

UβTN	Consensus	Alternate amino acids	Mutations	Modification	Interaction
β1	M	∅	✓		
β2	R	K	✓		
β3	E	∅	✓		✓
β4	I	∅	✓		✓
β5	V	L, I	✓		
β6	H	L, C, T, N	✓	✓	✓
β7	I	L, T, V, C	✓	✓	
β8	Q	S	✓		
β9	x	A, I, T, G, V	✓	✓	
β10	G	∅	✓		
β11	Q	G, S			✓
β12	C	A, G	✓	✓	✓
β13	G	∅	✓		
β14	N	∅	✓		
β15	Q	A, K	✓		✓
β16	I	V			
β17	G	∅	✓		✓
β18	A	S, T, G, Q, D, T, Y, R	✓		
β19	K	A, C, S	✓	✓	✓
β20	F	Y			✓
β21	W	∅	✓		
β22	E	S, Q, H	✓		✓
β23	V	I, T, M, S, Y, E, N, A, R	✓		✓
β24	I	V, L	✓		
β25	x	S, G, A, C, L, N	✓	✓	
β26	D	G, E, T, H, E, K, Q, F, L, A	✓		✓
β27	E	∅	✓		✓
β28	H	∅	✓		
β29	G	A, Q	✓		
β30	I	V, L	✓		
β31	D	Q, W, E	✓		✓
β32	P	A, Q, H, F, S, G, L, C, P, Y, T, K	✓		✓
β33	T	S, A, N, D, Q, I	✓	✓	
β34	G	S	✓		
β35	X	T, S, A, Q, N, G, R, K, I, V, Y, L,	✓	✓	✓
β36	Y	D, F, S, R, H	✓	✓	
β37	X	H, Q, Y, N, V, A, S, T, R, C, K,	✓		
β38	G	K, T, R	✓		
β39	D	N, T, H, A, E, M, G	✓		
β40	S	D, T, N, A	✓	✓	
β41	D	E, A, H, P, G	✓		
β42	L	A, I, T, Q, E, H, S, F	✓		

β43	Q	I	✓		
β44	L	R, H, K	✓		
β45	E	D, Q	✓		
β46	R	N, K, Q	✓	✓	
β47	I	V, M, L	✓		
β48	N	S, D, T, G	✓	✓	
β49	V	S	✓		
β50	Y	F, H	✓	✓	✓
β51	Y	F, H	✓	✓	
β52	N	Q, T, K, D, H	✓		✓
β53	E	Q, A	✓		
β54	A	S, T, D, I, M, Q	✓		✓
β55	S	T, A, G, C, E, K, N, Y	✓	✓	✓
β56	G	S, C, Q, R, T, N, A, D	✓		✓
β57	G	N, S, A, H, K, R, D, Q	✓		✓
β58	R	K, N	✓	✓	
β59	Y	F, I, W, H		✓	
β60	V	C, Y, K	✓		
β61	P	A, P	✓		
β62	R	I	✓		
β63	A	S, T	✓		
β64	V	I, C, A, L, M	✓		
β65	L	M, Q, N	✓		
β66	M	V, I, L	✓		
β67	D	∅	✓		
β68	L	T, G	✓		
β69	E	D	✓		✓
β70	P	A	✓		
β71	G	A, E, S, N	✓		✓
β72	T	V, L, S	✓	✓	✓
β73	M	V, I, L	✓		✓
β74	D	E, N, Q, F	✓		✓
β75	S	A, L, Y, R, Q	✓	✓	✓
β76	V	I, L	✓		✓
β77	R	H, K, N, Q	✓		✓
β78	S	A, T, Q, N, G	✓	✓	✓
β79	G	S, T, –	✓		✓
β80	P	A, D, E, K, T, Q, S, R, –	✓		✓
β81	F	S, Y, I, L, V, N	✓		✓
β82	G	A, R, S	✓		
β83	Q	H, V, A, E, N, K, S, T, G	✓		
β84	I	L, V, T	✓		
β85	F	Y	✓		

