



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:42 PM UTC

PDB ID : 8XO8 / pdb_00008xo8
Title : Crystal structure of measles virus fusion inhibitor MEK35GT complexed with F protein HR1 (HR1-42) (P21 space group)
Authors : Oishi, S.; Takahara, A.; Nakatsu, T.
Deposited on : 2023-12-31
Resolution : 1.85 Å(reported)

This is a Full wwPDB X-ray 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/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
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

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Mol	Chain	Length	Quality of chain
1	K	44	2%84%16%
2	B	37	3%84%8%8%
2	D	37	89%11%
2	F	37	84%8%8%
2	H	37	3%84%14%.
2	J	37	3%95%5%
2	L	37	11%81%16%.

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4366 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 Fusion glycoprotein F1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	44	Total	C	N	O	S	0	5	1
			353	214	64	73	2			
1	C	44	Total	C	N	O	S	0	3	1
			341	206	62	71	2			
1	E	44	Total	C	N	O	S	0	5	1
			356	215	65	74	2			
1	G	44	Total	C	N	O	S	0	4	1
			347	210	64	71	2			
1	I	44	Total	C	N	O	S	0	4	1
			346	211	62	71	2			
1	K	44	Total	C	N	O	S	0	5	1
			352	213	62	75	2			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	142	ACE	-	acetylation	UNP P69353
A	185	NH2	-	amidation	UNP P69353
C	142	ACE	-	acetylation	UNP P69353
C	185	NH2	-	amidation	UNP P69353
E	142	ACE	-	acetylation	UNP P69353
E	185	NH2	-	amidation	UNP P69353
G	142	ACE	-	acetylation	UNP P69353
G	185	NH2	-	amidation	UNP P69353
I	142	ACE	-	acetylation	UNP P69353
I	185	NH2	-	amidation	UNP P69353
K	142	ACE	-	acetylation	UNP P69353
K	185	NH2	-	amidation	UNP P69353

- Molecule 2 is a protein called Measles virus fusion inhibitor MEK35GT.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	34	Total	C	N	O	0	7	1
			316	202	51	63			
2	D	37	Total	C	N	O	0	4	1
			333	211	58	64			
2	F	34	Total	C	N	O	0	6	1
			317	205	55	57			
2	H	36	Total	C	N	O	0	3	1
			305	194	50	61			
2	J	37	Total	C	N	O	0	2	1
			299	192	51	56			
2	L	36	Total	C	N	O	0	2	1
			293	186	50	57			

- Molecule 3 is water.

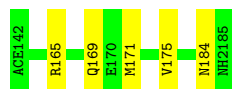
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	40	Total	O	0	0
			40	40		
3	B	45	Total	O	0	1
			45	45		
3	C	40	Total	O	0	0
			40	40		
3	D	47	Total	O	0	3
			47	47		
3	E	37	Total	O	0	0
			37	37		
3	F	41	Total	O	0	1
			41	41		
3	G	26	Total	O	0	0
			26	26		
3	H	19	Total	O	0	0
			19	19		
3	I	27	Total	O	0	0
			27	27		
3	J	27	Total	O	0	1
			27	27		
3	K	33	Total	O	0	0
			33	33		
3	L	26	Total	O	0	0
			26	26		

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: Fusion glycoprotein F1

Chain A:  89% 11%



- Molecule 1: Fusion glycoprotein F1

Chain C:  89% 11%

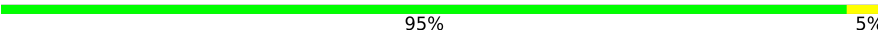


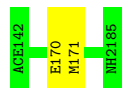
- Molecule 1: Fusion glycoprotein F1

Chain E:  91% 9%



- Molecule 1: Fusion glycoprotein F1

Chain G:  95% 5%

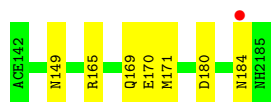
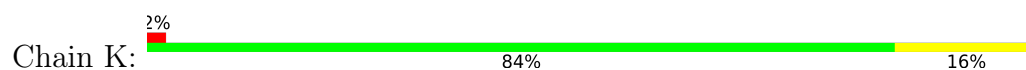


