

UγTN	Consensus	Alternate amino acid	Mutations	Modifications	Interactions
γ1	M	∅			✓
γ2	P	G, T	✓		✓
γ3	R	G, S	✓		✓
γ4	E	A, D	✓		✓
γ5	I	L, V			
γ6	I	M, V, L			
γ7	T	N			
γ8	L	V, I, C	✓		
γ9	Q	H	✓		
γ10	V	A, L, C		✓	✓
γ11	G	∅			✓
γ12	Q	∅	✓		✓
γ13	C	A	✓	✓	✓
γ14	G	∅	✓		✓
γ15	N	∅	✓		
γ16	Q	H, N			✓
γ17	I	V, L			✓
γ18	G	A	✓		
γ19	x	F, M, S, I, Q, K, A, L			
γ20	E	F, A, Q	✓		
γ21	F	L	✓		
γ22	W	∅			
γ23	K	S, Q, R	✓		
γ24	Q	S, K, R	✓		
γ25	L	M			
γ26	C	A, V, I		✓	
γ27	x	L, A, K, D, Q, M			
γ28	E	∅	✓		
γ29	H	∅	✓		✓
γ30	G	A			
γ31	I	∅			
γ32	S	G, N, D, A		✓	
γ33	P	T, E, Q, K, N			
γ34	E	R, D, Q, S	✓		
γ35	G	∅			
γ36	I	L, V, R, Q, T, N, D			✓
γ37	L	S, T, V			✓
γ38	E	Q, T, V	✓		✓
γ39	D	L, H, S, E, P	✓		✓
γ40	F	P, S, Y, W, -			✓
γ41	A	D, K	✓		✓
γ42	T	S, A, Q, L, N, -			✓
γ43	E	Y, L, N, Q, D, P, G, -	✓		✓
γ44	G	R, M, A, T, N, Q, -			✓
γ45	x	G, T, D, E, V, Q, L, N			✓
γ46	D	∅	✓		✓

γ47	R	D, K	✓		✓
γ48	K	T	✓	✓	✓
γ49	D	K, E	✓		✓
γ50	V	P, L, A	✓		✓
γ51	F	L			
γ52	F	∅			✓
γ53	Y	R	✓		
γ54	Q	E			✓
γ55	A	N, S			
γ56	D	S	✓		
γ57	D	R	✓		
γ58	E	N, D, R, T, Q	✓		✓
γ59	H	K, R, Q	✓		
γ60	Y	F, H			✓
γ61	I	T, V			
γ62	P	∅			
γ63	R	∅	✓		
γ64	A	S			
γ65	I	V, L, C	✓		
γ66	L	M			
γ67	I	M, V, F, L			
γ68	D	∅	✓		✓
γ69	L	S, M			✓
γ70	E	∅	✓		✓
γ71	P	D	✓		
γ72	R	S, G	✓		✓
γ73	V	∅			
γ74	I	V, L	✓		
γ75	N	A, K, H, Q			
γ76	x	S, G, N, V, R, D, A, Y, T	✓		
γ77	I	V, M	✓		
γ78	Q	E, M, L, V, K			
γ79	N	S, T, Q, K, G			
γ80	S	N, P, D, G		✓	
γ81	x	P, E, A, D, S, Q, T, N, V	✓		
γ82	Y	F, L			
γ83	S	R, G, K, A			
γ84	x	G, N, S, T, K	✓	✓	
γ85	L	F, I	✓		
γ86	Y	F	✓		
γ87	N	D	✓		
γ88	P	T, H, Q	✓		
γ89	E	R, D	✓		
γ90	N	∅	✓		
γ91	I	T, Y, F, V	✓		
γ92	F	W, Y, L	✓		
γ93	I	V, M, L, Y			

