wwPDB X-ray Structure Validation Summary Report (i)

Jan 30, 2024 – 12:54 PM EST

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PDB ID	:	1IAJ
Title	:	CRYSTAL STRUCTURE OF THE ATYPICAL PROTEIN KINASE DOMAIN OF A TRP CA-CHANNEL, CHAK (APO)
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Deposited on	:	2001-03-22
Resolution	:	2.80 Å(reported)

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 2.80 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.
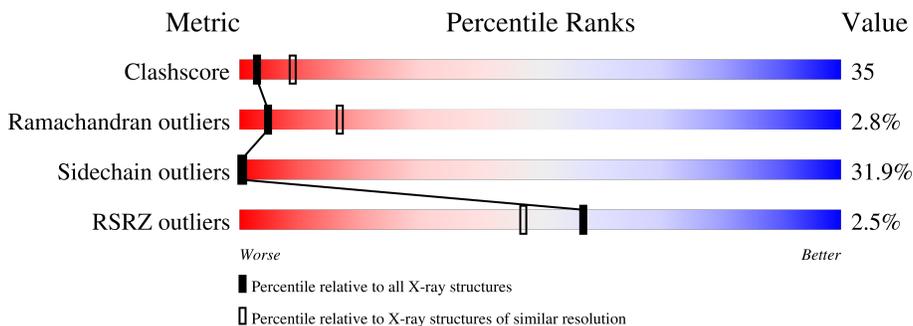
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)

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	280	2% 34% 35% 21% • 10%
1	B	280	2% 35% 40% 18% 8%

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 4134 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 TRANSIENT RECEPTOR POTENTIAL-RELATED PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	253	Total	C	N	O	S	0	0	0
			2032	1297	346	375	14			
1	B	259	Total	C	N	O	S	0	0	0
			2100	1340	361	385	14			

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

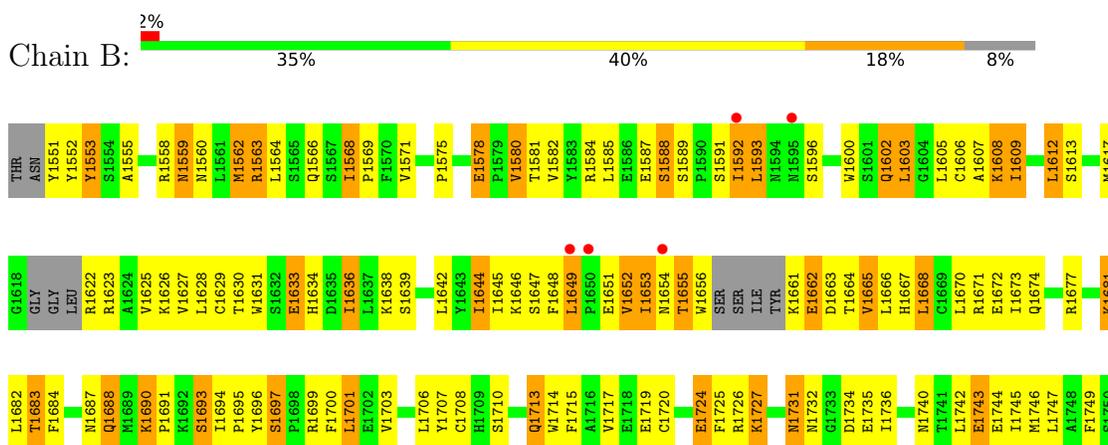| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

3 Residue-property plots ⓘ

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: TRANSIENT RECEPTOR POTENTIAL-RELATED PROTEIN

• Molecule 1: TRANSIENT RECEPTOR POTENTIAL-RELATED PROTEIN

H1751 W1752 Y1756 T1757 R1758 G1759 E1760 L1761 L1764 D1765 L1766 Q1767 G1768 V1769 G1770 E1771 T1774 D1775 P1776 S1777 V1778 I1779 K1780 A1781 E1782 GLU LYS ARG SER CYS ASP MET VAL PHE GLY PRO ALA N1795 L1796 G1797 E1798 I1801 K1802 N1803 F1804 R1805 S1812 R1815 K1816 L1817 K1818 L1819 P1820 D1821