- Molecule 1: Fusion glycoprotein F1

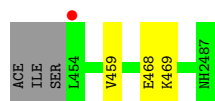
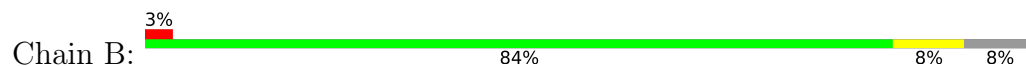
Chain I:  2% 89% 11%



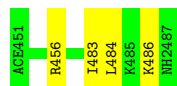
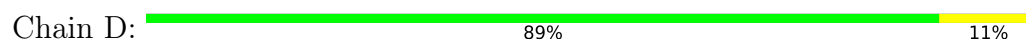
- Molecule 1: Fusion glycoprotein F1



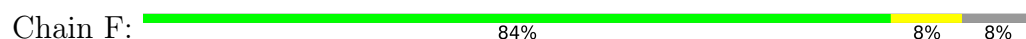
- Molecule 2: Measles virus fusion inhibitor MEK35GT



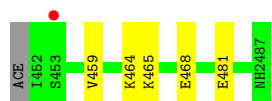
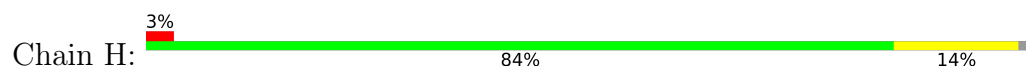
- Molecule 2: Measles virus fusion inhibitor MEK35GT



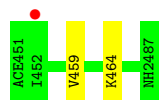
- Molecule 2: Measles virus fusion inhibitor MEK35GT



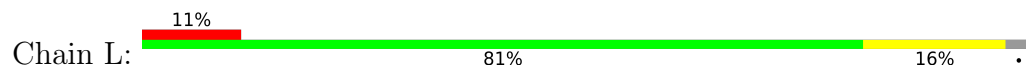
- Molecule 2: Measles virus fusion inhibitor MEK35GT

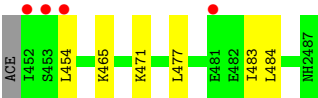


- Molecule 2: Measles virus fusion inhibitor MEK35GT



- Molecule 2: Measles virus fusion inhibitor MEK35GT





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	36.75Å 53.58Å 109.05Å 90.00° 94.96° 90.00°	Depositor
Resolution (Å)	48.01 – 1.85 48.01 – 1.85	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.01-1.85) 99.3 (48.01-1.85)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.75 (at 1.84Å)	Xtriage
Refinement program	REFMAC 5.8.0258	Depositor
R, R_{free}	0.180 , 0.240 0.189 , 0.248	Depositor DCC
R_{free} test set	1692 reflections (4.64%)	wwPDB-VP
Wilson B-factor (Å ²)	28.2	Xtriage
Anisotropy	0.138	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 31.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.53$, $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	4366	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 17.77% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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

Bond lengths and bond angles in the following residue types are not validated in this section: NH2, 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	1.03	0/365	1.40	0/492
1	C	1.02	0/347	1.40	0/469
1	E	1.01	0/365	1.38	2/492 (0.4%)
1	G	1.02	0/356	1.46	0/480
1	I	1.09	0/355	1.43	0/480
1	K	1.03	0/364	1.35	0/492
2	B	0.97	0/329	1.35	2/431 (0.5%)
2	D	1.00	0/341	1.40	0/447
2	F	0.99	0/333	1.22	0/433
2	H	1.03	0/315	1.57	2/413 (0.5%)
2	J	0.97	0/301	1.56	2/394 (0.5%)
2	L	1.02	0/297	1.50	0/389
All	All	1.01	0/4068	1.42	8/5412 (0.1%)

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	J	459	VAL	CA-C-N	6.08	126.73	119.98
2	J	459	VAL	C-N-CA	6.08	126.73	119.98
1	E	148	ASP	CA-C-N	5.28	127.30	120.44
1	E	148	ASP	C-N-CA	5.28	127.30	120.44
2	B	459	VAL	CA-C-N	5.09	125.71	120.06
2	B	459	VAL	C-N-CA	5.09	125.71	120.06
2	H	459	VAL	CA-C-N	5.03	126.43	120.14
2	H	459	VAL	C-N-CA	5.03	126.43	120.14

