wwPDB X-ray Structure Validation Summary Report (i)

Mar 8, 2026 – 06:49 AM UTC

PDB ID	:	2DYP / pdb_00002dyp
Title	:	Crystal Structure of LILRB2(LIR2/ILT4/CD85d) complexed with HLA-G
Authors	:	Shiroishi, M.; Kuroki, K.; Rasubala, L.; Kohda, D.; Maenaka, K.
Deposited on	:	2006-09-15
Resolution	:	2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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/XrayValidationReportHelp
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 (1)) were used in the production of this report:

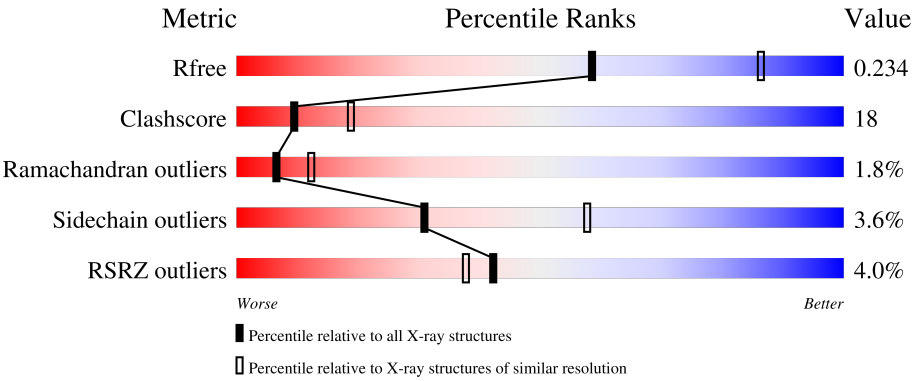
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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}	180053	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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 of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. 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% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	277	3% 68% 29%
2	B	100	2% 68% 29%
3	C	9	67% 33%
4	D	196	7% 52% 37% 5% 6%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 4696 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 HLA class I histocompatibility antigen, alpha chain G.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	275	Total	C	N	O	S	0	0	0
			2240	1396	402	430	12			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P17693
A	42	SER	CYS	engineered mutation	UNP P17693

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	100	Total	C	N	O	S	0	0	0
			837	533	141	159	4			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	initiating methionine	UNP P61769

- Molecule 3 is a protein called 9 Mer Peptide From Histone H2A.x.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	9	Total	C	N	O	0	0	0
			81	52	18	11			

- Molecule 4 is a protein called Leukocyte immunoglobulin-like receptor subfamily B member 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	185	Total	C	N	O	S	0	0	0
			1452	924	252	269	7			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	61	ARG	HIS	SEE REMARK 999	UNP Q8N423

- Molecule 5 is water.

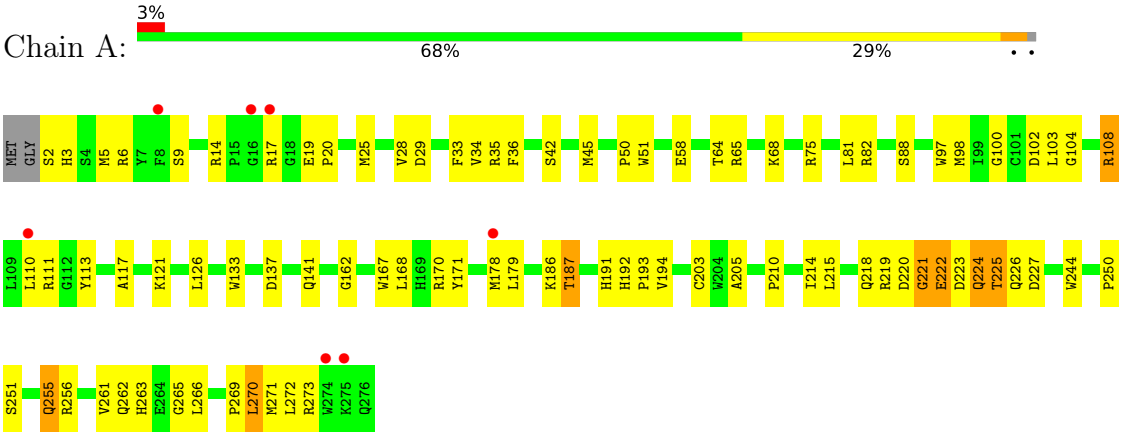
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	44	Total O 44 44	0	0
5	B	22	Total O 22 22	0	0
5	C	5	Total O 5 5	0	0
5	D	15	Total O 15 15	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-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. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

