SARS-COV-2 VARIANTS IN RISK ASSESSMENT: VARIANTS DETECTED IN THE UK

POSITION AS OF 15 December 2021 UKHSA

Last horizon scan	Signals currently under monitoring and investigation	Variants under investigation	Variants of concern
International Epidemiology Scan: 14-12-2021 Imported Sample Mutation Scan: 14-12-2021 Signals in Monitoring Scan: 14-12-2021 Phylogenetic Cluster detection: 14-12-2021 International Mutation Scan: 10-12-2021 Domestic Mutation Scan: 10-12-2021 Reinfections Scan: 10-12-2021 Vaccinees Scan: 19-11-2021	AY.33 (International)	Kappa - VUI-21APR-01 B.1.617.1 (India)	Alpha - VOC-20DEC-01 B.1.1.7 (UK)
	AY.34 (Delta + Q677H)	Mu - VUI-21JUL-01 B.1.621 (Colombia)	Beta - VOC-20DEC-02 B.1.351 (South Africa)
	AY.43 (N:Q9L)	VUI-21OCT-01 AY.4.2	Gamma - VOC-21JAN-02 P.1 (Japan ex Brazil)
	Delta + E484K Phylogenetic Cluster		Delta - VOC-21APR-02 B.1.617.2 (India), AY.1, AY.2, and AY.3
	B.1.640 (C.1.2-Like Congo/France)		Omicron – VOC-21NOV-01 B.1.1.529
	BA.2		
Signals investigated at last scan: 0			
New genomes in last 24 hr period: 9265			
Note: Signals of individual mutations and new clusters excluded until defined variant identified			

SARS-COV-2 VARIANTS IN RISK ASSESSMENT: VARIANTS NOT DETECTED IN THE UK

POSITION AS OF 15 December 2021 UKHSA

International signals under monitoring	International variants under investigation	International variants of concern
Variant Associated with North America: USA 214insQAS Samples	Zeta - VUI-21JAN-01 P.2	
Iota B.1.526 (New York)	VUI-21FEB-04 B.1.1.318 (England) *	
B.1.629 (Guinea/Angola)	VUI-21FEB-03 B.1.525 (Formerly Eta)	
B.1.630, B.1.631 & B.1.628 (USA, Spain, Honduras, **Mexico**, Brazil, Norway)	VUI-21APR-03 B.1.617.3 (India)	
P.1.8 (Brazil)		
B.1.1.7 + B.1.617.2 (Japan)		
C.37 (2nd Gen, Peru)		
B.1.427/B.1.429 (California)		
C.1.2		
Lambda C.37 (Peru)		

* - Note that there is a known issue in the detection of AZ.5 (B.1.1.318.5) which will have an impact on the detection of VUI-21FEB-04 sequences

