A:23:GLU:HG2	0.48	1.91
1:A:15:TYR:CZ	1:A:15:TYR:CE1	0.47	0.61
1:A:23:GLU:CG	1:A:23:GLU:CD	0.46	0.74
1:A:4:ILE:O	1:A:5:VAL:C	0.45	2.54
1:A:16:TRP:C	1:A:17:SER:C	0.45	2.82

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)
1:A:15:TYR:CG	1:A:15:TYR:HD1	0.45	1.20
1:A:19:THR:O	1:A:20:GLN:C	0.45	2.54
1:A:15:TYR:CG	1:A:15:TYR:HD2	0.44	1.20
1:A:14:ARG:CZ	1:A:14:ARG:HD3	0.44	2.14
1:A:5:VAL:O	1:A:6:HIS:C	0.43	2.60
1:A:9:ALA:O	1:A:10:ILE:C	0.43	2.59
1:A:24:TYR:O	1:A:27:LYS:O	0.43	2.34
1:A:23:GLU:C	1:A:25:ASN:N	0.43	2.65
1:A:8:CYS:O	1:A:9:ALA:C	0.42	2.59
1:A:15:TYR:CZ	1:A:15:TYR:HE2	0.42	1.18
1:A:15:TYR:CZ	1:A:15:TYR:HE1	0.41	1.17
1:A:26:LEU:O	1:A:26:LEU:HB3	0.41	2.10
1:A:1:THR:C	1:A:3:SER:N	0.41	2.68
1:A:13:ILE:O	1:A:14:ARG:C	0.41	2.63
1:A:28:ARG:HG2	1:A:29:THR:HA	0.40	1.57

6.3 Torsion angles (i)

6.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the backbone conformation was analysed and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	30/32 (94%)	23 (77%)	5 (17%)	2 (7%)	2	17
All	All	30/32 (94%)	23 (77%)	5 (17%)	2 (7%)	2	17

All 2 Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	17	SER
1	A	18	ILE

6.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the sidechain conformation

was analysed and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	30/30 (100%)	17 (57%)	13 (43%)	0 3
All	All	30/30 (100%)	17 (57%)	13 (43%)	0 3

All 13 residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type
1	A	2	SER
1	A	3	SER
1	A	4	ILE
1	A	11	SER
1	A	12	LEU
1	A	16	TRP
1	A	18	ILE
1	A	19	THR
1	A	20	GLN
1	A	22	ILE
1	A	24	TYR
1	A	26	LEU
1	A	32	ARG

6.3.3 RNA

There are no RNA molecules in this entry.

6.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

6.5 Carbohydrates

There are no oligosaccharides in this entry.

6.6 Ligand geometry

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	16

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	22:ILE	C	23:GLU	N	1.19
1	A	2:SER	C	3:SER	N	1.15
1	A	3:SER	C	4:ILE	N	1.15
1	A	23:GLU	C	24:TYR	N	1.15
1	A	1:THR	C	2:SER	N	1.13
1	A	25:ASN	C	26:LEU	N	1.09
1	A	11:SER	C	12:LEU	N	1.07
1	A	7:LEU	C	8:CYS	N	1.02
1	A	21:ALA	C	22:ILE	N	0.98
1	A	28:ARG	C	29:THR	N	0.91
1	A	16:TRP	C	17:SER	N	0.85
1	A	26:LEU	C	27:LYS	N	0.81
1	A	30:PRO	C	31:ARG	N	0.67
1	A	27:LYS	C	28:ARG	N	0.64
1	A	31:ARG	C	32:ARG	N	0.60
1	A	29:THR	C	30:PRO	N	0.48

7 Chemical shift validation

No chemical shift data were provided