



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 22, 2020 – 01:42 am BST

PDB ID : 1CA9  
Title : STRUCTURE OF TNF RECEPTOR ASSOCIATED FACTOR 2 IN COM-  
PLEX WITH A PEPTIDE FROM TNF-R2  
Authors : Park, Y.C.; Burkitt, V.; Villa, A.R.; Tong, L.; Wu, H.  
Deposited on : 1999-02-25  
Resolution : 2.30 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](mailto: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 ⓘ symbol.

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

MolProbity : 4.02b-467  
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

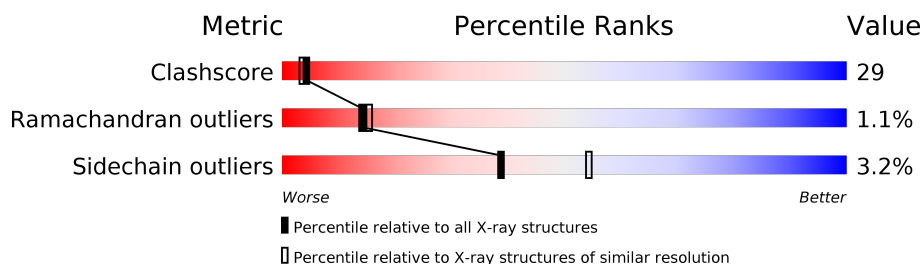
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 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	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)

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  $\geq 3$ , 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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	192	65% 32% ..
1	B	192	72% 24% ..
1	C	192	70% 28% ..
1	D	192	50% 45% ..
1	E	192	48% 46% ..
1	F	192	67% 27% ..
2	G	10	10% 50% 10% 30%
2	H	10	70% 30%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 9554 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 PROTEIN (TNF RECEPTOR ASSOCIATED FACTOR 2).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	191	Total	C	N	O	S	0	0	0
			1435	919	242	264	10			
1	B	191	Total	C	N	O	S	0	0	0
			1417	904	241	262	10			
1	C	191	Total	C	N	O	S	0	0	0
			1440	921	243	266	10			
1	D	186	Total	C	N	O	S	0	0	0
			1406	901	241	254	10			
1	E	186	Total	C	N	O	S	0	0	0
			1410	902	240	258	10			
1	F	186	Total	C	N	O	S	0	0	0
			1401	895	238	258	10			

- Molecule 2 is a protein called PROTEIN (TNF-R2).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	7	Total	C	N	O	S	0	0	0
			58	36	8	13	1			
2	H	10	Total	C	N	O	S	0	0	0
			77	48	11	17	1			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	128	Total	O	0	0
			128	128		
3	B	140	Total	O	0	0
			140	140		
3	C	181	Total	O	0	0
			181	181		
3	D	134	Total	O	0	0
			134	134		

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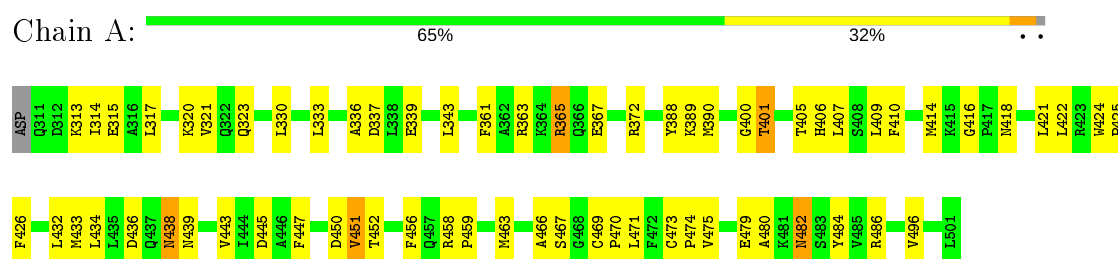
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	E	139	Total 139	O 139	0	0
3	F	159	Total 159	O 159	0	0
3	G	13	Total 13	O 13	0	0
3	H	16	Total 16	O 16	0	0

