



wwPDB X-ray Structure Validation Summary Report i

Feb 27, 2014 – 01:08 AM GMT

PDB ID : 3GD7
Title : Crystal structure of human NBD2 complexed with N6-Phenylethyl-ATP (P-ATP)
Authors : Atwell, S.; Antonysamy, S.; Conners, K.; Emtage, S.; Gheyi, T.; Lewis, H.A.; Lu, F.; Sauder, J.M.; Wasserman, S.R.; Zhao, X.
Deposited on : 2009-02-23
Resolution : 2.70 Å(reported)

This is a wwPDB validation summary report for a publicly released PDB entry.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

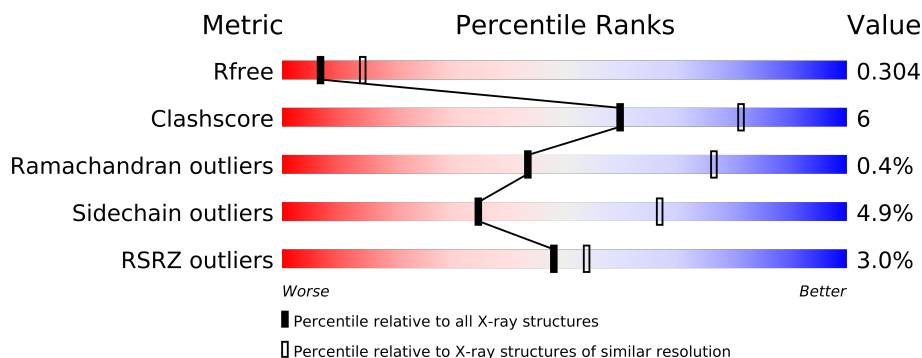
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.70 Å.

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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	66092	1557 (2.70-2.70)
Clashscore	79885	1939 (2.70-2.70)
Ramachandran outliers	78287	1905 (2.70-2.70)
Sidechain outliers	78261	1905 (2.70-2.70)
RSRZ outliers	66119	1559 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	390	
1	B	390	
1	C	390	
1	D	390	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 11834 atoms, of which 0 are hydrogen and 0 are deuterium.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Fusion complex of Cystic fibrosis transmembrane conductance regulator, residues 1193-1427 and Maltose/maltodextrin import ATP-binding protein malK, residues 219-371.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	378	Total	C	N	O	S	0	0	0
			2898	1844	506	535	13			
1	B	377	Total	C	N	O	S	0	0	0
			2907	1851	505	538	13			
1	C	376	Total	C	N	O	S	0	0	0
			2813	1798	482	520	13			
1	D	375	Total	C	N	O	S	0	0	0
			2806	1788	487	519	12			

There are 36 discrepancies between the modelled and reference sequences:

