

Last horizon scan	Signals currently under monitoring and investigation	Variants under investigation	Variants of concern
International Epidemiology Scan: 12-10-2021	Epsilon B.1.427/B.1.429 (California)	VUI-21FEB-04 B.1.1.318 (England)	Alpha - VOC-20DEC-01 B.1.1.7 (UK)
Imported Sample Mutation Scan: 07-10-2021	B.1.1.7 with S494P (UK)	Kappa - VUI-21APR-01 B.1.617.1 (India)	Beta - VOC-20DEC-02 B.1.351 (South Africa)
Signals in Monitoring Scan: 07-10-2021	B.1.620 (travellers to the UK)	Mu - VUI-21JUL-01 B.1.621 (Colombia)	Gamma - VOC-21JAN-02 P.1 (Japan ex Brazil)
Phylogenetic Cluster detection: 12-09-2021	R.1 Associated with multiple locations		Delta - VOC-21APR-02 B.1.617.2 (India), AY.1, AY.2, and AY.3
	C.1.2		
International Mutation Scan: 12-10-2021	AY.33 (International)		
	AY.4.2		
Domestic Mutation Scan: 08-10-2021			
Reinfections Scan: 08-10-2021			
Vaccinees Scan: 01-10-2021			
Signals investigated at last scan: 0			
New genomes in last 24 hr period: 4657			
Note: Signals of individual mutations and new clusters excluded until defined variant identified			

Variants provisionally extinct (not detected for 12 weeks in the UK or internationally)	International signals under monitoring	International variants under investigation	International variants of concern
VUI-21MAR-01 B.1.324.1 with E484K (UK)	P.5 (Brazil)	VUI-21APR-03 B.1.617.3 (India)	
VUI-21FEB-01, A.23.1 with E484K, (UK) focus Liverpool	Variant Associated with North America: USA 214insQAS Samples	VUI-21MAY-02 C.36.3 (Egypt)	
VOC-21FEB-02 B.1.1.7 with E484K (UK) focus Bristol/SW.	Iota B.1.526 (New York)	VUI-21MAY-01 AV.1 (UK)	
B1.214.2 (Belgium)	A.27 (France)	Eta - VUI-21FEB-03 B.1.525	
B.1.633 (India, UK, Japan)	B.1.1.7 with Q677H (UK)	Theta - VUI-21MAR-02 P.3 (Philippines)	
A.30 (Tanzania/Angola)	AT.1 (Russia)	Zeta (VUI-21JAN-01, P.2)	
	B.1.629 (Guinea/Angola)	Lambda – VUI-21JUN-01 C.37 (Peru)	
	B.1.619 (S. Korea)		
	B.1.630, B.1.631 & B.1.628 (USA, Spain, Honduras, Mexico , Brazil, Norway)		
	P.1.8 (Brazil)		

MUTATION PROFILES: VARIANTS OF CONCERN AND VARIANTS UNDER INVESTIGATION

VARIANT	MUTATION PROFILE (SUBSTITUTIONS 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
VUI-21FEB-01	S: R102I, F157L, V367F, E484K, Q613H, P681R; ORF1ab: L1559F, M3655I, L3667F, M3752I; ORF8: L84S, E92K; N: S202N
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
VUI-21MAR-01	B.1.324.1 + S: E484K; ORF1ab: G894S, G5530C; ORF8: Δ27922-27956
Theta VUI-21MAR-02	S: Δ141-143, E484K, N501Y, P681H, E1092K, H1101Y, V1176F; ORF1ab: L71F, D112E, A368V, L438P, D736G; ORF8: K2Q
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

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](#)

MUTATION PROFILES: VARIANTS OF CONCERN AND VARIANTS UNDER INVESTIGATION

VARIANT	MUTATION PROFILE (SUBSTITUTIONS AND INSERTION/DELETIONS)
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
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
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
Lambda VUI-21JUN-01	S: L452Q, F490S, T859N, Δ22298; ORF1ab: L438P, T492I, Δ11287, F1569V; N: P13L, G214C
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

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

MUTATION PROFILES: SIGNALS IN MONITORING

VARIANT	MUTATION PROFILE (SUBSTITUTIONS 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.1.1.7 with S494P (UK)	S: S494P
A.27 (France)	S: L18F L452R N501Y A653V H655Y D796Y G1219V
B.1.1.7 with Q677H (UK)	S: Q677H
B.1.620 (travellers to the UK)	S: P26S V126A S477N E484K P681H T1027I D1118H
R1 (Multiple Locations)	S: W152L E484K D614G G769V
B1.214.2 (Belgium)	S: Q414K N450K D614G T716I Ins: 22204 – ACAGATCGA
AT.1 (Russia)	S:D215G, E484K, E780K, H245P, P9L, Δ136-144, N679K/insGIAL
VOC-21FEB-02	VOC-20DEC-01 + S: E484K; N: A173V A398T
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
B.1.629 (Guinea/Angola)	S: G142D, K182R, L452R, T478K, <i>D614G</i> , P681H, D796Y, C1235F
B.1.619 (S. Korea)	I210T, N440K, E484K, D614G, D936N, S939F, T1027I
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

MUTATION PROFILES: SIGNALS IN MONITORING

VARIANT	MUTATION PROFILE (SUBSTITUTIONS AND INSERTION/DELETIONS)
P.1.8	S: Gamma + T470N, P681R, C1235F Gamma + NSP3 – I441V; NSP4 – A446V; ORF3a – S216L; ORF8 – G8*STOP; N – TRS insertion
AY.33	S: Delta+Q613H (lineage defining), T29A, T250I, and T299I.
AY.4.2	S: Delta + A222V, Y145H