γ94	S	A, D, T, G	✓		
γ95	K	S, D, R, E, Q, T	✓		
γ96	H	D, N, Q, E			
γ97	G	R			
γ98	G	A, I			
γ99	G	S	✓		
γ100	A	∅	✓		
γ101	G	∅			✓
γ102	N	∅			✓
γ103	N	S, V	✓		✓
γ104	W	∅	✓		
γ105	A	G	✓		
γ106	S	C, N, V, A, Y, R, Q,			
γ107	G	∅	✓		
γ108	Y	F			
γ109	S	H, C, A, T, D, Q			
γ110	Q	I, A, H, E, D	✓		
γ111	G	A			
γ112	E	T, Q, N, K			
γ113	K	R, E, V, G, A, Q, M	✓	✓	
γ114	V	N, L, I, Y	✓		
γ115	Q	F, E, V, H, D, Y	✓		
γ116	E	D	✓		
γ117	D	K, L, E, T	✓		
γ118	I	L, V			
γ119	x	L, F, I, M	✓		
γ120	D	N, E	✓		
γ121	M	K, I			
γ122	I	V, L			
γ123	D	I	✓		
γ124	R	K	✓		
γ125	E	∅	✓		
γ126	A	I	✓		
γ127	D	E	✓		
γ128	G	S, N, Y, T			
γ129	S	T, A, C	✓	✓	✓
γ130	D	N, E	✓		✓
γ131	S	N, C	✓	✓	✓
γ132	L	F			✓
γ133	E	D, A	✓		✓
γ134	G	A			
γ135	F	I	✓		
γ136	V	Q, L, M, S, N, I	✓		
γ137	L	F, I, M	✓		
γ138	C	L, T, I	✓		
γ139	H	∅	✓		
γ140	S	∅	✓		✓

γ141	I	V	✓		✓
γ142	A	S	✓		✓
γ143	G	∅			✓
γ144	G	∅			✓
γ145	T	∅	✓		✓
γ146	G	∅	✓		✓
γ147	S	∅			✓
γ148	G	∅			
γ149	M	L, T, V, F, S			
γ150	G	∅			
γ151	S	∅			
γ152	Y	N, L, F			
γ153	L	V, I, M	✓		✓
γ154	L	M			✓
γ155	E	∅	✓		
γ156	R	A, Q, L, K, T	✓		
γ157	L	M, I	✓		✓
γ158	N	C, R, H, S, A			✓
γ159	D	E	✓		
γ160	R	A, H	✓		
γ161	Y	F			✓
γ162	P	S			✓
γ163	K	∅	✓		✓
γ164	K	Q	✓	✓	✓
γ165	L	I, V	✓		✓
γ166	I	V, L			✓
γ167	Q	K, T			
γ168	T	∅	✓		
γ169	Y	F		✓	
γ170	S	∅			
γ171	V	I			✓
γ172	F	L			✓
γ173	P	A	✓		✓
γ174	N	A, L, D, S, Y, E	✓		✓
γ175	Q	S, E, L, T, R, G	✓		
γ176	x	Y, Q, T, S, H, N, M, D, -	✓		
γ177	E	A, M, S, T, -	✓		
γ178	x	T, M, I, S, F, V, -	✓		
γ179	S	T, A, -	✓		
γ180	D	E	✓		
γ181	V	G	✓		✓
γ182	V	∅			
γ183	V	∅	✓		
γ184	Q	H, N			✓
γ185	P	S			
γ186	Y	∅	✓	✓	
γ187	N	∅			

γ188	S	C, T, W	✓		
γ189	L	I, V, M			
γ190	L	∅	✓		
γ191	T	A, S	✓		
γ192	L	T, M			
γ193	K	R, Q	✓	✓	
γ194	R	∅	✓		
γ195	L	∅	✓		
γ196	T	A, I, V			✓
γ197	Q	L, E, N, T, K			✓
γ198	N	A, H, D, C, F			✓
γ199	A	P, S	✓		✓
γ200	D	∅	✓		✓
γ201	C	A, S, H, M	✓		✓
γ202	V	T			✓
γ203	V	T			
γ204	V	∅	✓		
γ205	L	F			
γ206	D	∅	✓		
γ207	N	∅	✓		✓
γ208	T	A, N			
γ209	A	S, T			
γ210	L	∅			✓
γ211	N	T, L, H, A, S, D, E, G			
γ212	R	N, K, L, H	✓		
γ213	I	L	✓		
γ214	A	S, V			
γ215	x	V, T, A, C, G, Q, S	✓		
γ216	D	E, N, G, K	✓		
γ217	R	K, V	✓		
γ218	L	F			
γ219	H	K, R, Y			
γ220	I	L, T, V, N			
γ221	x	Q, P, D, H, L, T, E, A, S	✓		
γ222	N	I, Q, T, E, K, D			
γ223	P	I	✓		
γ224	T	S, D			
γ225	F	V, I, L	✓		✓
γ226	S	A, Q, D, H, E, T, V, F			✓
γ227	Q	H, T	✓		
γ228	x	I, T, Q			✓
γ229	N	∅	✓		✓
γ230	S	Q, A, N, R	✓		
γ231	L	I	✓		
γ232	V	I, A			✓
γ233	S	A			
γ234	T	M, R	✓		