β86	R	Q, N, D, H, K	✓		
β87	P	S	✓		
β88	D	N, E	✓		
β89	N	S, C, T	✓		
β90	F	Y, I, A, L	✓		
β91	V	I	✓		
β92	F	Y, H, S, Q, A, I	✓		
β93	G	D, A	✓		
β94	Q	N, S, E	✓		✓
β95	S	T, C, W, E, S, D	✓	✓	✓
β96	G	S, P	✓		✓
β97	A	∅	✓		✓
β98	G	A, E, S	✓		
β99	N	∅			✓
β100	N	I, V, C	✓		✓
β101	W	F	✓		✓
β102	A	G, S	✓		✓
β103	K	R, I	✓	✓	✓
β104	G	∅	✓		✓
β105	H	R, Y	✓	✓	✓
β106	Y	Q, H, N	✓	✓	✓
β107	T	E, I, –	✓	✓	✓
β108	E	D, Q, L, –	✓		✓
β109	G	F	✓		✓
β110	A	Y, P, V	✓		✓
β111	E	A, Q	✓		✓
β112	L	I, Y	✓		✓
β113	I	V, M, A, T, L, Q	✓		✓
β114	D	E, Q	✓		✓
β115	S	A, N, Q, L, K, P, E	✓	✓	✓
β116	V	∅	✓		✓
β117	L	M, V, I, K	✓		✓
β118	D	E, S	✓		
β119	V	Q, N, T, I	✓		✓
β120	V	I, L, T			
β121	R	∅	✓		
β122	K	H, R, Q, I	✓	✓	
β123	E	Q, L	✓		✓
β124	A	S, C, V	✓	✓	
β125	E	∅	✓		
β126	N	S, G, H, E, I, K, A, N	✓	✓	✓
β127	C	T, S, V, A	✓	✓	✓
β128	D	E	✓		✓

β129	C	S, Q, A	✓		✓
β130	L	F, M			✓
β131	Q	E	✓		✓
β132	G	∅	✓		✓
β133	F	∅	✓		✓
β134	Q	∅	✓		✓
β135	I	L, M, V, F	✓		✓
β136	X	T, C, V, A, L, I, M	✓	✓	✓
β137	H	R	✓		
β138	S	∅	✓	✓	
β139	L	I	✓		
β140	G	∅	✓		
β141	G	∅	✓		
β142	G	∅	✓		
β143	T	∅	✓	✓	
β144	G	∅	✓		
β145	S	A	✓	✓	
β146	G	∅	✓		
β147	M	L	✓		
β148	G	T	✓		
β149	T	S, A, D	✓	✓	
β150	L	V	✓		
β151	L	I	✓		✓
β152	I	L, M	✓		✓
β153	S	Q, K, E, G, N	✓		✓
β154	K	R, S, A	✓	✓	✓
β155	I	V, L, M	✓		✓
β156	R	K, V	✓	✓	✓
β157	E	∅	✓		✓
β158	E	K, Q	✓		✓
β159	Y	F	✓	✓	✓
β160	P	S	✓		✓
β161	D	N	✓		✓
β162	R	Q, N, K	✓		✓
β163	M	I, L, T	✓		✓
β164	M	L, I, T, F	✓		✓
β165	X	N, M, S, C, A, L, T, E, Q	✓		✓
β166	T	S, N, A	✓	✓	✓
β167	F	Y, C	✓		✓
β168	S	C, V	✓	✓	✓
β169	V	I, T	✓		✓
β170	X	V, M, L, A, F, I	✓		
β171	P	∅	✓		