### 3 Residue-property plots

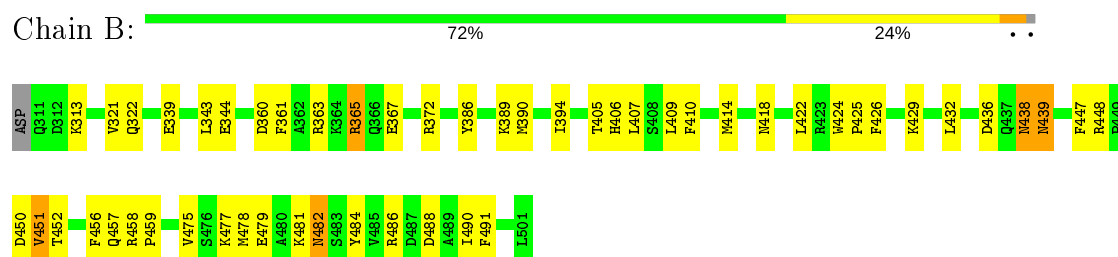
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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.

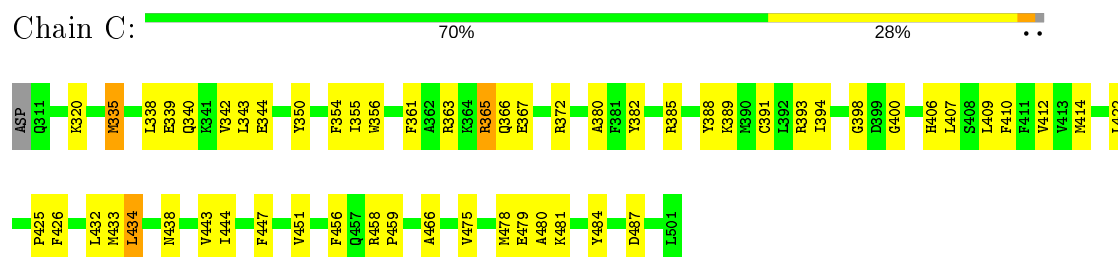
#### • Molecule 1: PROTEIN (TNF RECEPTOR ASSOCIATED FACTOR 2)



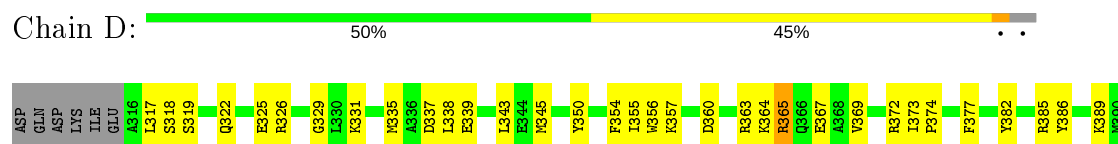
#### • Molecule 1: PROTEIN (TNF RECEPTOR ASSOCIATED FACTOR 2)

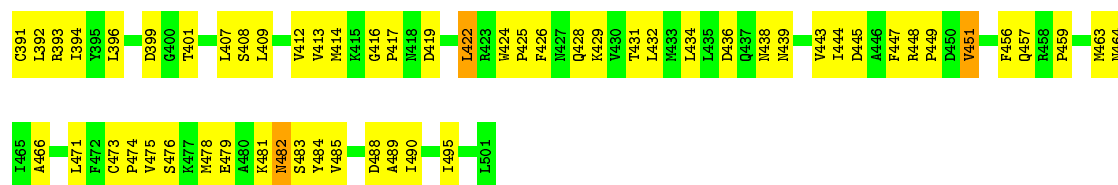


#### • Molecule 1: PROTEIN (TNF RECEPTOR ASSOCIATED FACTOR 2)



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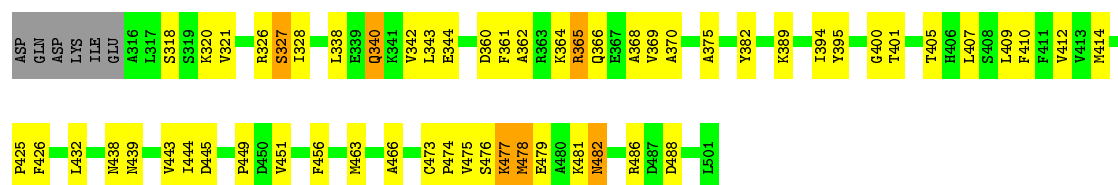




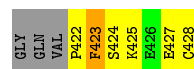
- Molecule 1: PROTEIN (TNF RECEPTOR ASSOCIATED FACTOR 2)