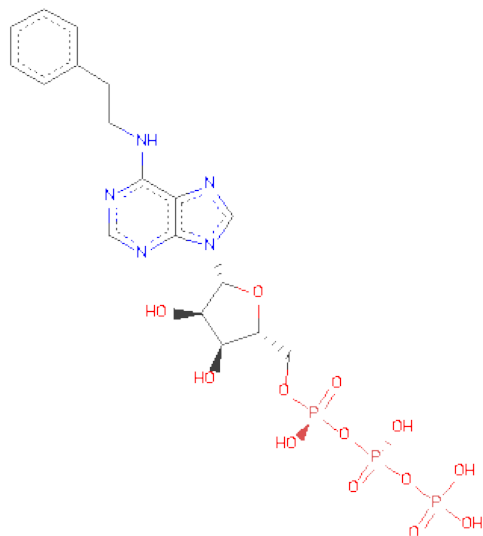
Chain	Residue	Modelled	Actual	Comment	Reference
A	1191	SER	-	EXPRESSION TAG	UNP P13569
A	1192	LEU	-	EXPRESSION TAG	UNP P13569
A	1280	GLU	GLN	ENGINEERED	UNP P13569
A	1307	ASN	TYR	ENGINEERED	UNP P13569
A	1308	ALA	GLU	ENGINEERED	UNP P13569
A	1309	ALA	GLN	ENGINEERED	UNP P13569
A	1310	HIS	TRP	ENGINEERED	UNP P13569
A	1402	ALA	HIS	ENGINEERED	UNP P13569
A	1411	ASP	GLN	ENGINEERED	UNP P13569
B	1191	SER	-	EXPRESSION TAG	UNP P13569
B	1192	LEU	-	EXPRESSION TAG	UNP P13569
B	1280	GLU	GLN	ENGINEERED	UNP P13569
B	1307	ASN	TYR	ENGINEERED	UNP P13569
B	1308	ALA	GLU	ENGINEERED	UNP P13569
B	1309	ALA	GLN	ENGINEERED	UNP P13569
B	1310	HIS	TRP	ENGINEERED	UNP P13569
B	1402	ALA	HIS	ENGINEERED	UNP P13569
B	1411	ASP	GLN	ENGINEERED	UNP P13569
C	1191	SER	-	EXPRESSION TAG	UNP P13569

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Chain	Residue	Modelled	Actual	Comment	Reference
C	1192	LEU	-	EXPRESSION TAG	UNP P13569
C	1280	GLU	GLN	ENGINEERED	UNP P13569
C	1307	ASN	TYR	ENGINEERED	UNP P13569
C	1308	ALA	GLU	ENGINEERED	UNP P13569
C	1309	ALA	GLN	ENGINEERED	UNP P13569
C	1310	HIS	TRP	ENGINEERED	UNP P13569
C	1402	ALA	HIS	ENGINEERED	UNP P13569
C	1411	ASP	GLN	ENGINEERED	UNP P13569
D	1191	SER	-	EXPRESSION TAG	UNP P13569
D	1192	LEU	-	EXPRESSION TAG	UNP P13569
D	1280	GLU	GLN	ENGINEERED	UNP P13569
D	1307	ASN	TYR	ENGINEERED	UNP P13569
D	1308	ALA	GLU	ENGINEERED	UNP P13569
D	1309	ALA	GLN	ENGINEERED	UNP P13569
D	1310	HIS	TRP	ENGINEERED	UNP P13569
D	1402	ALA	HIS	ENGINEERED	UNP P13569
D	1411	ASP	GLN	ENGINEERED	UNP P13569

- Molecule 2 is N-(2-PHENYLETHYL)ADENOSINE5'-(TETRAHYDROGEN TRIPHOSPHATE) (three-letter code: B44) (formula: $C_{18}H_{24}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			39	18	5	13	3		
2	B	1	Total	C	N	O	P	0	0
			39	18	5	13	3		

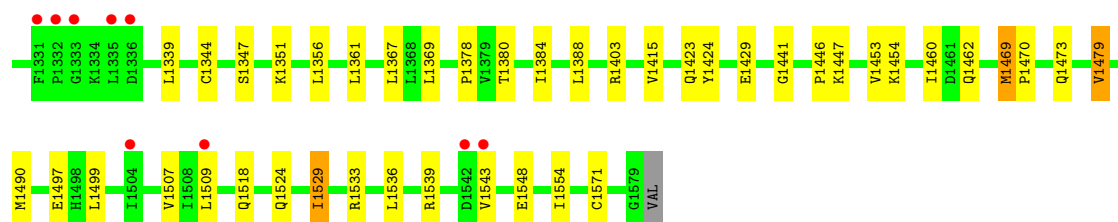
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			39	18	5	13	3		
2	D	1	Total	C	N	O	P	0	0
			39	18	5	13	3		

