Recurrent *TERT* promoter mutations identified in a large-scale study of multiple tumor types are associated with increased *TERT* expression and telomerase activation

Supplementary Tables

Table S1. *TERT* promoter mutations in tumor samples in a Chinese population. Listed below are all mutations identified in 799 tumor samples from Sanger sequencing. The surrounding sequence was used to determine whether or not an ETS binding site was formed (underlined) in the presence of the mutation (red, bold text). ETS binding sites were taken as either: A/TTCCGG (6bp) or A/TTCC (4 bp) (reverse complement: CCGGAA/T (6 bp) or GGAA/T (4 bp)).

Mutation Name	Location (hg19, antisense)	Base change	Distance from *TERT* ATG (bp)	Genomic sequence +/- 10 bp (hg19 assembly, antisense)	Genomic sequence +/- 10 bp with mutation (hg19 assembly, antisense)	Generates ETS binding site?
C250T	chr5:1,295,250	C > T	-146	CCCGACCCCT**C**CCGG GTCCCC	CCCGACCCCT**T**CCGGGT CCCC	Yes, 6 bp
G245A	chr5:1,295,245	G > A	-141	CCCCTCCCGG**G**TCCC CGGCCC	CCCCTCCCGG**A**TCCCCG GCCC	Yes, 4 bp
C242T + C243T	chr5:1,295,242-1,295,243	C > T, C > T	- 138, - 139	CCTCCCGGGT**CC**CCG GCCCAGC	CCTCCCGGGT**TT**CCGGC CCAGC	Yes, 6 bp
C242T + C243T + C250T	chr5:1,295,242-1,295,243 1,295,250	C > T, C > T, C>T	- 138, - 139, - 146	CCCGACCCCT**C**CCGG GT**CC**CCGGCCCAGC	CCCGACCCCT**T**CCGGGT **TT**CCGGCCCAGC	Yes, two 6 bp
C228T	chr5:1,295,228	C > T	- 124	GCCCAGCCCC**C**TCCG GGCCCT	GCCCAGCCCC**T**TCCGGG CCCT	Yes, 6 bp
C228A	chr5:1,295,228	C > A	- 104	GCCCAGCCCC**C**TCCG GGCCCT	GCCCAGCCCC**A**TCCGGG CCCT	Yes, 6 bp
T198G	chr5:1,295,198	T > G	- 94	TCCCCTTCCT**T**TCCGC GGCCC	TCCCCTTCCT**G**TCCGCG GCCC	No

C193T	chr5:1,295,193	C >T	- 89	TTCCTTTCCG**C**GGCC CCGCCC	TTCCTTTCCG**T**GGCCCC GCCC	No
C184T + C190T	chr5:1,295,184, 1,295,190	C > T, C > T	- 80, - 86	CTTTCCGCGG**C**CCCG C**C**CTCTCCTCGC	CTTTCCGCGG**T**CCCGC**T** CTCT CCTCGC	No
A161C	chr5:1,295,161	A > C	- 57	CGCGAGTTTC**A**GGCA GCGCTG	CGCGAGTTTC**C**GGCAGC GCTG	Yes, 6 bp
C158A	chr5:1,295,158	C > A	- 54	GAGTTTCAGG**C**AGCG CTGCGT	GAGTTTCAGG**A**AGCGCT GCGT	Yes, 4 bp
G149T	chr5:1,295,149	G > T	- 45	GCAGCGCTGC**G**TCCT GCTGCG	GCAGCGCTGC**T**TCCTGC TGCG	Yes, 4 bp

Table S2. *TERT* promoter mutations in Chinese patient tumors, organized by tumor type. Urinary tract cancers displayed the largest number of different *TERT* promoter mutations, while most other tumors had only C228T or C250T hotspot somatic mutations (except for CNS tumors which had 1 case of C242T+C243T).

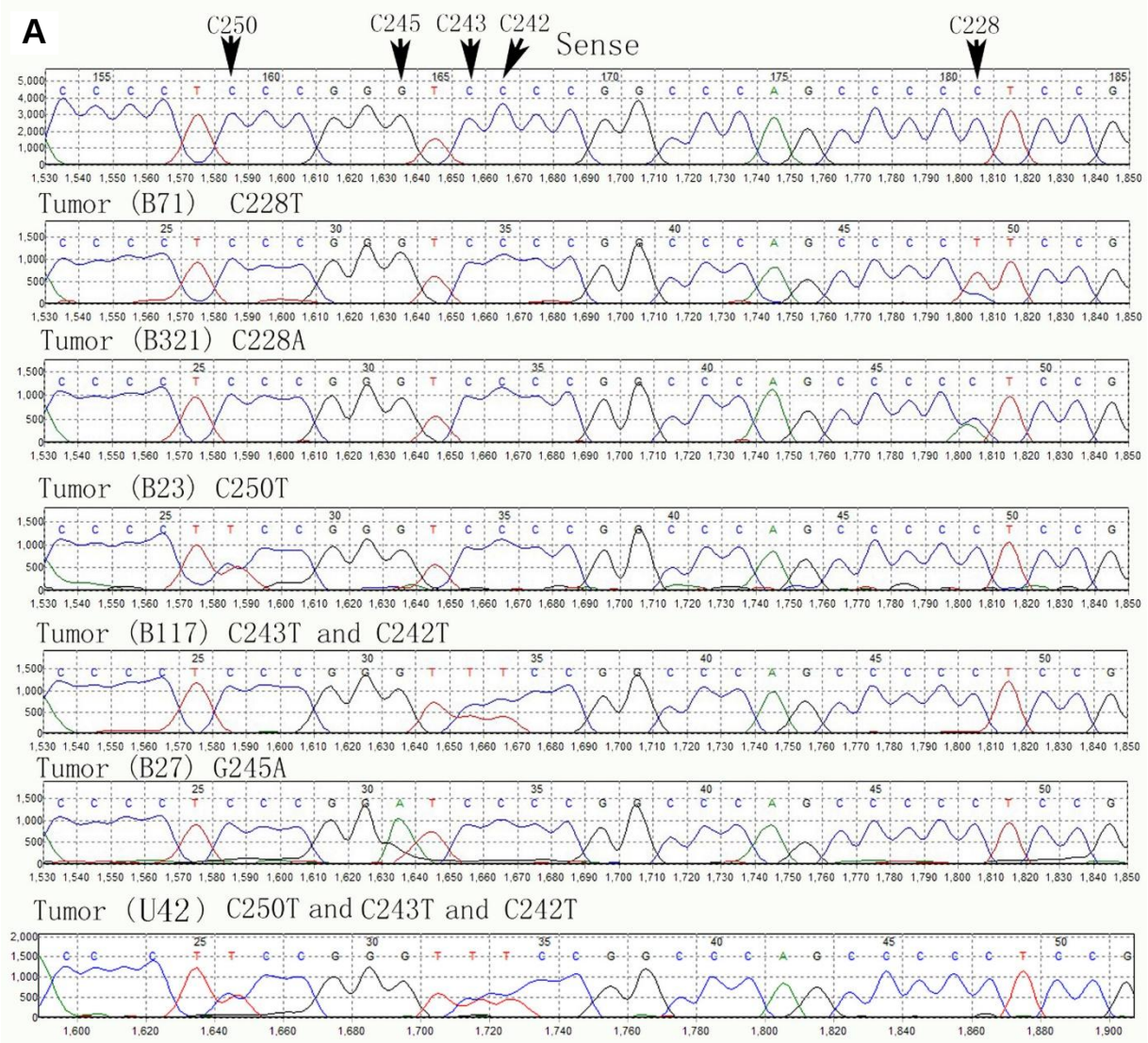
Tumor type	Mutation name	Genomic position	Distance from ATG translation start site (bp)	Base change	No. of mutation tumors (%)
Urinary tract cancers (n=292)	C250T	1,295,250	-146	C>T	42(14.4)
	C228T	1,295,228	-124	C>T	116(39.7)
	C228A	1,295,228	-124	C>A	2(0.7)
	G245A	1,295,245	-141	G>A	1(0.3)
	C242T+C243T	1,295,242 and 1,295,243	-138 and -139	C>T	6(2.1)
	C250T +C242T+C243T	1,295,250, 1,295,242 and 1,295,243	-146, -138 and -139	C>T	1(0.3)
	T198G	1,295,198	-93	T>G	1(0.3)
	C193T	1,295,193	-89	C>T	1(0.3)
	C190T+C184T	1,295,190 and 1,295,184	-86 and -80	C>T	1(0.3)
	A161C	1,295,161	-57	A>C	12(4.1)
	C158A	1,295,158	-54	C>A	3(1.0)
	G149T	1,295,149	-45	G>T	2(0.7)
Diffuse astrocytomas	C228T	1,295,228	-124	C>T	5(12.5)

