wwPDB X-ray Structure Validation Summary Report (i)

May 14, 2020 – 01:58 am BST

PDB ID	:	1D0J
Title	:	STRUCTURE OF TNF RECEPTOR ASSOCIATED FACTOR 2 IN COMPLEX WITH A M4-1BB PEPTIDE
Authors	:	Ye, H.; Park, Y.C.; Kreishman, M.; Kieff, E.; Wu, H.
Deposited on	:	1999-09-10
Resolution	:	2.50 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance ⓘ

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.
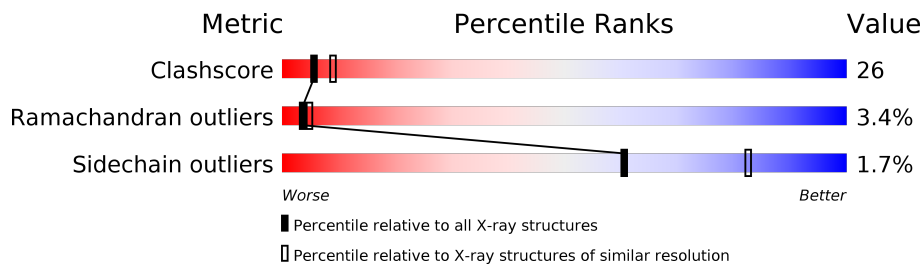
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
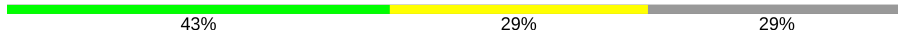
The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. 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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	168	50% 44% 6%
1	B	168	63% 34% •
1	C	168	60% 38% •
1	D	168	54% 42% •
1	E	168	55% 43% •
1	F	168	66% 32% •
2	G	7	57% 14% 29%
2	H	7	57% 14% 29%

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Mol	Chain	Length	Quality of chain
2	I	7	57% 43%
2	J	7	71% 14% 14%
2	K	7	43% 29% 29%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 8112 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 TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	B	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	C	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	D	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	E	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	F	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			

- Molecule 2 is a protein called 4-1BB LIGAND RECEPTOR.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	G	5	Total	C	N	O	0	0	0
			34	19	6	9			
2	H	5	Total	C	N	O	0	0	0
			34	19	6	9			
2	I	7	Total	C	N	O	0	0	0
			41	23	7	11			
2	J	6	Total	C	N	O	0	0	0
			38	21	7	10			
2	K	5	Total	C	N	O	0	0	0
			34	19	6	9			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	24	Total	O	0	0
			24	24		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	46	Total 46	O 46	0	0
3	C	45	Total 45	O 45	0	0
3	D	32	Total 32	O 32	0	0
3	E	49	Total 49	O 49	0	0
3	F	39	Total 39	O 39	0	0
3	G	1	Total 1	O 1	0	0
3	I	1	Total 1	O 1	0	0
3	J	2	Total 2	O 2	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA and DNA 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. 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. 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.

Note EDS was not executed.

• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain A:

• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain B:
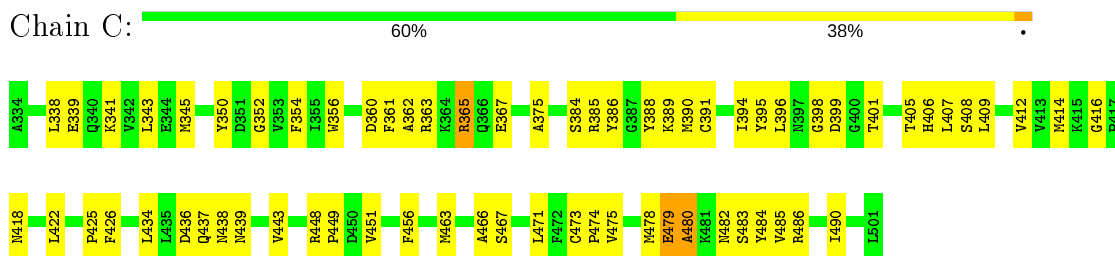

• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain C:

• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2
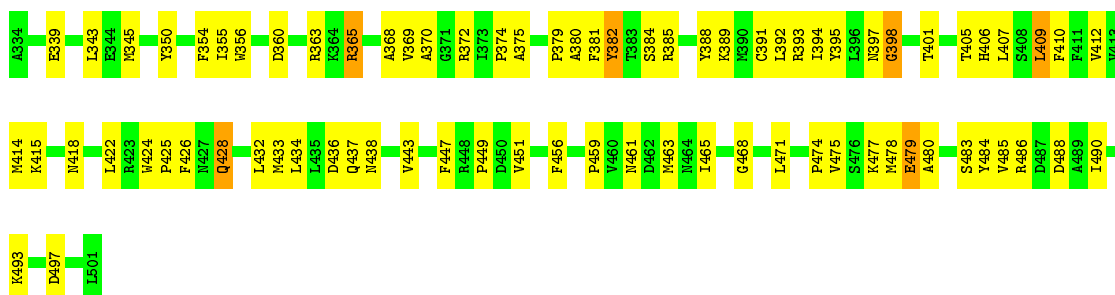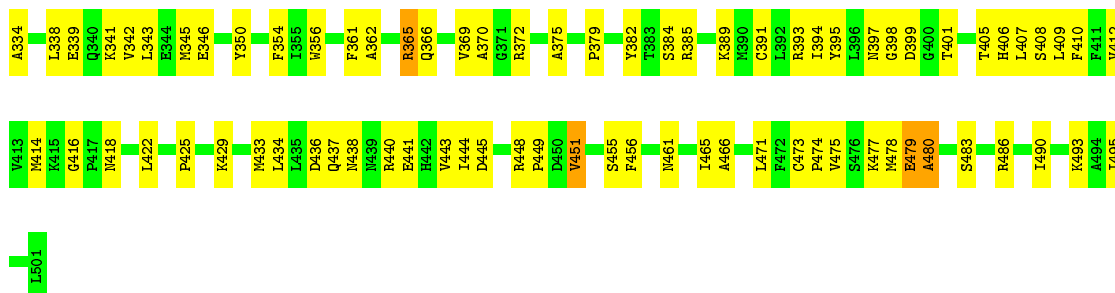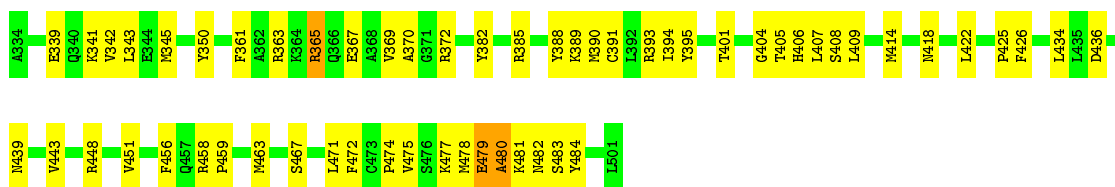
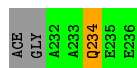Chain D:

A334 E339 L343 E344 M345 Y350 F354 I355 W356 D360 R363 K364 R365 A368 V369 A370 G371 R372 I373 P374 A375 P379 A380 F381 Y382 T383 S384 R385 Y388 K389 M390 C391 L392 R393 I394 Y395 L396 N397 G398 T401 T405 H406 L407 S408 L409 F410 F411 V412 V413

M414 K415 N418 L422 R423 W424 P425 F426 N427 Q428 L432 M433 L434 L435 D436 Q437 N438 V443 F447 R448 P449 D450 V451 F456 P459 V460 N461 D462 M463 N464 I465 G468 L471 P474 V475 S476 K477 M478 E479 A480 S483 Y484 V485 R486 D487 D488 A489 I490

K493 D497 L501

• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain E: 55% 43% •

A334 L338 E339 Q340 K341 V342 L343 E344 M345 E346 Y350 F354 I355 W356 F361 A362 R365 Q366 V369 A370 G371 R372 A375 P379 Y382 T383 S384 R385 K389 M390 C391 L392 R393 I394 Y395 L396 N397 G398 D399 G400 T401 T405 H406 L407 S408 L409 F410 F411 V412

V413 M414 K415 G416 P417 N418 L422 P425 K429 M433 L434 L435 D436 Q437 N438 M439 R440 E441 H442 V443 I444 D445 R448 P449 D450 V451 S455 F456 N461 I465 A466 L471 F472 C473 P474 V475 S476 K477 M478 E479 A480 S483 R486 I490 K493 A494 I495

L501

• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain F: 66% 32% •

A334 E339 Q340 K341 V342 L343 E344 M345 Y350 F361 A362 R363 K364 R365 Q366 E367 A368 V369 A370 G371 R372 Y382 R385 Y388 K389 M390 C391 L392 R393 I394 Y395 T401 G404 T405 H406 L407 S408 L409 M414 N418 L422 P425 F426 L434 L435 D436

N439 V443 R448 V451 F456 Q457 R458 P459 M463 S467 L471 F472 C473 P474 V475 S476 K477 M478 E479 A480 K481 N482 S483 Y484 L501

• Molecule 2: 4-1BB LIGAND RECEPTOR

Chain G: 57% 14% 29%

ACE GLY A232 A233 Q234 E235 E236

• Molecule 2: 4-1BB LIGAND RECEPTOR
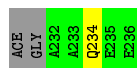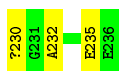
Chain H: 57% 14% 29%