β172	S	A	✓	✓	
β173	P	S, A, T, V, L	✓		✓
β174	K	Q, N	✓	✓	✓
β175	V	T, S, I, M	✓		✓
β176	S	A, C	✓		✓
β177	D	E, Q	✓		✓
β178	T	V, C, K, N	✓		✓
β179	V	I	✓		✓
β180	V	I	✓		✓
β181	E	A	✓		✓
β182	P	S	✓		✓
β183	Y	∅	✓		✓
β184	N	∅	✓		✓
β185	A	C, T	✓		✓
β186	T	V, L, I	✓		✓
β187	L	∅	✓		
β188	S	∅	✓		
β189	V	I, M, L, T	✓		
β190	H	P, N, Y	✓		✓
β191	Q	G, A, H, N	✓		✓
β192	L	∅			✓
β193	V	I, L, M	✓		✓
β194	E	V, Q, N, D	✓		✓
β195	N	H, D, Y, Q	✓		✓
β196	A	T, S, Q, CV	✓		✓
β197	D	H	✓		✓
β198	E	S, A, Q, I, L	✓		✓
β199	X	T, C, N, V	✓		✓
β200	F	M, Y, C, Q	✓		✓
β201	X	C, S, V, A	✓		
β202	I	L, Y	✓		✓
β203	D	∅	✓		✓
β204	N	∅	✓		
β205	E	D, K	✓		✓
β206	A	S	✓		✓
β207	L	I	✓		✓
β208	Y	S, F	✓	✓	✓
β209	D	S, N, Q, G	✓		✓
β210	I	A	✓		✓
β211	C	L, F	✓		✓
β212	F	Y, S, L, I, M, Q, A, K, N, V	✓		✓
β213	R	Q, K, N, Y, S	✓		✓
β214	T	S, N, V, D, L	✓		✓

β215	L	I, A	✓		✓
β216	K	R, G	✓	✓	✓
β217	L	V, K, I, M, P	✓		✓
β218	T	A, S, P, C, N, K, E, M, Q, Y	✓	✓	✓
β219	T	S, Q, N, A, H, M	✓	✓	✓
β220	P	K, S, V	✓		✓
β221	T	S, E, G, N	✓	✓	✓
β222	Y	F, L	✓	✓	✓
β223	G	D, Q, K, E, N, A	✓		✓
β224	D	H, T	✓		✓
β225	L	I	✓		✓
β226	N		✓		✓
β227	H	N, Q, Y, S, T, K	✓		✓
β228	L	I, Y	✓		✓
β229	V	I, V, A	✓		✓
β230	S	K, A	✓	✓	✓
β231	A	L, M, S, V, I, K, G	✓		✓
β232	T	V, A, C	✓	✓	✓
β233	M	I, L	✓		✓
β234	S	T	✓		✓
β235	G	C, S	✓		✓
β236	V	I, F, T	✓		✓
β237	T	∅	✓		✓
β238	X	T, V, C, S, A	✓	✓	✓
β239	C	S, T, N, F, Q	✓	✓	✓
β240	L	F, M, Q, W	✓		✓
β241	R	G	✓		✓
β242	S	Y	✓		✓
β243	P	K	✓	✓	✓
β244	G	S	✓	✓	✓
β245	Q	E, L, V, N	✓		✓
β246	L	F, I, V			✓
β247	N	K, Y	✓		✓
β248	S	A, N, T	✓		✓
β249	D	G, T	✓		✓
β250	L	I, M	✓		✓
β251	R	∅	✓		✓
β252	K	∅	✓	✓	✓
β253	L	I, F	✓		✓
β254	A	S, G, N, Y	✓		✓
β255	V	L, T, –	✓		✓
β256	N	–	✓		✓
β257	M	T, L	✓		✓