γ235	V	I	✓		
γ236	M	I			
γ237	S	A	✓		
γ238	A	L, S, T, V			
γ239	S	C, V	✓		
γ240	T	∅	✓		
γ241	T	A, N, S			
γ242	T	P, S			✓
γ243	L	I, M, Y	✓		✓
γ244	R	∅	✓		✓
γ245	Y	F			✓
γ246	P	N			✓
γ247	G	S, A			✓
γ248	Y	A	✓		✓
γ249	M	S			✓
γ250	N	H, C, Y	✓		✓
γ251	N	P, Q, S, T	✓		✓
γ252	D	N, S	✓		✓
γ253	L	M, I	✓		✓
γ254	V	I, R, L, S	✓		✓
γ255	G	S, Y, E	✓		✓
γ256	L	I, –			✓
γ257	I	L, T, M, V, Y, –	✓		✓
γ258	A	S, L	✓		✓
γ259	S	G, T, D, P	✓		✓
γ260	L	∅			✓
γ261	I	V, A			✓
γ262	P	∅	✓		✓
γ263	T	S, L, F			✓
γ264	P	∅			✓
γ265	R	P, Q, K, E	✓		✓
γ266	C	L, M, S			✓
γ267	H	∅	✓		
γ268	F	∅			✓
γ269	L	I			
γ270	M	L, Q, V, S	✓		
γ271	T	A, P, S	✓		
γ272	G	S, A	✓		
γ273	Y	C, F, I	✓		
γ274	T	S	✓		
γ275	P	∅	✓		
γ276	L	F, I, V	✓		
γ277	T	S, M, V			
γ278	x	T, I, V, L, S, D, N, G, A	✓		
γ279	D	E, Q, Y, P	✓		
γ280	Q	Y, N, T, E, A, R, S, C	✓	✓	
γ281	x	I, V, C, G, A, H, K, Q, S,	✓		

γ282	V	A, I, L, E, D, T, –	✓		
γ283	S	A, N, K, I, T, V	✓		
γ284	S	A, M, N, T, V, F, R		✓	
γ285	V	I, H, T	✓		
γ286	R	K, Q	✓		
γ287	K	G	✓	✓	
γ288	T	H	✓		✓
γ289	T	S	✓		
γ290	V	S, T			✓
γ291	L	A, M, Y			
γ292	D	∅	✓		✓
γ293	V	∅			✓
γ294	M	T			
γ295	R	L	✓	✓	
γ296	R	D, F	✓		✓
γ297	L	∅	✓		
γ298	L	V			
γ299	Q	D, K, L	✓		
γ300	P	T	✓		
γ301	K	S, T	✓	✓	
γ302	N	S			
γ303	I	V, M, R, Q, S, L	✓		
γ304	M	L	✓		
γ305	V	A	✓		
γ306	S	P	✓	✓	
γ307	T	S, A, G, I, V, C		✓	
γ308	x	A, P, T, N, S, H, Y, G, L			
γ309	x	R, T, A, P, I, L, M, S	✓		
γ310	K	D, R, S, N, T	✓		
γ311	x	R, E, K, D, V, –	✓		
γ312	x	Q, A, I, R, S, –			
γ313	x	T, K, A, N, P, S, –			
γ314	N	K, Q, R, S, H	✓		
γ315	x	G, H, A, S, D, P, Q			
γ316	x	C, K, A, N, M, T, Q, S			
γ317	Y	F, M	✓		✓
γ318	I	L, M, F, V			
γ319	S	A, N	✓		✓
γ320	I	A, L, M, V, C			✓
γ321	L	Y, M			✓
γ322	N	D, G, M	✓		✓
γ323	I	V, F, T			✓
γ324	I	L			
γ325	Q	I, R, S			✓
γ326	G	∅			
γ327	E	D, N, Q	✓		✓
γ328	V	A, I			✓