ACE GLY A232 A233 Q234 E235 E236

• Molecule 2: 4-1BB LIGAND RECEPTOR

Chain I: 57% 43%

• Molecule 2: 4-1BB LIGAND RECEPTOR
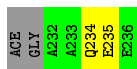
Chain J:

• Molecule 2: 4-1BB LIGAND RECEPTOR

Chain K:

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	135.90Å 85.60Å 124.10Å 90.00° 119.10° 90.00°	Depositor
Resolution (Å)	20.00 – 2.50	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.50)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.227 , 0.270	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8112	wwPDB-VP
Average B, all atoms (Å^2)	42.0	wwPDB-VP

5 Model quality (i)

5.1 Standard geometry (i)

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

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	0.43	0/1312	0.67	0/1781
1	B	0.41	0/1312	0.69	0/1781
1	C	0.41	0/1312	0.70	0/1781
1	D	0.41	0/1312	0.68	0/1781
1	E	0.43	0/1312	0.68	0/1781
1	F	0.41	0/1312	0.69	0/1781
2	G	0.52	0/33	0.43	0/42
2	H	0.55	0/33	0.48	0/42
2	I	0.39	0/38	0.54	0/49
2	J	0.62	0/37	0.60	0/47
2	K	0.51	0/33	0.48	0/42
All	All	0.42	0/8046	0.68	0/10908

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 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	1282	0	1242	79	0
1	B	1282	0	1242	55	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1282	0	1242	63	0
1	D	1282	0	1242	81	0
1	E	1282	0	1242	73	0
1	F	1282	0	1242	50	0
2	G	34	0	25	1	0
2	H	34	0	25	1	0
2	I	41	0	32	3	0
2	J	38	0	28	1	0
2	K	34	0	25	2	0
3	A	24	0	0	9	0
3	B	46	0	0	2	0
3	C	45	0	0	12	0
3	D	32	0	0	10	0
3	E	49	0	0	10	0
3	F	39	0	0	4	0
3	G	1	0	0	0	0
3	I	1	0	0	1	0
3	J	2	0	0	1	0
All	All	8112	0	7587	395	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 26.

The worst 5 of 395 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)
1:F:425:PRO:HG3	1:F:451:VAL:HG13	1.36	1.01
1:E:425:PRO:HG3	1:E:451:VAL:HG13	1.40	1.00
1:A:425:PRO:HG3	1:A:451:VAL:HG13	1.44	0.98
1:F:482:ASN:HB2	3:F:6155:HOH:O	1.66	0.94
1:C:425:PRO:HG3	1:C:451:VAL:HG13	1.50	0.93

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.

wwPDB X-ray Structure Validation Summary Report

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	166/168 (99%)	138 (83%)	19 (11%)	9 (5%)	2	2
1	B	166/168 (99%)	146 (88%)	15 (9%)	5 (3%)	4	6
1	C	166/168 (99%)	151 (91%)	11 (7%)	4 (2%)	6	9
1	D	166/168 (99%)	144 (87%)	18 (11%)	4 (2%)	6	9
1	E	166/168 (99%)	148 (89%)	12 (7%)	6 (4%)	3	4
1	F	166/168 (99%)	150 (90%)	11 (7%)	5 (3%)	4	6
2	G	3/7 (43%)	2 (67%)	0	1 (33%)	0	0
2	H	3/7 (43%)	3 (100%)	0	0	100	100
2	I	5/7 (71%)	5 (100%)	0	0	100	100
2	J	4/7 (57%)	4 (100%)	0	0	100	100
2	K	3/7 (43%)	3 (100%)	0	0	100	100
All	All	1014/1043 (97%)	894 (88%)	86 (8%)	34 (3%)	3	5

5 of 34 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	480	ALA
1	C	480	ALA
1	D	480	ALA
1	E	480	ALA
1	A	398	GLY

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	132/144 (92%)	130 (98%)	2 (2%)	65	85
1	B	132/144 (92%)	130 (98%)	2 (2%)	65	85
1	C	132/144 (92%)	130 (98%)	2 (2%)	65	85

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	132/144 (92%)	128 (97%)	4 (3%)	41	68
1	E	132/144 (92%)	130 (98%)	2 (2%)	65	85
1	F	132/144 (92%)	130 (98%)	2 (2%)	65	85
2	G	2/3 (67%)	2 (100%)	0	100	100
2	H	2/3 (67%)	2 (100%)	0	100	100
2	I	2/3 (67%)	2 (100%)	0	100	100
2	J	2/3 (67%)	2 (100%)	0	100	100
2	K	2/3 (67%)	2 (100%)	0	100	100
All	All	802/879 (91%)	788 (98%)	14 (2%)	60	82

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	365	ARG
1	D	382	TYR
1	E	409	LEU
1	C	409	LEU
1	E	365	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	461	ASN
1	D	439	ASN
1	F	366	GLN
1	C	418	ASN
1	C	439	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 (i)

There are no carbohydrates in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.