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	353	0	358	6	0
1	C	341	0	340	9	0
1	E	356	0	357	2	0
1	G	347	0	352	3	0
1	I	346	0	351	4	0
1	K	352	0	350	7	0
2	B	316	0	358	1	0
2	D	333	0	379	6	0
2	F	317	0	379	2	0
2	H	305	0	341	5	0
2	J	299	0	349	0	0
2	L	293	0	329	4	0
3	A	40	0	0	0	0
3	B	45	0	0	0	0
3	C	40	0	0	0	0
3	D	47	0	0	0	0
3	E	37	0	0	0	0
3	F	41	0	0	1	0
3	G	26	0	0	0	0
3	H	19	0	0	0	0
3	I	27	0	0	1	0
3	J	27	0	0	0	0
3	K	33	0	0	2	0
3	L	26	0	0	0	0
All	All	4366	0	4243	34	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 4.

All (34) 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:C:165:ARG:NH1	1:C:169[A]:GLN:HE21	1.86	0.73
1:A:165:ARG:NH1	1:A:169[B]:GLN:HE21	1.87	0.72
1:C:165:ARG:HH12	1:C:169[A]:GLN:HE21	1.44	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:175:VAL:HG21	1:C:171[B]:MET:HE1	1.80	0.63
1:C:161:ILE:HG22	2:F:477:LEU:HD11	1.81	0.61
1:C:171[B]:MET:HA	1:C:171[B]:MET:HE3	1.82	0.61
1:C:149[B]:ASN:OD1	2:D:483:ILE:O	2.18	0.61
1:C:171[B]:MET:HE3	1:C:171[B]:MET:CA	2.34	0.58
1:E:143:ASN:OD1	1:E:145:GLN:HB2	2.03	0.57
1:K:165:ARG:NH1	1:K:169[B]:GLN:HE21	2.03	0.56
1:K:180:ASP:O	1:K:184:ASN:HB2	2.06	0.55
1:C:149[B]:ASN:HD21	2:D:484:LEU:HA	1.74	0.52
1:I:143:ASN:HB3	3:I:208:HOH:O	2.10	0.52
2:F:462:ASN:ND2	3:F:502:HOH:O	2.43	0.50
2:B:468[B]:GLU:HG2	2:B:469:LYS:N	2.26	0.50
1:K:165:ARG:HH12	1:K:169[B]:GLN:HE21	1.60	0.50
1:G:171[B]:MET:HE2	1:K:171[B]:MET:HB3	1.93	0.49
1:I:161:ILE:HG22	2:L:477:LEU:HD11	1.96	0.47
1:K:149[B]:ASN:OD1	2:L:483:ILE:O	2.32	0.47
1:A:184:ASN:HD21	2:D:456[C]:ARG:HH22	1.63	0.47
1:A:184:ASN:ND2	2:D:456[C]:ARG:HH22	2.14	0.46
1:A:165:ARG:HH12	1:A:169[B]:GLN:HE21	1.59	0.45
1:G:170:GLU:CD	2:H:465:LYS:HD2	2.42	0.44
1:G:170:GLU:CD	2:H:465:LYS:CD	2.90	0.44
1:I:165:ARG:NH1	1:I:169[B]:GLN:HE21	2.16	0.44
1:C:149[B]:ASN:ND2	2:D:484:LEU:HA	2.32	0.43
2:H:481:GLU:HG2	3:K:226:HOH:O	2.19	0.43
1:K:149[B]:ASN:HD21	2:L:484:LEU:HA	1.83	0.43
1:K:170:GLU:CD	2:L:465:LYS:HD3	2.44	0.43
2:H:464[B]:LYS:CA	2:H:464[B]:LYS:HE3	2.50	0.42
1:I:144:SER:HB2	3:K:207:HOH:O	2.20	0.41
1:A:171[B]:MET:HE1	1:E:175:VAL:HG21	2.02	0.41
2:D:483:ILE:HA	2:D:486:LYS:HE2	2.01	0.41
2:H:465:LYS:O	2:H:468[C]:GLU:HG2	2.20	0.40