L1822 K1823 R1824 N1825 D1826 Y1827 T1828
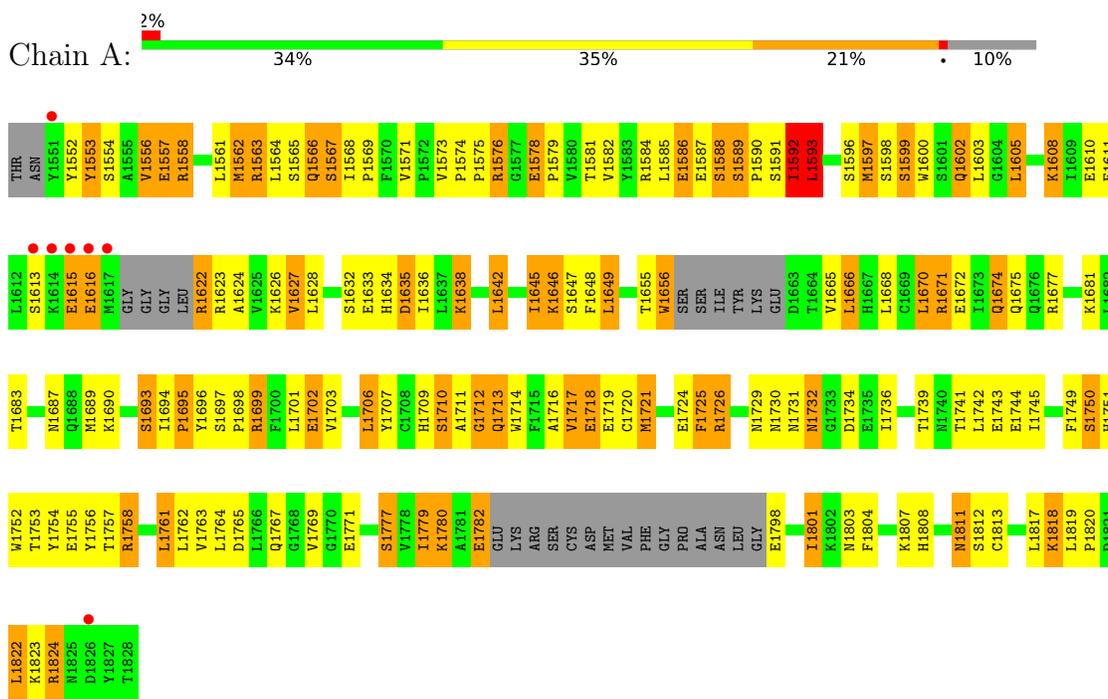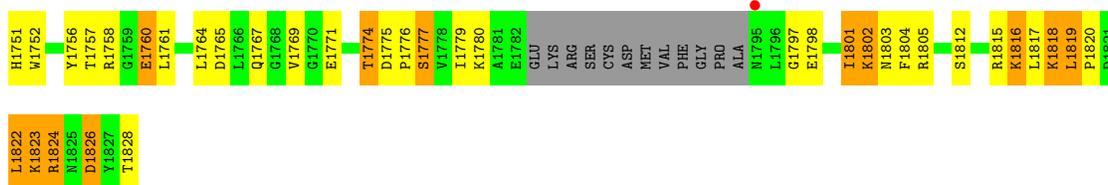
4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	108.27Å 138.20Å 113.52Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.80 29.74 – 2.80	Depositor EDS
% Data completeness (in resolution range)	(Not available) (20.00-2.80) 97.4 (29.74-2.80)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	4.90	Depositor
$< I/\sigma(I) >$ [1]	4.17 (at 2.80Å)	Xtriage
Refinement program	X-PLOR 3.851	Depositor
R, R_{free}	0.229 , 0.292 0.237 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	64.8	Xtriage
Anisotropy	0.185	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 73.3	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	4134	wwPDB-VP
Average B, all atoms (Å^2)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.48% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 ⓘ

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

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	0.46	0/2080	0.62	0/2819
1	B	0.47	0/2148	0.64	0/2904
All	All	0.47	0/4228	0.63	0/5723

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 ⓘ

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	2032	0	1966	145	0
1	B	2100	0	2072	163	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
All	All	4134	0	4038	286	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 35.

The worst 5 of 286 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:1649:LEU:H	1:B:1649:LEU:HD12	1.18	1.08
1:B:1665:VAL:HG11	1:B:1713:GLN:HE22	1.14	1.06
1:A:1563:ARG:HH11	1:A:1563:ARG:HG3	1.25	1.00
1:B:1805:ARG:HG2	1:B:1822:LEU:HG	1.40	0.99
1:A:1605:LEU:HD12	1:A:1605:LEU:H	1.26	0.97

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	245/280 (88%)	216 (88%)	22 (9%)	7 (3%)	4	15
1	B	251/280 (90%)	219 (87%)	25 (10%)	7 (3%)	5	17
All	All	496/560 (89%)	435 (88%)	47 (10%)	14 (3%)	5	17

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1567	SER
1	B	1612	LEU
1	B	1823	LYS
1	B	1575	PRO
1	B	1588	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	223/253 (88%)	143 (64%)	80 (36%)	0	0
1	B	234/253 (92%)	168 (72%)	66 (28%)	0	1
All	All	457/506 (90%)	311 (68%)	146 (32%)	0	0

5 of 146 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1681	LYS
1	B	1824	ARG
1	B	1690	LYS
1	B	1744	GLU
1	A	1674	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1825	ASN
1	B	1566	GLN
1	B	1767	GLN
1	B	1713	GLN
1	B	1731	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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	253/280 (90%)	-0.13	7 (2%) 53	43	29, 59, 95, 100	0
1	B	259/280 (92%)	0.06	6 (2%) 60	51	32, 67, 96, 100	0
All	All	512/560 (91%)	-0.04	13 (2%) 57	47	29, 63, 96, 100	0

The worst 5 of 13 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1795	ASN	4.2
1	A	1551	TYR	3.5
1	A	1616	GLU	3.0
1	A	1614	LYS	3.0
1	A	1615	GLU	2.8

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 monosaccharides 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. 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	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	ZN	A	2001	1/1	0.98	0.17	59,59,59,59	0
2	ZN	B	2001	1/1	0.98	0.12	59,59,59,59	0

6.5 Other polymers (i)

There are no such residues in this entry.