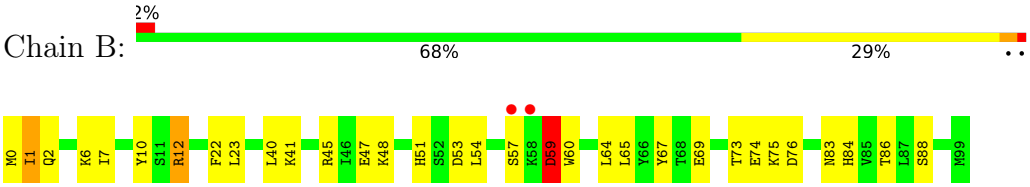
• Molecule 1: HLA class I histocompatibility antigen, alpha chain G

Chain A:



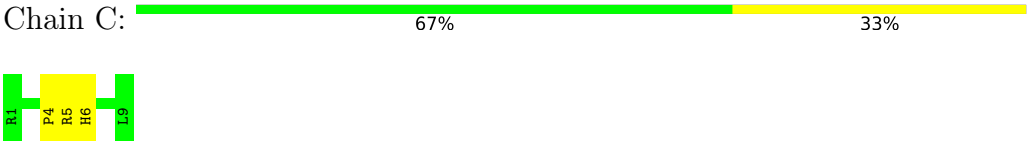
• Molecule 2: Beta-2-microglobulin

Chain B:



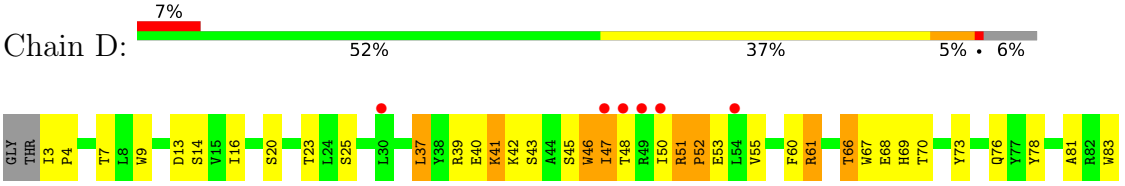
• Molecule 3: 9 Mer Peptide From Histone H2A.x

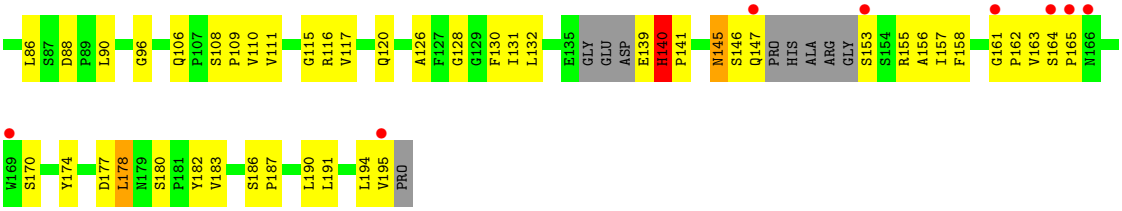
Chain C:



• Molecule 4: Leukocyte immunoglobulin-like receptor subfamily B member 2

Chain D:




L86
S87
D88
P89
L90
G96
Q106
P107
S108
P109
V110
V111
G115
R116
V117
Q120
A126
F127
G128
G129
F130
I131
L132
E135
GLY
GLU
ASP
E139
H140
P141
N145
S146
Q147
PRO
HIS
ALA
ARG
GLY
S153
S154
R155
A156
I157
F158
G161
P162
V163
S164
P165
N166
W169
S170
Y174
D177
L178
N179
S180
P181
Y182
V183
S186
P187
L190
L191
L194
V195
PRO