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	47/44 (107%)	47 (100%)	0	0	100	100
1	C	45/44 (102%)	45 (100%)	0	0	100	100
1	E	47/44 (107%)	47 (100%)	0	0	100	100
1	G	46/44 (104%)	46 (100%)	0	0	100	100
1	I	46/44 (104%)	45 (98%)	1 (2%)	0	100	100
1	K	47/44 (107%)	46 (98%)	1 (2%)	0	100	100
2	B	39/37 (105%)	38 (97%)	1 (3%)	0	100	100
2	D	41/37 (111%)	40 (98%)	1 (2%)	0	100	100
2	F	39/37 (105%)	38 (97%)	1 (3%)	0	100	100
2	H	38/37 (103%)	38 (100%)	0	0	100	100
2	J	37/37 (100%)	36 (97%)	1 (3%)	0	100	100
2	L	36/37 (97%)	35 (97%)	1 (3%)	0	100	100
All	All	508/486 (104%)	501 (99%)	7 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	39/34 (115%)	39 (100%)	0	100	100
1	C	37/34 (109%)	37 (100%)	0	100	100
1	E	39/34 (115%)	39 (100%)	0	100	100
1	G	38/34 (112%)	38 (100%)	0	100	100
1	I	38/34 (112%)	38 (100%)	0	100	100
1	K	39/34 (115%)	39 (100%)	0	100	100
2	B	37/32 (116%)	37 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	D	38/32 (119%)	38 (100%)	0	100	100
2	F	37/32 (116%)	35 (95%)	2 (5%)	20	4
2	H	35/32 (109%)	35 (100%)	0	100	100
2	J	34/32 (106%)	32 (94%)	2 (6%)	18	4
2	L	33/32 (103%)	31 (94%)	2 (6%)	17	3
All	All	444/396 (112%)	438 (99%)	6 (1%)	68	45

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	F	482[A]	GLU
2	F	482[B]	GLU
2	J	464[A]	LYS
2	J	464[B]	LYS
2	L	454	LEU
2	L	471	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	158	ASN
1	A	184	ASN
1	C	158	ASN
1	C	184	ASN
1	E	176	GLN
2	F	462	ASN
1	G	184	ASN
2	H	462	ASN
1	I	158	ASN
1	I	159	GLN
1	K	145	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides 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

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	42/44 (95%)	-0.34	0	100	100	13, 23, 33, 41	5 (11%)
1	C	42/44 (95%)	-0.36	0	100	100	13, 23, 33, 39	3 (7%)
1	E	42/44 (95%)	-0.15	0	100	100	12, 23, 36, 45	5 (11%)
1	G	42/44 (95%)	0.03	0	100	100	15, 28, 35, 51	4 (9%)
1	I	42/44 (95%)	0.10	1 (2%)	59	66	15, 27, 51, 70	4 (9%)
1	K	42/44 (95%)	-0.03	1 (2%)	59	66	15, 25, 32, 53	5 (11%)
2	B	33/37 (89%)	-0.07	1 (3%)	52	57	12, 25, 58, 73	7 (21%)
2	D	35/37 (94%)	-0.10	0	100	100	9, 26, 38, 60	4 (11%)
2	F	33/37 (89%)	0.07	0	100	100	11, 25, 50, 54	6 (18%)
2	H	35/37 (94%)	0.52	1 (2%)	53	58	16, 38, 52, 66	3 (8%)
2	J	35/37 (94%)	0.59	1 (2%)	53	58	19, 39, 55, 73	2 (5%)
2	L	35/37 (94%)	0.58	4 (11%)	10	9	18, 36, 66, 75	2 (5%)
All	All	458/486 (94%)	0.05	9 (1%)	65	72	9, 27, 52, 75	50 (10%)

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	L	452	ILE	4.6
1	K	184	ASN	3.7
2	B	454	LEU	3.5
2	L	454	LEU	3.3
2	L	453	SER	2.8
2	J	452	ILE	2.8
1	I	143	ASN	2.4
2	L	481	GLU	2.3
2	H	453	SER	2.2

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.