β258	V	I, T, A	✓		✓
β259	P	G	✓		✓
β260	F	S	✓		✓
β261	P	∅	✓		✓
β262	R	Q	✓		✓
β263	L	∅	✓		✓
β264	H	L	✓		✓
β265	F	∅	✓		✓
β266	F	L	✓		✓
β267	M	I, L, S, T, N	✓		
β268	X	P, V, I, T, A, S	✓		✓
β269	G	S, A	✓		✓
β270	F	Y, L, I, V	✓		✓
β271	A	T	✓		✓
β272	P	∅	✓		✓
β273	L	S, V, I	✓		✓
β274	T	V, L, A, S	✓	✓	✓
β275	S	A, G, T, H	✓	✓	✓
β276	R	T, I, N, K, C, H, Q, K	✓		✓
β277	G	S, A, R, K, E	✓		✓
β278	S	N, G, Q, I, F, A, T	✓	✓	✓
β279	Q	T, A, M, K, I, V, S, Y	✓		✓
β280	Q	M, A, S, D, T	✓	✓	✓
β281	Y	N, F, C	✓	✓	✓
β282	R	S, Q, Y, T, P, A, I	✓		✓
β283	A	S, T, N, H, P, K, –	✓		✓
β284	L	V, I, Y, S, P, F, G	✓		✓
β285	T	S, D, N, K	✓	✓	✓
β286	V	I, F, G	✓		✓
β287	P	A, S, H, K	✓		✓
β288	E	D, Y	✓		
β289	L	I, M	✓		✓
β290	T	L, H, K, V, I	✓	✓	✓
β291	Q	D, A, N, S	✓		
β292	Q	A, L, M	✓		✓
β293	M	A, I, V, L, C	✓		✓
β294	W	F, Y, L, Q	✓		✓
β295	D	N, Q, Y	✓		✓
β296	A	S, P, Y, K, N	✓	✓	✓
β297	K	N, R, H, A	✓	✓	✓
β298	N	S, T	✓		✓
β299	M	T, I, Q, L, S	✓		✓
β300	M	F, T, L, V	✓		✓

β301	C	A, V, T, -	✓	✓	✓
β302	A	S, N, -	✓	✓	✓
β303	X	A, S, C, I, T, H	✓	✓	✓
β304	D	N	✓		✓
β305	P	V, L, W, H, I, F, Y	✓		
β306	R	Q, S, L, N	✓		✓
β307	H	N, R, Y, Q, F, K	✓		✓
β308	G	D	✓		✓
β309	R	C, K	✓		✓
β310	Y	F, L		✓	✓
β311	L	Y, F	✓		✓
β312	T	S, A	✓	✓	✓
β313	A	V, S, C	✓		✓
β314	A	S, C, F, L	✓		✓
β315	A	T, C, L, V, I, G, Y	✓	✓	✓
β316	M	V, I, C, L, Y, A, S, F	✓		✓
β317	F	Y	✓		✓
β318	R	∅	✓	✓	✓
β319	G	∅	✓		✓
β320	R	K, P, Q, S, N	✓		✓
β321	M	E, Q, I, L, V	✓		
β322	S	P, A, T	✓	✓	
β323	T	M, E, P, Y, S, V	✓		
β324	K	L, Q, Y, R	✓	✓	
β325	E	K, D	✓		✓
β326	V	I, D, F	✓		
β327	D	E, L, A, F	✓		
β328	E	Q, N, K, D, T	✓		
β329	Q	E, C, A, L	✓		✓
β330	M	I, F, L, V	✓		✓
β331	L	I, M, V, S, W, T, Q, R, H, Y, F	✓		✓
β332	N	A, S, K, M, D, G	✓	✓	
β333	V	I, A, M, T, F, S, Q	✓		✓
β334	Q	R, E, S, H	✓		✓
β335	N	S, T, A, D, Q, I	✓	✓	✓
β336	K	E, R	✓	✓	✓
β337	N	Y, D, T	✓		✓
β338	S	Q, I, P, N	✓	✓	✓
β339	S	A, N, D, Y, E, -	✓	✓	✓
β340	Y	F, C, S, R, H, E, N, -	✓	✓	✓
β341	F	M, -	✓		✓
β342	V	A, T, I, -	✓		✓
β343	E	D, Y, Q, P	✓		✓