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α, β, γ	81.40Å 81.40Å 186.73Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.66 – 2.50 46.66 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.4 (46.66-2.50) 99.4 (46.66-2.50)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	6.20 (at 2.51Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.233 , 0.278 0.236 , 0.234	Depositor DCC
R_{free} test set	1838 reflections (7.22%)	wwPDB-VP
Wilson B-factor (Å^2)	56.5	Xtriage
Anisotropy	0.381	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 42.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.035 for -h,-k,l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	4696	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.21% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

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	0.45	0/2301	0.95	9/3122 (0.3%)
2	B	0.43	0/860	0.95	2/1162 (0.2%)
3	C	0.51	0/82	1.09	0/108
4	D	0.40	0/1493	0.98	8/2035 (0.4%)
All	All	0.43	0/4736	0.96	19/6427 (0.3%)

There are no bond length outliers.

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	59	ASP	N-CA-C	-10.22	99.61	113.30
4	D	51	ARG	C-N-CD	-8.96	100.89	120.60
1	A	224	GLN	N-CA-C	-7.24	104.33	113.02
1	A	192	HIS	CA-C-N	6.67	126.91	119.90
1	A	192	HIS	C-N-CA	6.67	126.91	119.90

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-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 hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2240	0	2091	71	0
2	B	837	0	803	28	0
3	C	81	0	94	1	0
4	D	1452	0	1412	68	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	44	0	0	1	0
5	B	22	0	0	0	0
5	C	5	0	0	0	0
5	D	15	0	0	0	0
All	All	4696	0	4400	161	0

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 18.

The worst 5 of 161 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:73:THR:HG22	2:B:75:LYS:H	1.14	1.11
4:D:131:ILE:HD13	4:D:145:ASN:HB3	1.51	0.91
1:A:35:ARG:NH1	2:B:53:ASP:HB3	1.85	0.91
4:D:165:PRO:HG3	4:D:195:VAL:HG11	1.55	0.86
4:D:111:VAL:HG11	4:D:117:VAL:HB	1.61	0.82

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 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 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	273/277 (99%)	261 (96%)	9 (3%)	3 (1%)	11 22
2	B	98/100 (98%)	95 (97%)	2 (2%)	1 (1%)	12 24
3	C	7/9 (78%)	7 (100%)	0	0	100 100
4	D	179/196 (91%)	165 (92%)	8 (4%)	6 (3%)	3 4
All	All	557/582 (96%)	528 (95%)	19 (3%)	10 (2%)	6 12

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	225	THR
4	D	46	TRP
4	D	52	PRO
2	B	1	ILE
1	A	222	GLU

5.3.2 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 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	232/233 (100%)	225 (97%)	7 (3%)	36	64
2	B	95/95 (100%)	93 (98%)	2 (2%)	47	74
3	C	9/9 (100%)	8 (89%)	1 (11%)	6	12
4	D	162/172 (94%)	154 (95%)	8 (5%)	22	45
All	All	498/509 (98%)	480 (96%)	18 (4%)	31	58

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	D	86	LEU
4	D	178	LEU
4	D	157	ILE
2	B	59	ASP
4	D	66	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
4	D	120	GLN
4	D	171	HIS
1	A	263	HIS
2	B	2	GLN
2	B	83	ASN

5.3.3 RNA

There are no RNA molecules 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 oligosaccharides in this entry.

5.6 Ligand geometry

There are no ligands in this entry.

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	275/277 (99%)	0.31	7 (2%) 58 54	36, 54, 88, 109	0
2	B	100/100 (100%)	0.10	2 (2%) 65 61	35, 48, 74, 87	0
3	C	9/9 (100%)	0.01	0 100 100	40, 46, 56, 62	0
4	D	185/196 (94%)	0.69	14 (7%) 20 17	37, 65, 106, 117	0
All	All	569/582 (97%)	0.39	23 (4%) 42 38	35, 56, 97, 117	0

The worst 5 of 23 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	17	ARG	4.3
4	D	169	TRP	3.7
4	D	166	ASN	3.2
4	D	50	ILE	3.1
4	D	147	GLN	3.1

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 oligosaccharides in this entry.

6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.