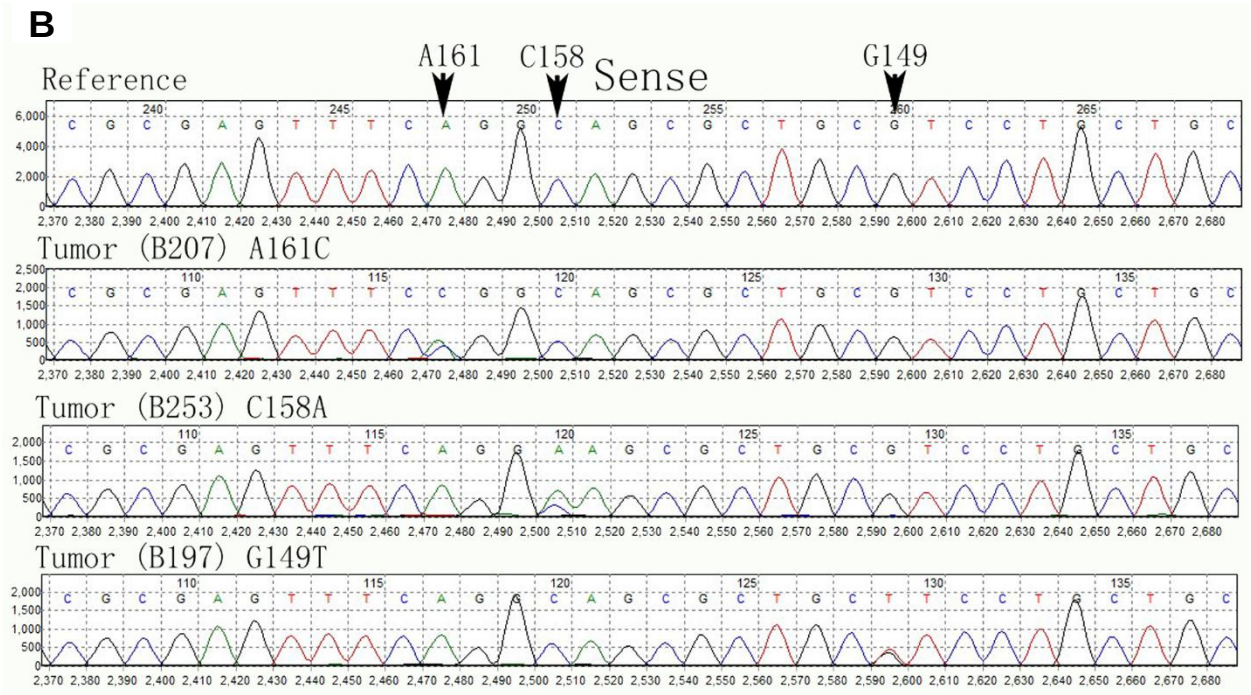
(n=40)	C250T	1,295,250	-146	C>T	2(5.0)
	C242T+C243T	1,295,242 and 1,295,243	-138 and -139	C>T	1(2.5)
Anaplastic astrocytomas	C228T	1,295,228	-124	C>T	4(33.3)
(n=12)	C250T	1,295,250	-146	C>T	0(0.0)
Glioblastoma	C228T	1,295,228	-124	C>T	31(55.4)
(n=56)	C250T	1,295,250	-146	C>T	16(28.6)
Oligodendroglioma	C228T	1,295,228	-124	C>T	6(60.0)
(n=10)	C250T	1,295,250	-146	C>T	1(10.0)
Medulloblastoma	C228T	1,295,228	-124	C>T	1(16.7)
(n=6)	C250T	1,295,250	-146	C>T	1(16.7)
Hepatocellular carcinoma	C228T	1,295,228	-124	C>T	9(25.7)
(n=35)	C250T	1,295,250	-146	C>T	2(5.7)
Gallbladder carcinoma (n=2)	C228T	1,295,228	-124	C>T	1(50.0)

Supplementary Figures

Figure S1. *TERT* promoter mutations identified in tumor samples.

Reference sequence is located on top of each panel. Panels (A) and (B) contain mutations that generate ETS binding sites (A/TTCCGG or A/TCC, reverse complement: CCGGAA/T or GGAA/T). G149T, C158A, A161C, C228T, C228A, C242T+C243T, C242T+C243T+C250T, and C250T all generate de novo ETS binding sites.




B
Reference
A161
C158
Sense
G149
Tumor (B207) A161C
Tumor (B253) C158A
Tumor (B197) G149T

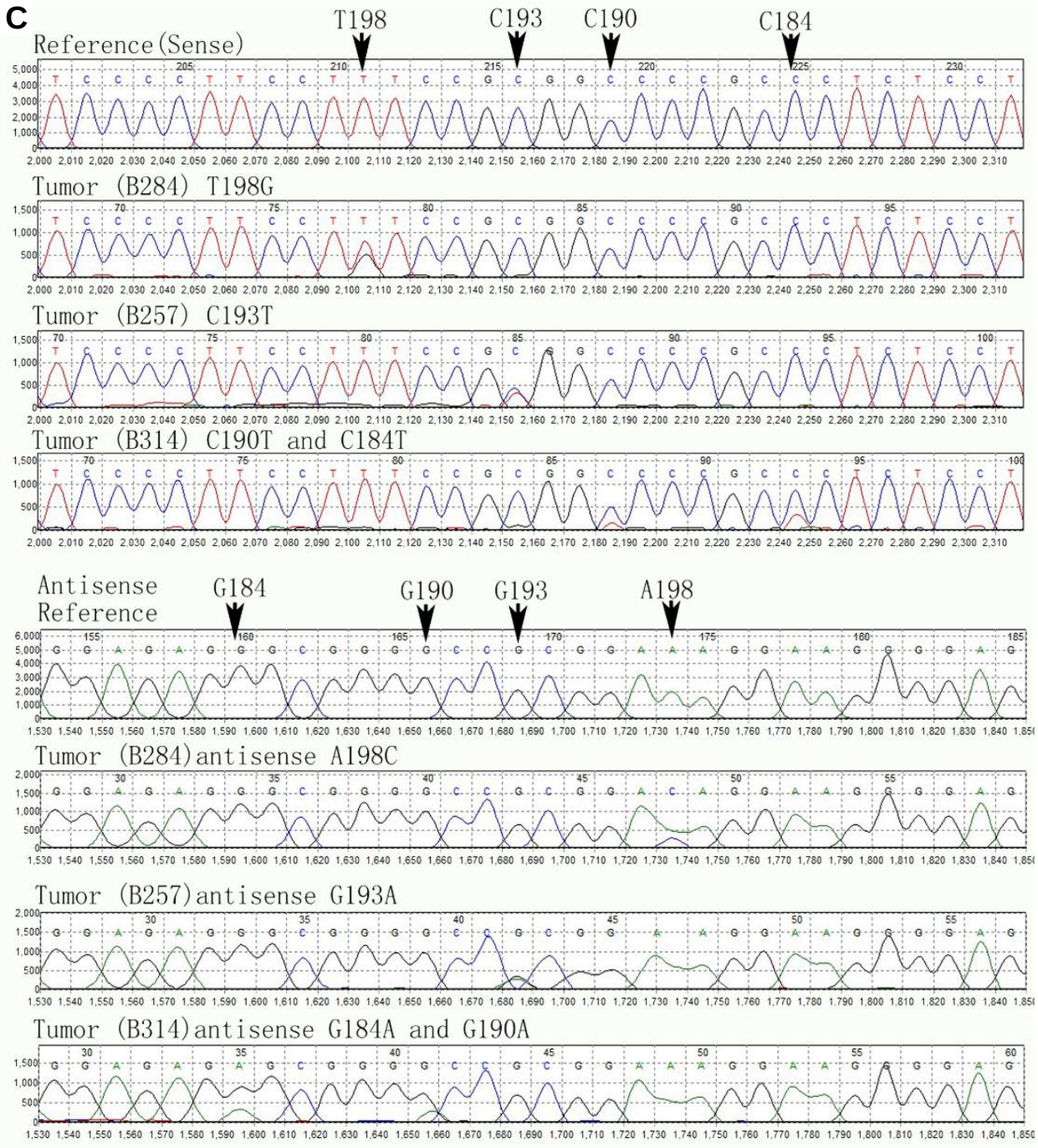

C
T198
C193
C190
C184
Reference(Sense)
Tumor (B284) T198G
Tumor (B257) C193T
Tumor (B314) C190T and C184T
Antisense Reference
G184
G190
G193
A198
Tumor (B284)antisense A198C
Tumor (B257)antisense G193A
Tumor (B314)antisense G184A and G190A

Table S3. Mean Age at Diagnosis Analysis: For patient cohorts with *TERT* promoter mutations and cohort sizes of greater than 50 by tumor type, mean age at diagnosis was analyzed. Unpaired t-test assuming unequal variances was used to compare the mean age at diagnosis of these patient groups with and without *TERT* promoter mutations.

	All cases (*TERT* promoter mutant and WT)		*TERT* promoter mutant cases			*TERT* promoter WT cases			t-test (TERT promoter mutant vs. WT age)
	Age (years)	N	Age (years)	N	% of total cases of this group	Age (years)	N	% of total cases of this group	p value *
Glioma (Grade II-IV)	50.69	121	54.95	66	54.55%	45.56	55	45.45%	**0.0003**
Glioma (Grade IV, GBM)	57.5	56	57.23	47	83.93%	58.9	9	16.07%	0.7680
Glioma (Grade II-III)	44.82	65	49.32	19	29.23%	42.96	46	70.77%	0.0290
Urinary Tract Cancer, All	67.37	292	67.97	188	64.38%	66.29	104	35.62%	1.0428
Urinary Tract Cancer, Infiltrating	68.99	131	69.08	91	69.47%	68.8	40	30.53%	0.1301
Urinary Tract Cancer, Non-invasive	66.05	161	66.93	97	60.25%	64.72	64	39.75%	0.9707

Table S4. Patients evaluated for *TERT* Promoter mutations: Total 799 tumor samples tested, divided by system (CNS, urinary tract, hepatobiliary, gastric, pancreatic, thymic) and glioma samples used for TRAP assay and RT-qPCR

A. CNS tumors: n= 204

Patients evaluated for *TERT* promoter mutations

Sample ID#	Tissue type	Gender	Age (years)	Tumor Type	Grade	*TERT* promoter mutation status
43	FFPE	Male	54	Angiomatous meningioma	I	None
52	FFPE	Female	56	Angiomatous meningioma	I	None
51	FFPE	Female	60	Fibrous meningioma	I	None
1	FFPE	Female	63	Meningioma	I	None
2	FFPE	Female	72	Meningioma	I	None
3	FFPE	Female	55	Meningioma	I	None
4	FFPE	Female	60	Meningioma	I	None
5	FFPE	Male	59	Meningioma	I	None
6	FFPE	Female	48	Meningioma	I	None
7	FFPE	Male	52	Meningioma	I	None
8	FFPE	Female	73	Meningioma	I	None
10	FFPE	Female	39	Meningioma	I	None
11	FFPE	Female	53	Meningioma	I	None
12	FFPE	Male	72	Meningioma	I	None
13	FFPE	Female	39	Meningioma	I	None
14	FFPE	Female	62	Meningioma	I	None
15	FFPE	Female	53	Meningioma	I	None
17	FFPE	Female	54	Meningioma	I	None
20	FFPE	Female	50	Meningioma	I	None
21	FFPE	Female	57	Meningioma	I	None
22	FFPE	Female	46	Meningioma	I	None
23	FFPE	Female	41	Meningioma	I	None
24	FFPE	Female	55	Meningioma	I	None
25	FFPE	Female	58	Meningioma	I	None
28	FFPE	Female	61	Meningioma	I	None
31	FFPE	Female	61	Meningioma	I	None
32	FFPE	Female	43	Meningioma	I	None
33	FFPE	Male	75	Meningioma	I	None