β344	W	Y, S, Q	✓		✓
β345	I	L, F	✓		✓
β346	P	∅	✓		✓
β347	N	H, D, G, K	✓		✓
β348	N	S	✓		✓
β349	V	C, I, M, L, S, T, Q	✓		✓
β350	K	N, L, S, Q	✓	✓	✓
β351	T	V, A, S, K, L, H, Y	✓		✓
β352	S	A, Y, D, T	✓		✓
β353	V	Q, L, I, K, M	✓		✓
β354	C	∅	✓	✓	✓
β355	D	S, V, N, G, E, T	✓		✓
β356	I	M, V, Q			✓
β357	P	A, S, T	✓		✓
β358	P	Q, L, S, F	✓		✓
β359	R	K, Q, N, I, L, E, T, V	✓		✓
β360	G	D, E, S, N, Q, R	✓		✓
β361	L	V, I, N, Q, F	✓		✓
β362	K	S, A, E, D, P, L, T, R, N	✓	✓	✓
β363	N	V, R, N, A, L, T	✓		✓
β364	S	A	✓	✓	
β365	A	V, S, G, C	✓		
β366	T	V, S, L	✓	✓	✓
β367	F	L, K	✓		✓
β368	I	V, L	✓		✓
β369	G	A, E, C	✓		✓
β370	N	∅			✓
β371	S	N, T, G	✓	✓	✓
β372	T	A	✓		✓
β373	A	S	✓		
β374	I	V	✓		✓
β375	Q	S, T, K	✓		✓
β376	E	S, D, T	✓		✓
β377	M	L, V, I, P	✓		✓
β378	F	L	✓		✓
β379	K	T, N, R, I, M, Q	✓	✓	✓
β380	R	C, E	✓	✓	✓
β381	V	I, L, S, Q	✓		
β382	S	G, A, N, H, L	✓	✓	✓
β383	E	D, A, T, N, K, Q	✓		✓
β384	Q	H, K, A, N			✓
β385	F	Y, S			✓
β386	T	S, K, R, A, M	✓	✓	✓

β387	A	T, S, G	✓		
β388	M	L	✓		
β389	F	Y, L	✓		✓
β390	R	K, Q	✓	✓	✓
β391	R	N, K	✓		✓
β392	K	R	✓	✓	✓
β393	A	T	✓		✓
β394	F	H	✓		✓
β395	L	V, T	✓		✓
β396	H	S, Q	✓		✓
β397	W	Q, Y	✓		✓
β398	Y	F, G	✓		✓
β399	T	V, L, F	✓		✓
β400	G	S, D, N, –	✓		✓
β401	E	D, K, Q, –	✓		✓
β402	G	–	✓		✓
β403	M	T	✓		✓
β404	D	E	✓		✓
β405	E	I, P	✓		✓
β406	M	L, N, S, Q, S, I	✓		✓
β407	E	∅	✓		✓
β408	F	L	✓		✓
β409	T	S, G, I, N, A, K, Q	✓	✓	✓
β410	E	D	✓		✓
β411	A	∅	✓		✓
β412	E	Q, H	✓		✓
β413	S	N, Q, A			✓
β414	N	D, Y, E, K	✓		✓
β415	M	I, L, V	✓		✓
β416	N	Q, H, M, S, L	✓		✓
β417	D	A	✓		✓
β418	L	I	✓		✓
β419	V	I, M, L, C	✓		✓
β420	S	A, D, I	✓	✓	✓
β421	E	L, D	✓		✓
β422	Y	F	✓	✓	✓
β423	Q	M, N, R, D	✓		✓
β424	Q	C, S	✓		✓
β425	Y	F, C, S, H	✓	✓	✓
β426	Q	A, E	✓		✓
β427	D	E, C, K, N, S, Q	✓		✓
β428	A	V, H, S, M, L, G	✓		✓
β429	T	A, G, S, K, R, V, E, H, F, D	✓	✓	✓

β430	A	V, I, Y, D, S, L	✓		✓
β431	D	E, N, S, V, G, A	✓		✓
β432	X	D, E, L, N, G, Q, S, -	✓		✓
β433	E	G, D, M, Q, A	✓		✓
β434	E	G, A, D, I, V, F, P, Y, -	✓		✓
β435	E	D, A, Y, S, L, G, F, Q, -	✓	✓	✓
β436	E	A, M, F, Y, G, D, P, V, L, I, -	✓	✓	✓
β437	X	E, G, D, Y, F, K, L, V, Q, A, -	✓	✓	✓
β438	E	D, F, L, A, V, Y, G, -	✓	✓	✓
β439	E	H, D, Y, I, N, A, T, V, Q, G, S	✓		✓
β440	E	D, G, Q, A, P, T, N, H, -	✓	✓	✓