BIW025.01

MUTATION PROFILES: VARIANTS OF CONCERN AND VARIANTS UNDER INVESTIGATION

VARIANT	MUTATION PROFILE (SUBSTUTITIONS AND INSERTION/DELETIONS)
Alpha VOC-20DEC-01	S: Δ69-70, Δ144, N501Y, A570D, P681H, T716I, S982A, D1118H; ORF1ab: T1001I, A1708D, I2230T, Δ3675-3677; ORF8: Q27*, R52I, Y73C; N: D3L
Beta VOC-20DEC-02	S: D80A, D215G, Δ242-244, K417N, E484K, N501Y, A701V; ORF1ab: T265I, K1655N, K3353R, Δ3675-3677; ORF3a: Q57H, S171L; E: P71L, T205I; N:T205I
Gamma VOC-21JAN-02	S: T20N, P26S, K417T, E484K N501Y, T1027I; ORF1ab: S1188L, K1795Q, Δ3675-3677; ORF8: E92K; N: P80R
Eta VUI-21FEB-03	S: Q52R, Δ69-70, Δ144, E484K, Q677H, F888L; ORF1ab: Δ3675-3677, P4715F; E: L21F; M: I82T; ORF6: Δ2; N: Δ2, D3Y
VUI-21FEB-04	S: T95I, Δ144, E484K, P681H, D796H; ORF1ab: E1196V, K2511N, T2936I, A3209V, T3284I, Δ3675-3677, V6672M; M: I82T; ORF8: Δ1-3, E106*; N: Δ208, R209G
Zeta VUI-21JAN-01	S: E484K; ORF1ab: L3468V; N: A119S, M234I
Kappa VUI-21APR-01	S: E154K, L452R, E484Q, P681R; ORF1ab: T1567I, T3646A, M5753I, K6711R; ORF7a: V82A; N: R203M
Delta VOC-21APR-02	B.1.617.2: S: T19R, G142D, Δ156-157, E156G, L452R, T478K, P681R, D950N; ORF3a: S26L; M: I82T, ORF7a: V82A, T120I N: D63G, R203M, D377Y AY.1: S:T19R, G142D, Δ156-157, **W258L, K417N,** L452R, T478K, D614G, P681R, D950N; ORF 3a:S26L; M:I82T; ORF 7a:V82A, T120I; **ORF 7b:T40I**; N:D63G, G215C, R203M, D377Y
VUI-21APR-03	S: T19R, Δ156-157, R158G, L452R, E484Q, P681R, D950N, ORF1ab: A1526V, T1830I, A194S, A117V, ORF7a: V82A, ORF8: T26I, N: P67S, R203M, D377Y
Mu - VUI-21JUL-01 B.1.621 (Columbia)	S: T95I, Y144T/144insS/Y145N, R346K, E484K, N501Y, D614G, P681H, D950N; orf1ab: T237A, P323L, P419S, T492I, T720I, Q160R; orf3a: Q57H; orf8: T11K, P38S, S67F; N: T205I
VUI-21OCT-01 AY.4.2	S: Delta + orf1ab:A2529V, S:Y145H, S:A222V
Omicron – VOC-21NOV-01 B.1.1.529	S: A67V, Δ69-70, T95I, G142D/Δ143-145, Δ211/L212I, ins214EPE, G339D, S371L, S373P, S375F, **K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H**, T547K, D614G, H655Y**, N679K, P681H,** N764K, D796Y, N856K, Q954H, N969K, L981F.

Where INDEL are defined in 'nt' the INDEL is non-codon aligned.

Note: These are not lineage defining mutations, these are mutations found in the VOC/VUIs. Lineage defining mutations can be found here

BIW025.01

MUTATION PROFILES: SIGNALS IN MONITORING

VARIANT	MUTATION PROFILE (SUBSTUTITIONS AND INSERTION/DELETIONS)
Epsilon B.1.427/B.1.429 (California)	S: S13I W152C L452R; N: T205I
Iota B.1.526 (New York)	S: L5F T95I D253G S477N/E484K A701V
B.1.629 (Guinea/Angola)	S: G142D, K182R, L452R, T478K, *D614G,* P681H, D796Y, C1235F
C.1.2	P9L, P25L, C136F, Δ144, R190S, D215G, Δ243-244, Y449H, E484K, N501Y, H655Y, N679K, T716I, T859N
B.1.630	P9L, Δ69-70, C136F,Δ144,A222V,Δ242-244,L452R,T478R,E484Q,D614G,H655Y,D950N.
B.1.631 & B.1.628	**L18R, T95I, R158S,** A411S, **N440K,** L452M, ***D614G***, **P681H**, **A688V**, **S735A**, **T1027I** **L18R*,** T95I, S151I*, **R158S, N440K**, E484Q*, ***D614G***, **P681H**, **A688V**, **S735A**, V1104*, **T1027I**
P.1.8	Gamma + S: T470N, P681R, C1235F Gamma + NSP3 – I441V; NSP4 – A446V; ORF3a – S216L; ORF8 – G8*STOP; N – TRS insertion
AY.33	Delta + S: Q613H (lineage defining), T29A, T250I, and T299I
AY.34 (Delta + Q677H)	Delta + S: Q677H
B.1.1.7 + B.1.617.2 (Japan)	Delta + S: Q173H, ORF3a: S26L, M: 182T, ORF6: 27390T, ORF8:Q27*, R52I, YY73C, N:D3L, R203K, G240R, S235F
B.1.640 (C.1.2-Like Congo/France)	S: D138, E96Q, N394S, P681H, P9L, R346S, T859N, D936H, F490R, N501Y, I210T, R190S, Y449N
C.37 (Lambda) (Previously VUI-21JUN-01)	S: L452Q, F490S, T859N, Δ22298;
C.37 (2nd Gen, Peru)	S: L5F, G75V, D614G, L452Q, E484K, P499R, N501T, H655Y, P681R, T859N
AY.43 (N:Q9L)	S: T19R , E156G , del157/158, L452R, T478K, D614G, P681R, D950N
Delta + E484K Phylogenetic Cluster	Delta + S: E484K, NSP3: Q1658H; NSP6: T180I, Q208R; ORF3a: P42L, T221A; N: A254S
BA.2	S: G142D, G339D, S373P, S375F, K417N, N440K, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K, T19I, LPPA24S, V213G, S371F, T376A, D405N, R408S