34	FFPE	Female	52	Meningioma	I	None
35	FFPE	Female	62	Meningioma	I	None
36	FFPE	Male	57	Meningioma	I	None
37	FFPE	Female	61	Meningioma	I	None
38	FFPE	Male	71	Meningioma	I	None
39	FFPE	Female	61	Meningioma	I	None
40	FFPE	Female	58	Meningioma	I	None
41	FFPE	Male	36	Meningioma	I	None
44	FFPE	Female	39	Meningioma	I	None
45	FFPE	Male	55	Meningioma	I	None
46	FFPE	Female	61	Meningioma	I	None
47	FFPE	Female	64	Meningioma	I	None
48	FFPE	Female	46	Meningioma	I	None
53	FFPE	Female	54	Meningioma	I	None
54	FFPE	Female	46	Meningioma	I	None
56	FFPE	Female	45	Meningioma	I	None
58	FFPE	Female	47	Meningioma	I	None
59	FFPE	Male	35	Meningioma	I	None
61	FFPE	Male	71	Meningioma	I	None
62	FFPE	Female	20	Meningioma	I	None
63	FFPE	Male	45	Meningioma	I	None
67	FFPE	Female	40	Meningioma	I	None
68	FFPE	Female	61	Meningioma	I	None
72	FFPE	Male	48	Meningioma	I	None
75	FFPE	Female	64	Meningioma	I	None
76	FFPE	Male	62	Meningioma	I	None
77	FFPE	Female	61	Meningioma	I	None
78	FFPE	Male	65	Meningioma	I	None
80	FFPE	Female	69	Meningioma	I	None
81	FFPE	Male	72	Meningioma	I	None
82	FFPE	Male	33	Meningioma	I	None
88	FFPE	Female	39	Meningioma	I	None
90	FFPE	Female	34	Meningioma	I	None
95	FFPE	Male	52	Meningioma	I	None
96	FFPE	Female	75	Meningioma	I	None
98	FFPE	Female	58	Meningioma	I	None
99	FFPE	Male	64	Meningioma	I	None
102	FFPE	Male	61	Meningioma	I	None
104	FFPE	Female	45	Meningioma	I	None
109	FFPE	Male	55	Meningioma	I	None

110	FFPE	Female	50	Meningioma	I	None
111	FFPE	Female	51	Meningioma	I	None
114	FFPE	Female	34	Meningioma	I	None
116	FFPE	Female	56	Meningioma	I	None
26	FFPE	Female	63	Meningothelial meningioma	I	None
115	FFPE	Male	45	Meningothelial meningioma	I	None
165	FFPE	Male	3	Pilocytic Astrocytoma	I	None
214	FFPE	Female	12	Subependymal Giant Cell Astrocytoma	I	None
27	FFPE	Female	58	Atypical meningioma	II	None
29	FFPE	Female	40	Atypical meningioma	II	None
148	FFPE	Female	11	Diffuse Astrocytoma	II	None
118	FFPE	Male	40	Diffuse Astrocytoma	II	None
119	FFPE	Male	51	Diffuse Astrocytoma	II	None
123	FFPE	Female	56	Diffuse Astrocytoma	II	None
127	FFPE	Male	61	Diffuse Astrocytoma	II	None
130	FFPE	Male	48	Diffuse Astrocytoma	II	None
136	FFPE	Female	44	Diffuse Astrocytoma	II	None
142	FFPE	Male	47	Diffuse Astrocytoma	II	None
145	FFPE	Male	39	Diffuse Astrocytoma	II	None
156	FFPE	Male	33	Diffuse Astrocytoma	II	None
157	FFPE	Female	47	Diffuse Astrocytoma	II	C228T
159	FFPE	Female	32	Diffuse Astrocytoma	II	None
160	FFPE	Male	49	Diffuse Astrocytoma	II	None
161	FFPE	Male	38	Diffuse Astrocytoma	II	None
173	FFPE	Female	29	Diffuse Astrocytoma	II	None
177	FFPE	Male	40	Diffuse Astrocytoma	II	None
178	FFPE	Male	15	Diffuse Astrocytoma	II	None
179	FFPE	Male	33	Diffuse Astrocytoma	II	None
207	FFPE	Female	34	Diffuse Astrocytoma	II	None
208	FFPE	Female	49	Diffuse Astrocytoma	II	None
211	FFPE	Male	38	Diffuse Astrocytoma	II	C228T
217	FFPE	Female	45	Diffuse Astrocytoma	II	None
219	FFPE	Male	41	Diffuse Astrocytoma	II	None
225	FFPE	Male	27	Diffuse Astrocytoma	II	None
230	FFPE	Female	25	Diffuse Astrocytoma	II	None
232	FFPE	Male	45	Diffuse Astrocytoma	II	None
126	FFPE	Female	39	Diffuse Astrocytoma	II	None
151	FFPE	Female	61	Diffuse Astrocytoma	II	None
154	FFPE	Male	39	Diffuse Astrocytoma	II	C250T

174	FFPE	Male	78	Diffuse Astrocytoma	Ⅱ	None
175	FFPE	Female	45	Diffuse Astrocytoma	Ⅱ	None
176	FFPE	Male	41	Diffuse Astrocytoma	Ⅱ	C228T
182	FFPE	Female	35	Diffuse Astrocytoma	Ⅱ	C228T
199	FFPE	Female	55	Diffuse Astrocytoma	Ⅱ	None
200	FFPE	Male	51	Diffuse Astrocytoma	Ⅱ	None
222	FFPE	Male	66	Diffuse Astrocytoma	Ⅱ	C250T
150	FFPE	Male	58	Diffuse Astrocytoma (Gemistocytic Astrocytoma)	Ⅱ	C228T
120	FFPE	Female	45	Diffuse Astrocytoma (Gemistocytic Astrocytoma)	Ⅱ	None
183	FFPE	Female	48	Diffuse Astrocytoma (Gemistocytic Astrocytoma)	Ⅱ	None
147	FFPE	Female	40	Diffuse Astrocytoma (Protoplasmic Astrocytoma)	Ⅱ	C242T+C243T
155	FFPE	Male	49	Oligodendroglioma	Ⅱ	C250T
162	FFPE	Male	56	Oligodendroglioma	Ⅱ	C228T
121	FFPE	Male	44	Oligodendroglioma	Ⅱ	None
166	FFPE	Male	57	Oligodendroglioma	Ⅱ	C228T
195	FFPE	Male	53	Oligodendroglioma	Ⅱ	None
122	FFPE	Male	44	Oligodendroglioma	Ⅱ	C228T
190	FFPE	Male	45	Oligodendroglioma	Ⅱ	C228T
149	FFPE	Male	28	Pleomorphic Xanthoastrocytoma	Ⅱ	None
143	FFPE	Male	63	Anaplastic Astrocytoma	Ⅲ	C228T
209	FFPE	Female	14	Anaplastic Astrocytoma	Ⅲ	None
202	FFPE	Male	52	Anaplastic Astrocytoma	Ⅲ	C228T
171	FFPE	Female	48	Anaplastic Astrocytoma	Ⅲ	C228T
180	FFPE	Female	67	Anaplastic Astrocytoma	Ⅲ	None
189	FFPE	Male	44	Anaplastic Astrocytoma	Ⅲ	C228T
197	FFPE	Male	24	Anaplastic Astrocytoma	Ⅲ	None
203	FFPE	Female	54	Anaplastic Astrocytoma	Ⅲ	None
223	FFPE	Female	43	Anaplastic Astrocytoma	Ⅲ	None
226	FFPE	Male	67	Anaplastic Astrocytoma	Ⅲ	None
198	FFPE	Male	45	Anaplastic Astrocytoma	Ⅲ	None
206	FFPE	Male	36	Anaplastic Astrocytoma	Ⅲ	None
91	FFPE	Male	66	Invasive meningioma（malignant meningioma）	Ⅲ	None
60	FFPE	Male	49	Oligodendroglioma	Ⅲ	None
69	FFPE	Male	57	Oligodendroglioma	Ⅲ	C228T
107	FFPE	Female	58	Oligodendroglioma	Ⅲ	C228T

108	FFPE	Female	55	Giant cell Glioblastoma	Ⅳ	C228T
221	FFPE	Female	66	Glioblastoma multiforme	Ⅳ	C228T
218	FFPE	Male	72	Glioblastoma multiforme	Ⅳ	C228T
124	FFPE	Male	55	Glioblastoma multiforme	Ⅳ	C228T
137	FFPE	Male	40	Glioblastoma multiforme	Ⅳ	C228T
146	FFPE	Female	56	Glioblastoma multiforme	Ⅳ	None
134	FFPE	Male	50	Glioblastoma multiforme	Ⅳ	C228T
139	FFPE	Female	51	Glioblastoma multiforme	Ⅳ	C228T
141	FFPE	Male	41	Glioblastoma multiforme	Ⅳ	C250T
164	FFPE	Female	40	Glioblastoma multiforme	Ⅳ	C228T
185	FFPE	Female	61	Glioblastoma multiforme	Ⅳ	C250T
187	FFPE	Male	44	Glioblastoma multiforme	Ⅳ	C228T
188	FFPE	Female	58	Glioblastoma multiforme	Ⅳ	C228T
193	FFPE	Female	65	Glioblastoma multiforme	Ⅳ	C250T
194	FFPE	Female	70	Glioblastoma multiforme	Ⅳ	C228T
213	FFPE	Female	68	Glioblastoma multiforme	Ⅳ	C228T
210	FFPE	Male	60	Glioblastoma multiforme	Ⅳ	C228T
229	FFPE	Female	56	Glioblastoma multiforme	Ⅳ	None
9	FFPE	Male	60	Glioblastoma multiforme	Ⅳ	C228T
19	FFPE	Male	60	Glioblastoma multiforme	Ⅳ	C228T
49	FFPE	Female	52	Glioblastoma multiforme	Ⅳ	C228T
50	FFPE	Female	64	Glioblastoma multiforme	Ⅳ	C228T
57	FFPE	Male	42	Glioblastoma multiforme	Ⅳ	C250T
64	FFPE	Male	51	Glioblastoma multiforme	Ⅳ	C250T
71	FFPE	Male	69	Glioblastoma multiforme	Ⅳ	C228T
73	FFPE	Female	62	Glioblastoma multiforme	Ⅳ	C228T
74	FFPE	Female	33	Glioblastoma multiforme	Ⅳ	None
83	FFPE	Female	40	Glioblastoma multiforme	Ⅳ	C228T
84	FFPE	Male	62	Glioblastoma multiforme	Ⅳ	None
85	FFPE	Female	78	Glioblastoma multiforme	Ⅳ	None
86	FFPE	Male	66	Glioblastoma multiforme	Ⅳ	C228T
89	FFPE	Male	38	Glioblastoma multiforme	Ⅳ	C250T
92	FFPE	Female	62	Glioblastoma multiforme	Ⅳ	C250T
93	FFPE	Female	67	Glioblastoma multiforme	Ⅳ	None
100	FFPE	Female	60	Glioblastoma multiforme	Ⅳ	C228T
106	FFPE	Male	65	Glioblastoma multiforme	Ⅳ	C250T
112	FFPE	Male	38	Glioblastoma multiforme	Ⅳ	None
113	FFPE	Male	55	Glioblastoma multiforme	Ⅳ	C228T
117	FFPE	Male	66	Glioblastoma multiforme	Ⅳ	C228T
131	FFPE	Male	42	Glioblastoma multiforme	Ⅳ	C228T