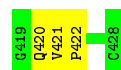
- Molecule 1: PROTEIN (TNF RECEPTOR ASSOCIATED FACTOR 2)



- Molecule 2: PROTEIN (TNF-R2)



- Molecule 2: PROTEIN (TNF-R2)



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	83.00 Å   84.40 Å   100.70 Å 90.00°   108.70°   90.00°	Depositor
Resolution (Å)	20.00 – 2.30	Depositor
% Data completeness (in resolution range)	87.2 (20.00-2.30)	Depositor
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS 0.3	Depositor
R, $R_{free}$	0.234 , 0.289	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	9554	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	47.0	wwPDB-VP

## 5 Model quality [i](#)

### 5.1 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 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	0.39	0/1465	0.67	0/1987
1	B	0.39	0/1447	0.68	0/1965
1	C	0.40	0/1470	0.68	1/1993 (0.1%)
1	D	0.39	0/1436	0.68	0/1946
1	E	0.40	0/1440	0.66	0/1951
1	F	0.39	0/1431	0.66	0/1940
2	G	0.47	0/59	0.78	0/75
2	H	0.63	0/78	0.97	0/102
All	All	0.40	0/8826	0.67	1/11959 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	434	LEU	N-CA-C	-5.07	97.32	111.00

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	1435	0	1375	68	0
1	B	1417	0	1322	60	0
1	C	1440	0	1375	50	0
1	D	1406	0	1354	108	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1410	0	1357	148	0
1	F	1401	0	1331	58	0
2	G	58	0	51	16	0
2	H	77	0	68	15	0
3	A	128	0	0	20	0
3	B	140	0	0	16	0
3	C	181	0	0	13	0
3	D	134	0	0	47	0
3	E	139	0	0	77	0
3	F	159	0	0	16	0
3	G	13	0	0	0	0
3	H	16	0	0	3	0
All	All	9554	0	8233	493	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 29.

The worst 5 of 493 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:B:448:ARG:HB2	2:H:421:VAL:CG1	1.73	1.17
1:B:448:ARG:HB2	2:H:421:VAL:HG13	1.11	1.11
1:B:448:ARG:HD2	2:H:421:VAL:HG22	1.41	1.02
1:C:338:LEU:HG	3:C:6769:HOH:O	1.60	1.01
1:B:448:ARG:HD2	2:H:421:VAL:CG2	1.91	0.99

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	189/192 (98%)	174 (92%)	13 (7%)	2 (1%)	14	15
1	B	189/192 (98%)	175 (93%)	11 (6%)	3 (2%)	9	9
1	C	189/192 (98%)	183 (97%)	6 (3%)	0	100	100
1	D	184/192 (96%)	166 (90%)	17 (9%)	1 (0%)	29	35
1	E	184/192 (96%)	167 (91%)	14 (8%)	3 (2%)	9	9
1	F	184/192 (96%)	169 (92%)	12 (6%)	3 (2%)	9	9
2	G	5/10 (50%)	5 (100%)	0	0	100	100
2	H	8/10 (80%)	7 (88%)	1 (12%)	0	100	100
All	All	1132/1172 (97%)	1046 (92%)	74 (6%)	12 (1%)	14	15

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	E	401	THR
1	A	451	VAL
1	B	451	VAL
1	B	479	GLU
1	F	327	SER

### 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	145/166 (87%)	142 (98%)	3 (2%)	53	70
1	B	138/166 (83%)	133 (96%)	5 (4%)	35	49
1	C	145/166 (87%)	141 (97%)	4 (3%)	43	60
1	D	141/166 (85%)	135 (96%)	6 (4%)	29	40
1	E	143/166 (86%)	139 (97%)	4 (3%)	43	60
1	F	140/166 (84%)	135 (96%)	5 (4%)	35	49
2	G	7/9 (78%)	6 (86%)	1 (14%)	3	3
2	H	9/9 (100%)	9 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	868/1014 (86%)	840 (97%)	28 (3%)	39 54

5 of 28 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	335	MET
1	D	438	ASN
1	F	438	ASN
1	D	365	ARG
1	D	422	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	418	ASN
1	D	439	ASN
1	F	366	GLN
1	B	482	ASN
1	C	366	GLN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

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 ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

### 6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.