Variants provisionally extinct (not detected for 12 weeks in the UK or internationally)

Signals under monitoring	Variants under investigation	Variants of concern
A.27 (France)	VUI-21MAR-01 B.1.324.1 with E484K (UK)	VOC-21FEB-02 B.1.1.7 with E484K (UK) focus Bristol/SW
AT.1 (Russia)	VUI-21FEB-01 A.23.1 with E484K, (UK) focus Liverpool	
B.1.619 (S. Korea)	VUI-21MAY-01 AV.1 (UK)	
B1.214.2 (Belgium)	Theta - VUI-21MAR-02 P.3 (Philippines)	
A.30 (Angola/Tanzania)		
B.1.633 (India, UK, Japan)		
P.5 (Brazil)		
B.1.620 (travellers to the UK)		
R.1 Associated with multiple locations		
C.36.3 (Egypt)		

VOC/VUI VARIANT	MUTATION PROFILE (SUBSTUTITIONS AND INSERTION/DELETIONS)
VUI-21MAR-01	B.1.324.1 + S: E484K; ORF1ab: G894S, G5530C; ORF8: Δ27922-27956
VUI-21FEB-01	S: R102I, F157L, V367F, E484K, Q613H, P681R; ORF1ab: L1559F, M3655I, L3667F, M3752I; ORF8: L84S, E92K; N: S202N
VUI-21MAY-01	S: D80G, T95I, G142D, Δ144, N439K, E484K, D614G, P681H, I1130V, D1139H , Orf1ab: A119V, G339S, H342Y, G519S, A591V, H1160Y, P1640L, N2405S, A3209V, Δ3675-3677, P4715L, S4826A, A6044V, M: A63T, H125Y , Orf3a: Δ26158-26161 , N: I157V, R203K, G204R
Theta VUI-21MAR-02	S: Δ141-143, E484K, N501Y, P681H, E1092K, H1101Y, V1176F; ORF1ab: L71F, D112E, A368V, L438P, D736G; ORF8: K2Q
VOC-21FEB-02	VOC-20DEC-01 + S: E484K; N: A173V A398T

SIM VARIANT	MUTATION PROFILE (SUBSTUTITIONS AND INSERTION/DELETIONS)
A.27 (France)	S: L18F L452R N501Y A653V H655Y D796Y G1219V
AT.1 (Russia)	S: D215G, E484K, E780K, H245P, P9L, Δ136-144, N679K/insGIAL
B.1.619 (S. Korea)	I210T, N440K, E484K, D614G, D936N, S939F, T1027I
B1.214.2 (Belgium)	S: Q414K N450K D614G T716I Ins: 22204 – ACAGATCGA
A.30 (Angola/Tanzania)	S: D80Y, Δ144, Δ210, Δ246-248, L249M, D215G, R346K, T478R, E484K, H655Y, P681H, Q957H
B.1.633 (India, UK, Japan)	S: T76I, Δ144, D253N, L452R, T478K, E484A, T572N, D614G, P681R, D796H, T859N, S939F
P.5 (Brazil)	S: F2L, Q14K, D53D, T95I, V143del, E484Q, N501T, D614G, D950N, I1114I, V1176F
B.1.620 (travellers to the UK)	S: P26S V126A S477N E484K P681H T1027I D1118H
R1 (Multiple Locations)	S: W152L E484K D614G G769V
C.36.3 (Egypt) (Previously VUI-21MAY-02)	S: S12F, Δ69-70, W152R, R346S, L452R, Q677H, A899S ; orf1ab: D105Y, S118L, D217N, E102K, A859V, S3687L, L3691S, T1246I, D1639N, P2287S, D3222N, G3278S, T4090I, P4715L; N: R203K, G204R, G212V; M: I82T