170	FFPE	Male	44	Glioblastoma multiforme	IV	C228T
227	FFPE	Male	60	Glioblastoma multiforme	IV	C250T
228	FFPE	Female	50	Glioblastoma multiforme	IV	C250T
231	FFPE	Female	62	Glioblastoma multiforme	IV	None
55	FFPE	Female	68	Glioblastoma multiforme	IV	C228T
79	FFPE	Male	72	Glioblastoma multiforme	IV	C228T
94	FFPE	Female	87	Glioblastoma multiforme	IV	C250T
101	FFPE	Male	45	Glioblastoma multiforme	IV	C250T
129	FFPE	Female	51	Glioblastoma multiforme	IV	C228T
138	FFPE	Male	54	Glioblastoma multiforme	IV	C250T
163	FFPE	Female	87	Glioblastoma multiforme	IV	C250T
167	FFPE	Male	54	Glioblastoma multiforme	IV	C250T
196	FFPE	Male	57	Glioblastoma multiforme	IV	C228T
204	FFPE	Female	66	Glioblastoma multiforme	IV	C228T
205	FFPE	Female	78	Glioblastoma multiforme	IV	None
215	FFPE	Male	45	Glioblastoma multiforme	IV	C250T
168	FFPE	Male	50	Medulloblastoma	IV	None
172	FFPE	Male	20	Medulloblastoma	IV	None
192	FFPE	Female	11 months	Medulloblastoma	IV	C228T
212	FFPE	Male	9	Medulloblastoma	IV	None
224	FFPE	Female	4	Medulloblastoma	IV	C250T
133	FFPE	Male	15	Medulloblastoma	IV	None

B. Urinary Tract Cancers: n=292

Patients evaluated for *TERT* promoter mutations

Sample ID#	Tissue type	Gender	Age (years)	Tumor Type	Invasive?	*TERT* promoter mutation status
B7	FFPE	Male	60	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B12	FFPE	Male	73	Urothelial carcinoma of the upper urinary tract	infiltrating	C250T
B14	FFPE	Male	55	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B26	FFPE	Male	79	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B32	FFPE	Male	65	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B72	FFPE	Male	82	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B104	FFPE	Male	73	Urothelial carcinoma of the upper urinary tract(squamous differentiation)	infiltrating	C228T
B114	FFPE	Male	45	Urothelial carcinoma of the upper urinary tract	infiltrating	C242T+C243T
B127	FFPE	Female	76	Urothelial carcinoma of the upper urinary tract (squamous differentiation)	infiltrating	C228T
B131	FFPE	Male	81	Urothelial carcinoma of the upper urinary tract	non-invasive	C250T
B133	FFPE	Male	61	Urothelial carcinoma of the upper urinary tract	non-invasive	None
B140	FFPE	Male	78	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B141	FFPE	Male	61	Urothelial carcinoma of the upper urinary tract	infiltrating	C228A
B142	FFPE	Female	80	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B151	FFPE	Male	69	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B161	FFPE	Female	76	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B162	FFPE	Male	64	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B178	FFPE	Male	62	Urothelial carcinoma of	infiltrating	C250T

				the upper urinary tract		
B200	FFPE	Male	46	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B204	FFPE	Female	57	Urothelial carcinoma of the upper urinary tract	infiltrating	A161C
B208	FFPE	Male	50	Urothelial carcinoma of the upper urinary tract (papillary)	infiltrating	None
B212	FFPE	Male	79	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B220	FFPE	Male	75	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B222	FFPE	Female	70	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B226	FFPE	Female	73	Urothelial carcinoma of the upper urinary tract (squamous differentiation)	infiltrating	C228T
B229	FFPE	Female	86	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B232	FFPE	Male	84	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B234	FFPE	Male	80	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B253	FFPE	Male	72	Urothelial carcinoma of the upper urinary tract	non-invasive	C158A
B265	FFPE	Male	61	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B283	FFPE	Male	60	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B291	FFPE	Male	73	Urothelial carcinoma of the upper urinary tract	infiltrating	G149T
B292	FFPE	Male	73	Urothelial carcinoma of the upper urinary tract	infiltrating	A161C
B293	FFPE	Female	58	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B294	FFPE	Male	64	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B296	FFPE	Female	60	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B298	FFPE	Male	73	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B300	FFPE	Female	72	Urothelial carcinoma of the upper urinary tract	non-invasive	None
B322	FFPE	Male	75	Urothelial carcinoma of	non-invasive	C228T

				the upper urinary tract		
B325	FFPE	Female	68	Urothelial carcinoma of the upper urinary tract	non-invasive	C250T
B333	FFPE	Female	73	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B342	FFPE	Female	68	Urothelial carcinoma of the upper urinary tract	non-invasive	C250T
B351	FFPE	Male	55	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B355	FFPE	Male	59	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B356	FFPE	Male	82	Urothelial carcinoma of the upper urinary tract	non-invasive	C228T
B371	FFPE	Male	56	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B75	FFPE	Male	75	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
B256	FFPE	Male	59	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
U14	FFPE	Female	76	Urothelial carcinoma of the upper urinary tract	infiltrating	C228T
U28	FFPE	Male	76	Urothelial carcinoma of the upper urinary tract	infiltrating	None
U39	FFPE	Female	62	Urothelial carcinoma of the upper urinary tract	infiltrating	None
U10	FFPE	Female	74	Urothelial carcinoma of the upper urinary tract	infiltrating	None
B330	FFPE	Male	62	Bladder urothelial carcinoma	non-invasive	C228T
B258	FFPE	Female	83	Bladder urothelial carcinoma	non-invasive	None
B323	FFPE	Male	58	Bladder urothelial carcinoma	non-invasive	C228T
B332	FFPE	Male	76	Bladder urothelial carcinoma	non-invasive	C250T
B354	FFPE	Female	41	Bladder urothelial carcinoma	non-invasive	C250T
B1	FFPE	Male	70	Bladder urothelial carcinoma	non-invasive	None
B2	FFPE	Male	68	Bladder urothelial carcinoma	infiltrating	None
B3	FFPE	Male	47	Bladder papillary urothelial carcinoma	non-invasive	C228T
B4	FFPE	Male	75	Bladder urothelial carcinoma	non-invasive	C228T

B5	FFPE	Male	59	Bladder urothelial carcinoma	infiltrating	C242T+C243T
B6	FFPE	Female	76	Bladder urothelial carcinoma	infiltrating	C228T
B8	FFPE	Male	84	Bladder urothelial carcinoma	infiltrating	C228T
B9	FFPE	Male	71	Bladder urothelial carcinoma	infiltrating	None
B13	FFPE	Male	82	Bladder urothelial carcinoma	non-invasive	C228T
B15	FFPE	Male	54	Bladder urothelial carcinoma	non-invasive	C228T
B16	FFPE	Male	47	Bladder urothelial carcinoma	infiltrating	C228T
B17	FFPE	Male	77	Bladder urothelial carcinoma	infiltrating	None
B18	FFPE	Male	60	Bladder urothelial carcinoma	infiltrating	C228T
B19	FFPE	Male	53	Bladder urothelial carcinoma	non-invasive	None
B20	FFPE	Male	63	Bladder urothelial carcinoma	non-invasive	C228T
B21	FFPE	Male	56	Bladder urothelial carcinoma	non-invasive	C250T
B23	FFPE	Female	65	Bladder urothelial carcinoma	non-invasive	C250T
B24	FFPE	Male	73	Bladder urothelial carcinoma	non-invasive	None
B25	FFPE	Male	62	Bladder urothelial carcinoma	non-invasive	C228T
B27	FFPE	Male	73	Bladder urothelial carcinoma	infiltrating	G245A
B28	FFPE	Male	78	Bladder urothelial carcinoma	non-invasive	C228T
B29	FFPE	Male	55	Bladder papillary urothelial carcinoma	non-invasive	C228T
B31	FFPE	Male	80	Bladder urothelial carcinoma	infiltrating	C228T
B35	FFPE	Male	57	Bladder urothelial carcinoma	non-invasive	None
B36	FFPE	Female	52	Bladder urothelial carcinoma	non-invasive	C250T
B38	FFPE	Male	65	Bladder papillary urothelial carcinoma	non-invasive	None
B41	FFPE	Male	83	Bladder urothelial	infiltrating	C228T

				carcinoma		
B42	FFPE	Male	71	Bladder urothelial carcinoma	infiltrating	C250T
B43	FFPE	Male	60	Bladder urothelial carcinoma	infiltrating	C228T
B44	FFPE	Female	75	Bladder urothelial carcinoma(squamous differentiation)	infiltrating	C228T
B45	FFPE	Male	70	Bladder urothelial carcinoma	infiltrating	C228T
B46	FFPE	Male	85	Bladder urothelial carcinoma	non-invasive	C250T
B47	FFPE	Male	62	Bladder urothelial carcinoma	infiltrating	None
B48	FFPE	Female	50	Bladder urothelial carcinoma	non-invasive	None
B51	FFPE	Female	54	Bladder urothelial carcinoma	non-invasive	C228T
B54	FFPE	Male	48	Bladder papillary urothelial carcinoma	non-invasive	None
B55	FFPE	Male	83	Bladder urothelial carcinoma(squamous differentiation and nested variant)	infiltrating	C228T
B58	FFPE	Male	84	Bladder urothelial carcinoma	non-invasive	C250T
B60	FFPE	Female	82	Bladder urothelial carcinoma	non-invasive	None
B61	FFPE	Female	54	Bladder urothelial carcinoma	non-invasive	C228T
B62	FFPE	Male	57	Bladder urothelial carcinoma	non-invasive	C250T
B63	FFPE	Male	53	Bladder urothelial carcinoma	non-invasive	None
B64	FFPE	Male	77	Bladder papillary urothelial carcinoma	non-invasive	C228T
B66	FFPE	Male	84	Bladder urothelial carcinoma	infiltrating	C250T
B67	FFPE	Male	50	Bladder papillary urothelial carcinoma	non-invasive	C228T
B68	FFPE	Male	55	Bladder urothelial carcinoma	infiltrating	None
B70	FFPE	Male	37	Bladder urothelial carcinoma	non-invasive	None
B71	FFPE	Male	62	Bladder urothelial	non-invasive	C228T