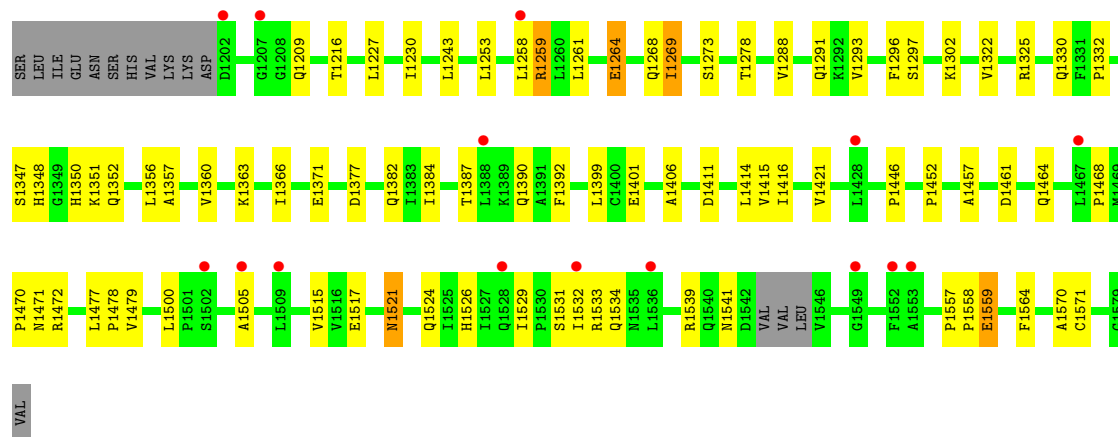
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	75	Total	O	0	0
			75	75		
3	B	80	Total	O	0	0
			80	80		
3	C	60	Total	O	0	0
			60	60		
3	D	39	Total	O	0	0
			39	39		



- Molecule 1: Fusion complex of Cystic fibrosis transmembrane conductance regulator, residues 1193-1427 and Maltose/maltodextrin import ATP-binding protein malK, residues 219-371

Chain D:



4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2	Depositor
Cell constants a, b, c, α , β , γ	137.84Å 173.72Å 82.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	54.00 – 2.70 53.39 – 2.70	Depositor EDS
% Data completeness (in resolution range)	(Not available) (54.00-2.70) 99.9 (53.39-2.70)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.77 (at 2.69Å)	Xtriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.247 , 0.308 0.245 , 0.304	Depositor DCC
R_{free} test set	2766 reflections (5.28%)	DCC
Wilson B-factor (Å ²)	53.4	Xtriage
Anisotropy	0.328	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 27.9	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Outliers	0 of 55240 reflections	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	11834	wwPDB-VP
Average B, all atoms (Å ²)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.89% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: B44

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 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	0.31	0/2956	0.51	0/4018
1	B	0.32	0/2965	0.50	0/4031
1	C	0.32	0/2871	0.50	0/3918
1	D	0.31	0/2863	0.49	0/3903
All	All	0.31	0/11655	0.50	0/15870

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2898	0	2866	38	0
1	B	2907	0	2896	33	0
1	C	2813	0	2724	31	0
1	D	2806	0	2710	41	0
2	A	39	0	20	0	0
2	B	39	0	20	1	0
2	C	39	0	20	0	0
2	D	39	0	20	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	75	0	0	1	0
3	B	80	0	0	3	0
3	C	60	0	0	2	0
3	D	39	0	0	1	0
All	All	11834	0	11276	138	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 6.

