

Table 2. Amino acid residues and substitutions in the VP2 gene of the recent CPV strains (2023) obtained from dogs, repository isolates (2009-2019) and the reference strains from NCBI GenBank

NCBI GenBank Accession ID		Sample ID	Place	State	Country	Year	Amino acid position at the CPV VP2 gene																						Strain		
							5	10	87	244	189	190	192	219	257	267	286	297	300	305	324	370	375	386	401	426	440	555		581	582
Vaccine	OR296289	Indian Vaccine strain					Ala	Gly	Leu	Ile	Ala	Met	Ser	Val	Thr	Phe	Gly	Ser	Ala	Asp	Tyr	Gln	Asn	Lys	Ile	Asn	Thr	Val	Arg	Lys	CPV-2
Reference Strains from NCBI GenBank	M38245				USA	1978	.	.	Met	.	.	.	.	Ile	.	.	.	.	.	.	.	.	Gln	.	.	.	.	.	.	.	CPV-2
	M24003				USA	1988	.	.	.	Thr	.	.	.	Ile	.	.	.	.	Gly	Tyr	.	.	Asp	Gln	.	.	.	Ile	.	.	CPV-2a
	JQ686671				China	2012	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	KF638400				China	2014	.	.	.	Thr	.	.	Phe	Ile	.	.	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	EF011664				China	2009	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	.	.	.	.	CPV-2a variant
	JQ268283				China	2011	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	.	.	.	.	CPV-2a variant
	AB437433				Japan	2008	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	Asp	.	.	.	.	CPV-2b variant
	AY742935				USA	2011	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	.	.	.	.	.	CPV-2a variant
	AY742936				USA	2005	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	Asp	.	.	.	.	CPV-2b variant
	KF676668				China	2013	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	EU659121				USA	2008	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	Asp	.	.	.	.	CPV-2b variant
	DQ340431				Brazil	2011	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	.	.	.	Thr	.	CPV-2a variant
	FJ222821				Italy	2008	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	Glu	.	.	.	.	CPV-2c
	MK895490				Nigeria	2018	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV-2c
	MK895486				Nigeria	2018	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV-2c
	MH476587				China	2017	Gly	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV-2c
	MG013488				China	2017	Gly	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV-2c
	ON322787				China	2020	Gly	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV-2c
	OP779666				China	2022	.	Arg	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV2c
	OP779663				China	2022	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV2c
	OP779651				China	2022	Gly	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV2c
	OQ024214		Imphal	Manipur	India	2021	-	-	-	-	-	-	-	-	Ser	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	-	-	-	CPV2c
	OP962003		Gangtok	Sikkim	India	2021	-	-	-	-	-	-	-	-	Ser	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	-	-	-	CPV2c
	OQ092740		Aizwal	Mizoram	India	2022	Gly	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	CPV2c
Repository isolates (2009 - 2019)	OR296278	3566	Puducherry	Puducherry	India	2009	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	OR296281	CO2	Coimbatore	Tamil Nadu	India	2011	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	OR296280	S4	Salem	Tamil Nadu	India	2012	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	OR296282	TH10	Trivandrum	Kerala	India	2012	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	OR296279	MY05	Mysore	karnataka	India	2012	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant
	OR296283	TRI6	Thrissur	Kerala	India	2012	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	Met	.	Ala	.	.	.	CPV-2a variant
	OR296284	UP6	Mathura	Uttar Pradesh	India	2014	.	.	.	Thr	.	.	.	Ile	.	.	.	Ala	Gly	Tyr	.	.	Asp	Gln	.	.	.	.	.	.	CPV-2a variant

	OR296285	KLD3	Thrissur	Kerala	India	2014	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant	
	OR296288	SD02	Gangtok	Sikkim	India	2014	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant	
	OR296287	QLN11	Goa	Goa	India	2019	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant	
	OR296286	WV14	Chennai	Tamil Nadu	India	2019	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	.	Ala	.	.	.	CPV-2a variant	
Recent CPV strains (2023)	OR296260	J01	Delhi	Delhi	India	2023	.	.	.	Thr	Ser	.	.	Ile	.	Tyr	Ser	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	Asn	CPV-2c	
	OR296261	M01	Mumbai	Maharashtra	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	.	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296262	N02	Pfutsero	Nagaland	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296263	124644	Chennai	Tamil Nadu	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296264	HYD05	Hyderabad	Telngana	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296265	3157	Puducherry	Puducherry	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	.	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296266	MJ02	Jabalpur	Madhya Pradesh	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296267	15024	Bhopal	Madhya Pradesh	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296268	B03	Patna	Bihar	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296269	Chhat01	Durg	Chhattisgarh	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	.	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296270	JH04	Ranchi	Jharkhand	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296271	HY01	Faridabad	Haryana	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296272	UP02	Ayodhya	Uttar Pradesh	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296273	WB02	Kolkata	West Bengal	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296274	AS03	Guwahati	Assam	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296275	01G	Goa	Goa	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296276	03R	Jaipur	Rajasthan	India	2023	.	.	.	Thr	.	.	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c
	OR296277	MZ04	Aizwal	Mizoram	India	2023	.	.	.	Thr	.	Ile	.	Ile	.	Tyr	.	Ala	Gly	Tyr	Ile	Arg	Asp	Gln	.	Glu	.	.	.	.	.	CPV-2c