				carcinoma		
B74	FFPE	Male	42	Bladder urothelial carcinoma	non-invasive	None
B77	FFPE	Female	53	Bladder urothelial carcinoma	infiltrating	C250T
B79	FFPE	Male	80	Bladder urothelial carcinoma	infiltrating	C228T
B84	FFPE	Female	49	Bladder urothelial carcinoma	infiltrating	None
B85	FFPE	Male	59	Bladder papillary urothelial carcinoma	non-invasive	C250T
B88	FFPE	Male	47	Bladder urothelial carcinoma	infiltrating	C250T
B89	FFPE	Male	61	Bladder urothelial carcinoma	infiltrating	C228T
B91	FFPE	Female	80	Bladder urothelial carcinoma	non-invasive	None
B92	FFPE	Male	83	Bladder urothelial carcinoma	non-invasive	C228T
B93	FFPE	Male	56	Bladder urothelial carcinoma	non-invasive	C250T
B94	FFPE	Male	73	Bladder urothelial carcinoma	infiltrating	C228T
B95	FFPE	Male	56	Bladder urothelial carcinoma	infiltrating	C228T
B96	FFPE	Female	55	Bladder urothelial carcinoma	non-invasive	C228T
B97	FFPE	Male	80	Bladder urothelial carcinoma	infiltrating	None
B99	FFPE	Male	80	Bladder urothelial carcinoma	non-invasive	None
B100	FFPE	Female	70	Bladder urothelial carcinoma	non-invasive	None
B101	FFPE	Male	60	Bladder urothelial carcinoma	infiltrating	C228A
B102	FFPE	Male	91	Bladder urothelial carcinoma	non-invasive	C228T
B105	FFPE	Male	82	Bladder papillary urothelial carcinoma	infiltrating	None
B106	FFPE	Male	56	Bladder urothelial carcinoma	non-invasive	None
B107	FFPE	Female	72	Bladder urothelial carcinoma	infiltrating	C250T
B109	FFPE	Male	65	Bladder papillary urothelial carcinoma	non-invasive	A161C

B110	FFPE	Male	65	Bladder urothelial carcinoma	infiltrating	C228T
B112	FFPE	Male	69	Bladder urothelial carcinoma	infiltrating	C228T
B113	FFPE	Male	80	Bladder urothelial carcinoma	infiltrating	A161C
B115	FFPE	Male	63	Bladder urothelial carcinoma	infiltrating	C228T
B117	FFPE	Female	49	Bladder urothelial carcinoma	non-invasive	C242T+C243T
B120	FFPE	Male	80	Bladder urothelial carcinoma	infiltrating	None
B121	FFPE	Female	40	Bladder urothelial carcinoma	infiltrating	None
B122	FFPE	Male	78	Bladder urothelial carcinoma	infiltrating	None
B123	FFPE	Male	60	Bladder urothelial carcinoma	non-invasive	C250T
B125	FFPE	Male	51	Bladder papillary urothelial carcinoma	non-invasive	None
B128	FFPE	Male	76	Bladder papillary urothelial carcinoma	infiltrating	C228T
B129	FFPE	Male	53	Bladder urothelial carcinoma	non-invasive	None
B132	FFPE	Male	85	Bladder urothelial carcinoma	infiltrating	C228T
B136	FFPE	Female	62	Bladder urothelial carcinoma	infiltrating	None
B137	FFPE	Male	79	Bladder urothelial carcinoma	non-invasive	C228T
B138	FFPE	Male	43	Bladder urothelial carcinoma(part of inverted papilloma)	non-invasive	None
B139	FFPE	Male	81	Bladder urothelial carcinoma	infiltrating	C250T
B144	FFPE	Male	61	Bladder urothelial carcinoma	infiltrating	None
B145	FFPE	Male	77	Bladder urothelial carcinoma	infiltrating	None
B146	FFPE	Male	79	Bladder urothelial carcinoma	infiltrating	C228T
B147	FFPE	Male	58	Bladder papillary urothelial carcinoma	infiltrating	C228T
B149	FFPE	Male	46	Bladder urothelial carcinoma	infiltrating	C228T

B150	FFPE	Male	65	Bladder urothelial carcinoma	infiltrating	C228T
B152	FFPE	Male	42	Bladder urothelial carcinoma	non-invasive	C228T
B154	FFPE	Male	53	Bladder urothelial carcinoma	non-invasive	None
B155	FFPE	Male	60	Bladder urothelial carcinoma	non-invasive	A161C
B156	FFPE	Male	61	Bladder papillary urothelial carcinoma	non-invasive	None
B157	FFPE	Female	63	Bladder urothelial carcinoma(part of inverted papilloma)	non-invasive	None
B158	FFPE	Male	73	Bladder urothelial carcinoma	infiltrating	None
B159	FFPE	Male	62	Bladder papillary urothelial carcinoma	non-invasive	C228T
B160	FFPE	Male	73	Bladder urothelial carcinoma	infiltrating	A161C
B163	FFPE	Male	61	Bladder urothelial carcinoma(squamous differentiation)	infiltrating	C228T
B164	FFPE	Male	80	Bladder urothelial carcinoma	infiltrating	C228T
B166	FFPE	Female	80	Bladder urothelial carcinoma	non-invasive	C242T+C243T
B171	FFPE	Male	82	Bladder urothelial carcinoma	non-invasive	None
B176	FFPE	Male	69	Bladder urothelial carcinoma	infiltrating	None
B179	FFPE	Male	80	Bladder papillary urothelial carcinoma	non-invasive	None
B181	FFPE	Female	70	Bladder urothelial carcinoma	infiltrating	C228T
B182	FFPE	Male	68	Bladder urothelial carcinoma	infiltrating	C250T
B184	FFPE	Male	88	Bladder urothelial carcinoma	infiltrating	None
B185	FFPE	Female	83	Bladder urothelial carcinoma(micropapillary variant)	infiltrating	C228T
B186	FFPE	Female	59	Bladder papillary urothelial carcinoma	non-invasive	C250T
B187	FFPE	Male	69	Bladder urothelial carcinoma(squamous differentiation)	infiltrating	None

B189	FFPE	Female	73	Bladder urothelial carcinoma	non-invasive	C228T
B190	FFPE	Male	48	Bladder urothelial carcinoma	non-invasive	None
B191	FFPE	Male	56	Bladder urothelial carcinoma	infiltrating	C228T
B192	FFPE	Male	62	Bladder urothelial carcinoma	non-invasive	C228T
B194	FFPE	Male	59	Bladder urothelial carcinoma	infiltrating	None
B195	FFPE	Male	70	Bladder urothelial carcinoma	infiltrating	None
B197	FFPE	Male	77	Bladder urothelial carcinoma	non-invasive	G149T
B198	FFPE	Male	62	Bladder urothelial carcinoma	infiltrating	C228T
B199	FFPE	Female	73	Bladder urothelial carcinoma	non-invasive	None
B201	FFPE	Male	64	Bladder urothelial carcinoma	infiltrating	C250T
B205	FFPE	Male	71	Bladder urothelial carcinoma(squamous differentiation)	infiltrating	C228T
B207	FFPE	Female	60	Bladder urothelial carcinoma	non-invasive	A161C
B209	FFPE	Male	73	PUNLMP(papillary urothelial neoplasm of low malignant potential)	non-invasive	C250T
B210	FFPE	Male	89	Bladder urothelial carcinoma	non-invasive	C228T
B211	FFPE	Male	92	Bladder urothelial carcinoma	non-invasive	C228T
B214	FFPE	Female	59	Bladder urothelial carcinoma	non-invasive	None
B215	FFPE	Male	65	Bladder urothelial carcinoma	infiltrating	C250T
B216	FFPE	Male	61	Bladder urothelial carcinoma	infiltrating	C228T
B217	FFPE	Male	88	Bladder urothelial carcinoma	infiltrating	C228T
B225	FFPE	Male	73	Bladder urothelial carcinoma	non-invasive	None
B227	FFPE	Male	52	Bladder urothelial carcinoma	non-invasive	C250T
B228	FFPE	Female	63	Bladder urothelial carcinoma	non-invasive	None

B230	FFPE	Male	75	Bladder urothelial carcinoma	infiltrating	None
B237	FFPE	Male	74	Bladder papillary urothelial carcinoma	non-invasive	None
B240	FFPE	Male	74	Bladder urothelial carcinoma	infiltrating	C228T
B241	FFPE	Female	78	Bladder urothelial carcinoma	non-invasive	C250T
B243	FFPE	Female	58	Bladder urothelial carcinoma	non-invasive	None
B244	FFPE	Female	36	Bladder urothelial carcinoma	non-invasive	C228T
B245	FFPE	Male	49	Bladder urothelial carcinoma	non-invasive	C228T
B246	FFPE	Male	68	Bladder urothelial carcinoma	non-invasive	A161C
B247	FFPE	Male	72	Bladder urothelial carcinoma	non-invasive	None
B248	FFPE	Male	55	Bladder urothelial carcinoma	non-invasive	C228T
B249	FFPE	Female	84	Bladder urothelial carcinoma	non-invasive	C250T
B250	FFPE	Male	76	Bladder urothelial carcinoma	non-invasive	None
B254	FFPE	Female	58	Bladder papillary urothelial carcinoma	non-invasive	None
B255	FFPE	Male	39	Bladder urothelial carcinoma	non-invasive	None
B257	FFPE	Male	77	Bladder urothelial carcinoma	infiltrating	C193T
B259	FFPE	Female	56	Bladder urothelial carcinoma	infiltrating	C158A
B261	FFPE	Female	79	Bladder urothelial carcinoma	non-invasive	None
B263	FFPE	Female	70	Bladder urothelial carcinoma	non-invasive	C228T
B266	FFPE	Male	49	Bladder urothelial carcinoma	infiltrating	C228T
B268	FFPE	Male	78	Bladder urothelial carcinoma	non-invasive	C228T
B273	FFPE	Male	54	Bladder urothelial carcinoma	infiltrating	C228T
B274	FFPE	Male	78	Bladder urothelial carcinoma	infiltrating	C228T
B276	FFPE	Female	85	Bladder urothelial	non-invasive	C158A