γ329	D	A, E	✓		✓
γ330	P	A, H			✓
γ331	T	S, A, R	✓		✓
γ332	Q	D, E, I	✓		✓
γ333	V	I, M			✓
γ334	H	Q, S, T			✓
γ335	K	E, R, A	✓	✓	✓
γ336	S	A, E	✓	✓	✓
γ337	L	M, Q			✓
γ338	Q	L, N, T	✓		✓
γ339	R	K, V	✓		✓
γ340	I	L, D			✓
γ341	R	Q, F, M	✓		✓
γ342	E	Q, A, D	✓		✓
γ343	R	I, –	✓		
γ344	K	R, E, Q, –	✓	✓	✓
γ345	L	M, R, N, Y, Q			✓
γ346	A	V, I, L, P			✓
γ347	N	S, K, G, P			✓
γ348	F	∅	✓		✓
γ349	I	P, T, Y	✓		✓
γ350	P	E, D, M, N, R, S	✓		✓
γ351	W	L			✓
γ352	G	A, K, N, S, T			✓
γ353	P	S, –			✓
γ354	A	T, S, –	✓		✓
γ355	S	A, N, P			✓
γ356	I	L, M, V			✓
γ357	Q	H, R			✓
γ358	V	M			✓
γ359	A	M, N, T	✓		✓
γ360	L	H, I			✓
γ361	S	A, T, G, P			✓
γ362	K	P, R	✓		✓
γ363	K	S, L, Q, R, T	✓	✓	✓
γ364	S	R	✓	✓	✓
γ365	P	G			✓
γ366	Y	F, M		✓	✓
γ367	I	L, V, G			
γ368	Q	P, E, D, K, R, S, A	✓		
γ369	T	S, N, P, L, C, G	✓		
γ370	S	E, Q, N, T, P, G, A			
γ371	H	N, Y	✓		
γ372	R	K, E	✓		
γ373	V	∅			
γ374	S	R	✓		
γ375	G	A			

γ376	L	M, V	✓		
γ377	M	L	✓		
γ378	L	M			
γ379	A	N, S	✓		
γ380	N	S	✓		
γ381	H	M, S			
γ382	T	S			
γ383	S	G, T			
γ384	I	V, M			
γ385	S	R, A, H, V, C		✓	
γ386	S	H, T, N, P	✓		
γ387	L	I, V	✓		
γ388	F	L			
γ389	E	K, S, D, N, G	✓		
γ390	R	K, S, V, N	✓	✓	
γ391	x	T, C, I, A, L, S, V, M	✓	✓	
γ392	L	C, I, Y			
γ393	x	R, S, D, Q, A, N, H, V, K	✓		
γ394	Q	A, D, K, N, T			
γ395	Y	F			
γ396	D	E, K, R	✓		
γ397	K	R, I, M	✓	✓	
γ398	L	F, M, V			
γ399	R	F, M, W	✓		
γ400	K	N, R, S, A, E	✓	✓	
γ401	R	K, N	✓		
γ402	x	N, Q, E, G, R, K, D	✓		
γ403	A	∅			
γ404	F	Y			
γ405	L	I, M			
γ406	D	E, N, Q, T	✓		
γ407	Q	N, A, K, T	✓		
γ408	Y	F			
γ409	R	K, Q, N, E, C	✓		
γ410	K	R, Q, D, V	✓	✓	
γ411	E	F, T, V, G, I	✓		
γ412	x	D, P, A, K, S	✓		
γ413	M	I, P, L, N, R, S	✓		
γ414	F	∅			
γ415	K	A, E, Q, S, –	✓	✓	
γ416	D	S, E, N, –	✓		
γ417	N	D, S, G, L, V	✓		
γ418	L	F, Q			
γ419	D	E, S, N, T	✓		
γ420	E	M	✓		
γ421	F	M, L	✓		
γ422	D	A, E, H	✓		

γ423	E	D, L, T, S, R, C, I	✓	✓	
γ424	S	A	✓	✓	
γ425	R	K, D, M	✓		
γ426	E	D, A, H, R	✓		
γ427	V	I, T, C	✓		
γ428	V	I, A, C	✓		
γ429	Q	E, K, D, M, A, V, H			
γ430	x	S, Q, D, E, C, N	✓		
γ431	L	∅	✓		✓
γ432	I	V, A, M, L, C, Q			
γ433	D	E, N, Q, S, G	✓		
γ434	E	D, V	✓		✓
γ435	Y	∅	✓		✓
γ436	K	V, L, A, R, E, H	✓		✓
γ437	A	Q, R	✓		✓
γ438	A	C, L, V	✓		✓
γ439	E	T, V	✓		✓
γ440	Q	D, R, G, S, E, K, N	✓		✓