The worst 5 of 138 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:1529:ILE:HD11	1:C:1536:LEU:HB2	1.48	0.96
1:B:1525:ILE:HD11	1:B:1544:VAL:HG11	1.63	0.81
1:D:1521:ASN:H	1:D:1521:ASN:HD22	1.28	0.78
1:B:1263:THR:HG21	1:B:1274:TRP:CH2	2.18	0.78
1:D:1356:LEU:HD21	1:D:1387:THR:HG21	1.72	0.71

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution. 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	376/390 (96%)	353 (94%)	23 (6%)	0	100	100
1	B	375/390 (96%)	361 (96%)	14 (4%)	0	100	100
1	C	374/390 (96%)	342 (91%)	29 (8%)	3 (1%)	27	58
1	D	371/390 (95%)	345 (93%)	23 (6%)	3 (1%)	27	58
All	All	1496/1560 (96%)	1401 (94%)	89 (6%)	6 (0%)	43	76

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	1206	SER

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Mol	Chain	Res	Type
1	C	1378	PRO
1	D	1533	ARG
1	D	1332	PRO
1	D	1472	ARG

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution. 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	308/339 (91%)	295 (96%)	13 (4%)	40	73
1	B	314/339 (93%)	302 (96%)	12 (4%)	44	76
1	C	290/339 (86%)	276 (95%)	14 (5%)	35	68
1	D	289/339 (85%)	269 (93%)	20 (7%)	22	48
All	All	1201/1356 (89%)	1142 (95%)	59 (5%)	35	67

5 of 59 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	1253	LEU
1	C	1469	MET
1	D	1411	ASP
1	C	1262	ASN
1	C	1274	TRP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 26 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1518	GLN
1	C	1224	ASN
1	D	1541	ASN
1	B	1562	HIS
1	C	1209	GLN

5.3.3 RNA ⓘ

There are no RNA chains in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	B44	A	1	-	42,42,42	0.89	1 (2%)	63,63,63	0.99	2 (3%)
2	B44	B	2	-	42,42,42	0.95	2 (4%)	63,63,63	0.98	3 (4%)
2	B44	C	3	-	42,42,42	0.90	2 (4%)	63,63,63	1.12	3 (4%)
2	B44	D	4	-	42,42,42	0.89	2 (4%)	63,63,63	1.01	2 (3%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	B44	A	1	-	-	0/28/44/44	0/2/4/4
2	B44	B	2	-	-	0/28/44/44	0/2/4/4
2	B44	C	3	-	-	0/28/44/44	0/2/4/4
2	B44	D	4	-	-	0/28/44/44	0/2/4/4

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2	B44	C9-N6	2.44	1.39	1.34
2	C	3	B44	C9-N6	2.37	1.39	1.34
2	D	4	B44	C9-N6	2.28	1.39	1.34
2	B	2	B44	O2-C5	2.27	1.44	1.41
2	A	1	B44	C9-N6	2.20	1.38	1.34

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	4	B44	C6-N1-C9	3.64	118.98	116.69
2	C	3	B44	C6-N1-C9	3.57	118.93	116.69
2	C	3	B44	C10-C11-C12	3.49	120.52	112.81
2	B	2	B44	C6-N1-C9	3.44	118.85	116.69
2	A	1	B44	C6-N1-C9	3.28	118.75	116.69

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	378/390 (96%)	0.23	6 (1%) 68 74	26, 51, 78, 89	0
1	B	377/390 (96%)	0.22	4 (1%) 77 82	27, 53, 73, 80	0
1	C	376/390 (96%)	0.43	20 (5%) 25 28	33, 66, 96, 102	0
1	D	375/390 (96%)	0.43	15 (4%) 36 41	36, 67, 91, 99	0
All	All	1506/1560 (96%)	0.33	45 (2%) 48 54	26, 59, 89, 102	0

The worst 5 of 45 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	1204	TRP	4.3
1	B	1203	ILE	4.0
1	D	1552	PHE	3.8
1	C	1326	SER	3.8
1	D	1509	LEU	3.6

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors

of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	B44	A	1	39/39	0.18	0.11	36,47,51,52	0
2	B44	C	3	39/39	0.17	-0.25	40,53,59,59	0
2	B44	D	4	39/39	0.16	-0.83	67,72,76,76	0
2	B44	B	2	39/39	0.16	-0.89	24,29,38,39	0

6.5 Other polymers ⓘ

There are no such residues in this entry.