				carcinoma		
B277	FFPE	Male	57	Bladder urothelial carcinoma	non-invasive	None
B278	FFPE	Male	54	Bladder urothelial carcinoma	non-invasive	A161C
B279	FFPE	Male	81	Bladder urothelial carcinoma(squamous differentiation)	infiltrating	None
B280	FFPE	Female	78	Bladder urothelial carcinoma	non-invasive	C228T
B281	FFPE	Male	46	Bladder urothelial carcinoma	non-invasive	C250T
B282	FFPE	Male	50	Bladder urothelial carcinoma	non-invasive	C228T
B284	FFPE	Male	70	Bladder urothelial carcinoma	non-invasive	T198G
B285	FFPE	Male	67	Bladder urothelial carcinoma	non-invasive	None
B286	FFPE	Male	82	Bladder urothelial carcinoma	non-invasive	C228T
B288	FFPE	Male	58	Bladder urothelial carcinoma	infiltrating	None
B289	FFPE	Male	78	Bladder urothelial carcinoma	infiltrating	None
B297	FFPE	Male	56	Bladder urothelial carcinoma	non-invasive	C250T
B299	FFPE	Male	52	Bladder urothelial carcinoma	non-invasive	None
B301	FFPE	Male	56	Bladder urothelial carcinoma	non-invasive	None
B302	FFPE	Male	82	Bladder urothelial carcinoma	infiltrating	C228T
B306	FFPE	Female	72	Bladder urothelial carcinoma	non-invasive	None
B307	FFPE	Male	80	Bladder urothelial carcinoma	non-invasive	A161C
B308	FFPE	Female	52	Bladder papillary urothelial carcinoma	non-invasive	C250T
B309	FFPE	Female	66	Bladder urothelial carcinoma	non-invasive	C242T+C243T
B310	FFPE	Male	59	Bladder urothelial carcinoma	non-invasive	A161C
B311	FFPE	Male	82	Bladder urothelial carcinoma	infiltrating	C228T
B313	FFPE	Male	78	Bladder urothelial	non-invasive	C250T

				carcinoma		
B314	FFPE	Male	61	Bladder urothelial carcinoma	non-invasive	C184T+C190T
B316	FFPE	Male	40	Bladder urothelial carcinoma	non-invasive	None
B319	FFPE	Male	69	Bladder papillary urothelial carcinoma	non-invasive	C250T
B320	FFPE	Male	72	Bladder urothelial carcinoma	non-invasive	C250T
B321	FFPE	Male	63	Bladder urothelial carcinoma	non-invasive	C228T
B327	FFPE	Male	75	Bladder urothelial carcinoma	infiltrating	None
B328	FFPE	Male	65	Bladder urothelial carcinoma	infiltrating	C228T
B329	FFPE	Male	49	Bladder urothelial carcinoma	infiltrating	C242T+C243T
B331	FFPE	Female	81	Bladder urothelial carcinoma	infiltrating	C228T
B336	FFPE	Male	88	Bladder urothelial carcinoma	infiltrating	C228T
B337	FFPE	Male	66	Bladder urothelial carcinoma	non-invasive	C228T
B338	FFPE	Male	82	Bladder urothelial carcinoma	non-invasive	C250T
B340	FFPE	Female	72	Bladder urothelial carcinoma	infiltrating	C250T
B341	FFPE	Male	82	Bladder urothelial carcinoma	non-invasive	A161C
B343	FFPE	Female	59	Bladder urothelial carcinoma	non-invasive	C250T
B344	FFPE	Male	69	Bladder urothelial carcinoma	non-invasive	C228T
B345	FFPE	Male	80	Bladder urothelial carcinoma	non-invasive	C228T
B346	FFPE	Male	76	Bladder urothelial carcinoma	non-invasive	None
B348	FFPE	Male	63	Bladder urothelial carcinoma	non-invasive	C228T
B349	FFPE	Male	33	Bladder urothelial carcinoma	non-invasive	None
B350	FFPE	Male	80	Bladder papillary urothelial carcinoma	non-invasive	None
B358	FFPE	Male	77	Bladder urothelial carcinoma	infiltrating	C228T

B359	FFPE	Male	71	Bladder urothelial carcinoma	infiltrating	C250T
B360	FFPE	Male	84	Bladder urothelial carcinoma	non-invasive	None
B361	FFPE	Male	81	Bladder urothelial carcinoma	non-invasive	None
B362	FFPE	Male	50	Bladder urothelial carcinoma	non-invasive	C228T
B364	FFPE	Male	35	Bladder urothelial carcinoma	non-invasive	None
B365	FFPE	Male	75	Bladder urothelial carcinoma	non-invasive	None
B367	FFPE	Male	69	Bladder urothelial carcinoma	non-invasive	C228T
B368	FFPE	Male	60	Bladder urothelial carcinoma	non-invasive	None
B370	FFPE	Male	85	Bladder urothelial carcinoma	non-invasive	None
B372	FFPE	Female	54	Bladder urothelial carcinoma	infiltrating	C228T
B373	FFPE	Male	88	Bladder urothelial carcinoma	non-invasive	None
B374	FFPE	Female	85	Bladder urothelial carcinoma	non-invasive	None
B376	FFPE	Male	58	Bladder urothelial carcinoma	non-invasive	None
B231	FFPE	Male	68	Bladder urothelial carcinoma	non-invasive	None
U3	FFPE	Male	78	Bladder urothelial carcinoma(part of inverted papilloma)	non-invasive	None
U4	FFPE	Male	80	Bladder papillary urothelial carcinoma	non-invasive	C250T
U6	FFPE	Female	79	Bladder urothelial carcinoma	non-invasive	None
U11	FFPE	Female	67	PUNLMP(papillary urothelial neoplasm of low malignant potential)	non-invasive	None
U12	FFPE	Male	88	Bladder urothelial carcinoma	infiltrating	None
U13	FFPE	Male	87	Bladder urothelial carcinoma (squamous differentiation)	infiltrating	C228T
U18	FFPE	Male	63	Bladder urothelial carcinoma	infiltrating	C228T

U19	FFPE	Male	67	Bladder urothelial carcinoma	non-invasive	C228T
U21	FFPE	Male	72	Bladder urothelial carcinoma (part of inverted papilloma)	non-invasive	None
U23	FFPE	Male	63	Bladder urothelial carcinoma	infiltrating	None
U24	FFPE	Male	78	Bladder urothelial carcinoma	non-invasive	C228T
U25	FFPE	Female	84	Bladder urothelial carcinoma	non-invasive	C250T
U27	FFPE	Female	74	Bladder papillary urothelial carcinoma	non-invasive	None
U29	FFPE	Female	71	Bladder urothelial carcinoma	infiltrating	None
U32	FFPE	Male	54	Bladder urothelial carcinoma	infiltrating	None
U36	FFPE	Male	47	Bladder urothelial carcinoma	non-invasive	None
U37	FFPE	Female	83	Bladder urothelial carcinoma	non-invasive	None
U38	FFPE	Male	77	Bladder urothelial carcinoma	infiltrating	None
U42	FFPE	Male	79	Bladder papillary urothelial carcinoma	non-invasive	C250T+C242T+C243T

C. **Hepatobiliary tumors:** n=47

Patients evaluated for *TERT* promoter mutations

Sample ID#	**Tissue type**	**Gender**	**Age (years)**	**Tumor Type**	**Edmondson Grade**	***TERT* promoter mutation**

H19	Fresh sample	Male	59	Hepatocellular carcinoma	Ⅱ	C228T
H23	Fresh sample	Male	54	Hepatocellular carcinoma	Ⅰ	None
H37	Fresh sample	Female	57	Hepatocellular carcinoma	Ⅳ	None
H61	Fresh sample	Male	55	Hepatocellular carcinoma	Ⅱ	None
H53	Fresh sample	Female	67	Hepatocellular carcinoma	Ⅱ	None
H67	Fresh sample	Male	71	Hepatocellular carcinoma	Ⅱ	None
H33	Fresh sample	Male	52	Hepatocellular carcinoma	Ⅱ	C250T
H41	Fresh sample	Female	58	Hepatocellular carcinoma	Ⅱ	None
H49	Fresh sample	Male	66	Hepatocellular carcinoma	Ⅱ	C228T
H59	Fresh sample	Male	73	Hepatocellular carcinoma	Ⅱ	None
H57	Fresh sample	Male	61	Hepatocellular carcinoma	Ⅱ	None
H81	Fresh sample	Male	50	Hepatocellular carcinoma	Ⅱ	None
H3	Fresh sample	Female	51	Hepatocellular carcinoma	Ⅲ	None
H47	Fresh sample	Male	51	Hepatocellular carcinoma	Ⅱ	C228T
H96	Fresh sample	Male	44	Hepatocellular carcinoma	Ⅱ	None
H83	Fresh sample	Male	76	Hepatocellular carcinoma	Ⅰ	None
H17	Fresh sample	Male	45	Hepatocellular carcinoma	Ⅱ	None
H71	Fresh sample	Female	49	Hepatocellular carcinoma	Ⅱ	None
H29	Fresh sample	Male	62	Hepatocellular carcinoma	Ⅱ	C228T
H43	Fresh sample	Male	44	Hepatocellular carcinoma	Ⅲ	None
H35	Fresh sample	Male	39	Hepatocellular carcinoma	Ⅲ	None
H97	Fresh sample	Male	64	Hepatocellular carcinoma	Ⅲ	C228T
H65	Fresh	Male	75	Hepatocellular	Ⅱ	None

	sample			carcinoma		
H1	Fresh sample	Male	66	Hepatocellular carcinoma	Ⅱ	C228T
H15	Fresh sample	Male	60	Hepatocellular carcinoma	Ⅲ	None
H25	Fresh sample	Male	45	Hepatocellular carcinoma	Ⅱ	C228T
H27	Fresh sample	Male	55	Hepatocellular carcinoma	Ⅱ	None
H21	Fresh sample	Male	47	Hepatocellular carcinoma	Ⅱ	None
H89	Fresh sample	Male	64	Hepatocellular carcinoma	Ⅱ	C228T
H75	Fresh sample	Male	57	Hepatocellular carcinoma	Ⅲ	None
H73	Fresh sample	Male	48	Hepatocellular carcinoma	Ⅱ	None
H7	Fresh sample	Male	52	Hepatocellular carcinoma	Ⅱ	None
H6	Fresh sample	Male	61	Hepatocellular carcinoma	Ⅱ	C228T
H11	Fresh sample	Female	44	Hepatocellular carcinoma	Ⅱ	None
H92	Fresh sample	Male	50	Hepatocellular carcinoma	Ⅱ	C250T
H45	Fresh sample	Female	68	Intrahepatic lymphoepithelioma-like cholangiocarcinoma	High differentiation	None
H63	Fresh sample	Male	68	Intrahepatic cholangiocarcinoma	High differentiation	None
H55	Fresh sample	Male	55	Intrahepatic cholangiocarcinoma	Moderately differentiation	None
H69	Fresh sample	Male	20	Hepatoblastoma	NR	None
H91	Fresh sample	Male	52	Gallbladder carcinoma	Poor differentiation	None
H87	Fresh sample	Female	62	Gallbladder carcinoma	Moderate differentiation	C228T
H85	Fresh sample	Female	70	Cholangiocarcinoma	Moderate differentiation	None
H31	Fresh sample	Female	74	Cholangiocarcinoma	Moderate differentiation	None
H77	Fresh sample	Female	65	Cholangiocarcinoma	Moderate differentiation	None
H79	Fresh	Female	77	Cholangiocarcinoma	Moderate	None

	sample				differentiation	
H94	Fresh sample	Female	60	Cholangiocarcinoma	Moderate differentiation	None
H95	Fresh sample	Female	53	Cholangiocarcinoma	Moderate differentiation	None

D. Gastric tumors: 74 gastric cancer, 82 other gastric tumors (GIST, leiomyoma, schwannoma), total n=156

Patients evaluated for *TERT* promoter mutations

Sample ID#	Tissue type	Gender	Age (years)	Tumor Type	Lauren classification	*TERT* promoter mutation
1GF	Fresh sample	Male	50	Gastric Cancer	Intestinal type	None
2GF	Fresh sample	Female	43	Gastric Cancer	Diffuse type	None
3GF	Fresh sample	Male	73	Gastric Cancer	Intestinal type	None
4GF	Fresh sample	Male	79	Gastric Cancer	Intestinal type	None
5GF	Fresh sample	Male	80	Gastric Cancer	Intestinal type	None
6GF	Fresh sample	Male	60	Gastric Cancer	Diffuse type	None
7GF	Fresh sample	Male	62	Gastric Cancer	Intestinal type	None
8GF	Fresh sample	Male	66	Gastric Cancer	Diffuse type	None
9GF	Fresh sample	Male	70	Gastric Cancer	Diffuse type	None
10GF	Fresh sample	Female	75	Gastric Cancer	Diffuse type	None
11GF	Fresh sample	Female	64	Gastric Cancer	Diffuse type	None
12GF	Fresh sample	Male	67	Gastric Cancer	Diffuse type	None
14GF	Fresh sample	Male	79	Gastric Cancer	Diffuse type	None
15GF	Fresh sample	Male	66	Gastric Cancer	Intestinal type	None
16GF	Fresh sample	Female	51	Gastric Cancer	Diffuse type	None
18GF	Fresh sample	Male	71	Gastric Cancer	Intestinal type	None
19GF	Fresh sample	Male	51	Gastric Cancer	Diffuse type	None
20GF	Fresh	Male	62	Gastric Cancer	Intestinal type	None

	sample					
21GF	Fresh sample	Male	55	Gastric Cancer	Intestinal type	None
22GF	Fresh sample	Male	58	Gastric Cancer	Diffuse type	None
23GF	Fresh sample	Male	82	Gastric Cancer	Intestinal type	None
24GF	Fresh sample	Female	86	Gastric Cancer	Intestinal type	None
25GF	Fresh sample	Female	42	Gastric Cancer	Diffuse type	None
26GF	Fresh sample	Male	68	Gastric Cancer	Diffuse type	None
27GF	Fresh sample	Male	41	Gastric Cancer	Diffuse type	None
28GF	Fresh sample	Male	68	Gastric Cancer	Diffuse type	None
29GF	Fresh sample	Female	79	Gastric Cancer	Diffuse type	None
30GF	Fresh sample	Male	78	Gastric Cancer	Diffuse type	None
31GF	Fresh sample	Female	47	Gastric Cancer	Intestinal type	None
32GF	Fresh sample	Male	75	Gastric Cancer	Diffuse type	None
33GF	Fresh sample	Male	59	Gastric Cancer	Intestinal type	None
34GF	Fresh sample	Female	52	Gastric Cancer	Diffuse type	None
35GF	Fresh sample	Female	75	Gastric Cancer	Intestinal type	None
36GF	Fresh sample	Male	63	Gastric Cancer	Diffuse type	None
37GF	Fresh sample	Male	65	Gastric Cancer	Diffuse type	None
38GF	Fresh sample	Male	57	Gastric Cancer	Diffuse type	None
39GF	Fresh sample	Male	66	Gastric Cancer	Diffuse type	None
40GF	Fresh sample	Male	70	Gastric Cancer	Diffuse type	None
41GF	Fresh sample	Female	76	Gastric Cancer	Diffuse type	None
42GF	Fresh sample	Male	61	Gastric Cancer	Intestinal type	None

43GF	Fresh sample	Male	66	Gastric Cancer	Intestinal type	None
44GF	Fresh sample	Female	46	Gastric Cancer	Diffuse type	None
45GF	Fresh sample	Female	71	Gastric Cancer	Diffuse type	None
46GF	Fresh sample	Male	75	Gastric Cancer	Intestinal type	None
47GF	Fresh sample	Female	39	Gastric Cancer	Diffuse type	None
48GF	Fresh sample	Male	83	Gastric Cancer	Diffuse type	None
49GF	Fresh sample	Male	60	Gastric Cancer	Diffuse type	None
50GF	Fresh sample	Female	78	Gastric Cancer	Intestinal type	None
51GF	Fresh sample	Male	55	Gastric Cancer	Diffuse type	None
52GF	Fresh sample	Male	77	Gastric Cancer	Intestinal type	None
53GF	Fresh sample	Male	78	Gastric Cancer	Diffuse type	None
54GF	Fresh sample	Male	63	Gastric Cancer	Intestinal type	None
55GF	Fresh sample	Female	48	Gastric Cancer	Intestinal type	None
57GF	Fresh sample	Female	64	Gastric Cancer	Diffuse type	None
58GF	Fresh sample	Male	49	Gastric Cancer	Diffuse type	None
59GF	Fresh sample	Male	71	Gastric Cancer	Diffuse type	None
60GF	Fresh sample	Male	49	Gastric Cancer	Intestinal type	None
62GF	Fresh sample	Female	62	Gastric Cancer	Intestinal type	None
63GF	Fresh sample	Male	69	Gastric Cancer	Intestinal type	None
64GF	Fresh sample	Male	60	Gastric Cancer	Intestinal type	None
65GF	Fresh sample	Male	70	Gastric Cancer	Diffuse type	None
66GF	Fresh sample	Female	68	Gastric Cancer	Diffuse type	None
67GF	Fresh	Female	77	Gastric Cancer	Intestinal type	None

	sample					
68GF	Fresh sample	Male	66	Gastric Cancer	Diffuse type	None
69GF	Fresh sample	Female	79	Gastric Cancer	Diffuse type	None
70GF	Fresh sample	Male	74	Gastric Cancer	Diffuse type	None
72GF	Fresh sample	Female	49	Gastric Cancer	Diffuse type	None
73GF	Fresh sample	Female	70	Gastric Cancer	Diffuse type	None
74GF	Fresh sample	Male	56	Gastric Cancer	Intestinal type	None
76GF	Fresh sample	Male	56	Gastric Cancer	Diffuse type	None
77GF	Fresh sample	Male	62	Gastric Cancer	Intestinal type	None
78GF	Fresh sample	Female	60	Gastric Cancer	Diffuse type	None
79GF	Fresh sample	Male	75	Gastric Cancer	Diffuse type	None
56GF	Fresh sample	Male	66	Gastric Cancer	Diffuse type	None

Sample ID#	**Tissue type**	**Gender**	**Age (years)**	**Tumor Type**	**Risk**	***TERT* promoter mutation**
JF15	Fresh sample	Female	59	GIST	Low	None
JF2	Fresh sample	Female	54	GIST	Low	None
JF10	Fresh sample	Male	56	GIST	Low	None
JF13	Fresh sample	Male	64	GIST	Very-low	None
JF14	Fresh sample	Female	46	GIST	Low	None
JF8	Fresh sample	Female	56	GIST	High	None
JF1	Fresh sample	Male	67	GIST	Low	None

JF12	Fresh sample	Female	56	GIST	High	None
HF51	Fresh sample	Female	50	GIST	High	None
JP60	FFPE	Male	60	GIST	High	None
JP61	FFPE	Female	36	GIST	Very-low	None
JP64	FFPE	Male	66	GIST	Low	None
JP56	FFPE	Female	65	GIST	Low	None
JP62	FFPE	Male	53	GIST	High	None
JP67	FFPE	Female	70	GIST	Low	None
JP70	FFPE	Female	54	GIST	Moderate	None
JP42	FFPE	Male	73	GIST	Very-low	None
JP68	FFPE	Male	58	GIST	Very-low	None
JP53	FFPE	Male	65	GIST	Moderate	None
JP71	FFPE	Male	67	GIST	Low	None
JP59	FFPE	Female	68	GIST	Very-low	None
JP58	FFPE	Male	60	GIST	Low	None
JP54	FFPE	Male	49	GIST	High	None
JP52	FFPE	Female	45	GIST	Moderate	None
JP57	FFPE	Female	50	GIST	Low	None
JP51	FFPE	Male	55	GIST	Very-low	None
JP65	FFPE	Female	50	GIST	High	None
JP37	FFPE	Male	56	GIST	Moderate	None
JP47	FFPE	Female	69	GIST	Low	None
JP46	FFPE	Female	34	GIST	Low	None
JP45	FFPE	Male	43	GIST	Low	None
JP49	FFPE	Female	46	GIST	Moderate	None
JP38	FFPE	Female	67	GIST	Moderate	None
JP50	FFPE	Female	38	GIST	High	None
JP44	FFPE	Male	69	GIST	High	None
JP55	FFPE	Male	66	GIST	Low	None
JP28	FFPE	Male	43	GIST	Low	None
JP24	FFPE	Male	48	GIST	High	None
JP21	FFPE	Female	49	GIST	Low	None
JP25	FFPE	Male	71	GIST	Low	None
JP2	FFPE	Female	83	GIST	low	None
JP20	FFPE	Female	43	GIST	Low	None
JP7	FFPE	Female	31	GIST	Moderate	None
JP1	FFPE	Male	84	GIST	Low	None
JP32	FFPE	Female	52	GIST	Very-low	None
JP22	FFPE	Male	69	GIST	Low	None
JP36	FFPE	Male	41	GIST	High	None

JP43	FFPE	Male	58	GIST	Low	None
JP40	FFPE	Male	50	GIST	Very-low	None
JP41	FFPE	Female	30	GIST	Low	None
JP26	FFPE	Female	38	GIST	Moderate	None
JP5	FFPE	Male	73	GIST	Low	None
JP17	FFPE	Female	56	GIST	Low	None
JP30	FFPE	Female	43	GIST	Very-low	None
JP11	FFPE	Female	63	GIST	Moderate	None
JP6	FFPE	Female	56	GIST	Very-low	None
JP29	FFPE	Female	53	GIST	Low	None
JP14	FFPE	Male	57	GIST	Low	None
JP34	FFPE	Male	78	GIST	Low	None
JP13	FFPE	Male	71	GIST	Low	None
JP31	FFPE	Male	52	GIST	Low	None
JP18	FFPE	Female	45	GIST	High	None
JP16	FFPE	Male	49	GIST	Low	None
JP35	FFPE	Female	64	GIST	Moderate	None
JP9	FFPE	Male	69	GIST	Low	None
JP8	FFPE	Male	41	GIST	Moderate	None
JP10	FFPE	Male	58	GIST	Low	None
JP19	FFPE	Male	50	GIST	Low	None
JP3	FFPE	Female	30	GIST	Very-low	None
JP4	FFPE	Female	38	GIST	Moderate	None
JP15	FFPE	Male	73	GIST	Very-low	None
JP27	FFPE	Female	56	GIST	Low	None
JP23	FFPE	Female	43	GIST	Low	None
JP12	FFPE	Female	56	GIST	Low	None
JP39	FFPE	Female	43	GIST	Low	None
JP33	FFPE	Female	56	GIST	Low	None
JP66	FFPE	Male	32	Gastrointestinal leiomyoma		None
JP48	FFPE	Male	69	Gastrointestinal leiomyoma		None
JP63	FFPE	Female	43	Gastrointestinal leiomyoma		None
JP69	FFPE	Male	52	Gastrointestinal leiomyoma		None
JF6	FFPE	Male	27	Gastrointestinal leiomyoma		None
JF4	FFPE	Female	60	Gastric schwannoma		None

E. Pancreatic cancer: n= 46

Patients evaluated for *TERT* promoter mutations

Sample ID#	Tissue type	Gender	Age (years)	Tumor Type	Lauren classification	*TERT* promoter mutation
P1	FFPE	Female	49	Pancreatic cancer	High	None
P2	FFPE	Male	50	Pancreatic cancer	Low	None
P3	FFPE	Female	88	Pancreatic cancer	High	None
P4	FFPE	Male	64	Pancreatic cancer	Moderate	None
P5	FFPE	Male	61	Pancreatic cancer	Low	None
P6	FFPE	Male	65	Pancreatic cancer	Low	None
P7	FFPE	Female	76	Pancreatic cancer	Moderate	None
P8	FFPE	Male	76	Pancreatic cancer	Low	None
P9	FFPE	Male	72	Pancreatic cancer	Moderate	None
P10	FFPE	Male	59	Pancreatic cancer	Low	None
P11	FFPE	Female	63	Pancreatic cancer	Moderate	None
P12	FFPE	Male	62	Pancreatic cancer	High	None
P13	FFPE	Female	45	Pancreatic cancer	Low	None
P14	FFPE	Male	73	Pancreatic cancer	Moderate	None
P15	FFPE	Female	47	Pancreatic cancer	Moderate	None
P16	FFPE	Male	66	Pancreatic cancer	Moderate	None
P17	FFPE	Male	72	Pancreatic cancer	Moderate	None
P19	FFPE	Male	53	Pancreatic cancer	Moderate	None
P20	FFPE	Female	64	Pancreatic cancer	Moderate	None
P21	FFPE	Female	66	Pancreatic cancer	Low	None
P22	FFPE	Male	68	Pancreatic cancer	Low	None
P23	FFPE	Female	84	Pancreatic cancer	High	None
P24	FFPE	Female	74	Pancreatic cancer	High	None
P25	FFPE	Male	78	Pancreatic cancer	High	None
P26	FFPE	Female	79	Pancreatic cancer	High	None
P27	FFPE	Female	60	Pancreatic cancer	Moderate	None
P28	FFPE	Male	61	Pancreatic cancer	High	None
P29	FFPE	Female	77	Pancreatic cancer	Moderate	None
P30	FFPE	Male	76	Pancreatic cancer	Low	None
P31	FFPE	Female	44	Pancreatic cancer	High	None
P32	FFPE	Female	63	Pancreatic cancer	Low	None
P33	FFPE	Male	54	Pancreatic cancer	High	None
P34	FFPE	Male	65	Pancreatic cancer	Moderate	None
P35	FFPE	Male	61	Pancreatic cancer	Low	None

P36	FFPE	Female	55	Pancreatic cancer	Low	None
P37	FFPE	Female	65	Pancreatic cancer	Moderate	None
P38	FFPE	Female	51	Pancreatic cancer	Moderate	None
P39	FFPE	Female	55	Pancreatic cancer	Low	None
P43	FFPE	Female	66	Pancreatic cancer	Moderate	None
P41	FFPE	Male	71	Pancreatic cancer	Low	None
P42	FFPE	Female	41	Pancreatic cancer	Moderate	None
P43	FFPE	Female	74	Pancreatic cancer	Moderate	None
75C	FFPE	Male	60	Pancreatic cancer	Moderate	None
61C	FFPE	Male	73	Pancreatic cancer	Low	None
13C	FFPE	Female	68	Pancreatic cancer	Moderate	None
71C	FFPE	Male	67	Pancreatic cancer	Low	None

F. Tumors of the thymus, n= 54

Patients evaluated for *TERT* promoter mutations

Sample ID#	Tissue type	Gender	Age (years)	Tumor Type	WHO classification	*TERT* promoter mutation
X1	FFPE	Male	27	Thymoma	Type B1	None
X2	FFPE	Male	30	Thymoma	Type A	None
X3	FFPE	Male	49	Thymoma	Type B2	None
X4	FFPE	Female	70	Thymoma	Type AB	None
X5	FFPE	Female	55	Thymoma	Type B1	None
X6	FFPE	Female	25	Thymoma	Type A	None
X7	FFPE	Male	51	Thymoma	Type B1	None
X8	FFPE	Female	82	Thymoma	Type AB	None
X9	FFPE	Female	75	Thymic Cancer	Type C	None
X10	FFPE	Male	61	Thymoma	Type B1	None
X11	FFPE	Female	51	Thymoma	Type AB	None
X12	FFPE	Male	44	Thymoma	Type B1	None
X13	FFPE	Female	24	Thymoma	Type AB	None
X14	FFPE	Female	24	Thymoma	Type B1	None
X15	FFPE	Male	13	Thymoma	Type B1	None
X16	FFPE	Female	41	Thymoma	Type A	None
X17	FFPE	Female	38	Thymoma	Type A	None
X18	FFPE	Female	66	Thymoma	Type A	None
X19	FFPE	Female	65	Thymoma	Type A	None
X20	FFPE	Male	62	Thymoma	Type AB	None
X21	FFPE	Male	41	Thymoma	Type B1	None
X22	FFPE	Male	57	Thymoma	Type B2	None
X23	FFPE	Male	46	Thymoma	Type B1	None
X24	FFPE	Male	62	Thymoma	Type B1	None
X25	FFPE	Female	53	Thymoma	Type B1	None
X26	FFPE	Male	62	Thymoma	Type B1	None
X27	FFPE	Male	46	Thymoma	Type B1	None
X28	FFPE	Female	53	Thymoma	Type B1	None
X29	FFPE	Female	61	Thymoma	Type B2	None
X30	FFPE	Male	81	Thymoma	Type A	None
X31	FFPE	Male	66	Thymoma	Type B3	None
X32	FFPE	Male	58	Thymoma	Type AB	None
X33	FFPE	Male	43	Thymoma	Type AB	None
X34	FFPE	Female	15	Thymoma	Type B1	None

X35	FFPE	Male	32	Thymic Neuroendocrine Carcinoma	Atypical carcinoid	None
X36	FFPE	Male	61	Thymic Neuroendocrine Carcinoma	Atypical carcinoid	None
X37	FFPE	Male	58	Thymoma	Type AB	None
X38	FFPE	Female	50	Thymoma	Type AB	None
X39	FFPE	Female	52	Thymoma	Type B1	None
X40	FFPE	Male	54	Thymoma	Type B2	None
X41	FFPE	Female	47	Thymoma	Type AB	None
X42	FFPE	Female	70	Thymic Cancer	Type C	None
X43	FFPE	Female	70	Thymic Cancer	Type C	None
X44	FFPE	Female	62	Thymoma	Type AB	None
X45	FFPE	Female	62	Thymoma	Type AB	None
X46	FFPE	Male	23	Thymoma	Type B3	None
X47	FFPE	Male	78	Thymic Cancer	Type C	None
X48	FFPE	Female	57	Thymic Cancer	Type C	None
X49	FFPE	Female	50	Thymoma	Type B2	None
X50	FFPE	Male	60	Thymoma	Type AB	None
X51	FFPE	Female	82	Thymoma	Type B2	None
X52	FFPE	Male	45	Thymoma	Type B2	None
X53	FFPE	Male	57	Thymoma	Type AB	None
X54	FFPE	Male	44	Thymoma	Type B3	None

G. Samples used for TRAP assay, n=16

Sample ID	Tissue Type	Gender	Age	Tumor type	Grade	*TERT* promoter mutation
XG1	Xenograft	F	41	Glioblastoma Multiforme	IV	C228T
XG2	Xenograft	M	60	Glioblastoma Multiforme	IV	C228T
XG3	Xenograft	F	47	Glioblastoma Multiforme	IV	C250T
XG4	Xenograft	M	50	Glioblastoma Multiforme	IV	C250T
XG5	Xenograft	F	37	Glioblastoma Multiforme	IV	WT
XG6	Xenograft	F	31	Glioblastoma Multiforme	IV	WT
XG7	Xenograft	F	44	Glioblastoma Multiforme	IV	WT
PTT1	Primary tumor tissue	M	53	Oligodendroglioma	II	WT
PTT2	Primary tumor tissue	M	48	Oligoastrocytoma	II	WT
PTT3	Primary tumor tissue	M	52	Oligodendroglioma	II	C228T
PTT4	Primary tumor tissue	M	48	Oligodendroglioma	II	C228T
PTT5	Primary tumor tissue	M	25	Oligodendroglioma	II	C228T
PTT6	Primary tumor tissue	F	44	Oligodendroglioma	II	C228T
PTT7	Primary tumor tissue	M	28	Oligodendroglioma	II	C228T
PTT18	Primary tumor tissue	M	65	Oligoastrocytoma	II	C250T
PTT44	Primary tumor tissue	M	34	Oligodendroglioma	III	WT

H. **Samples used for RT-qPCR, along with relative *TERT* mRNA expression (normalized to GAPDH and BSG cell line SF7761, a brain stem glioma cell line transduced with *TERT*), n= 43**

Sample ID	Tissue Type	Gender	Age	Tumor Type	Grade	*TERT* promoter mutation	Relative *TERT* Expression
PTT15	Primary tumor tissue	F	33	Astrocytoma	II	WT	0.091
PTT27	Primary tumor tissue	M	34	Astrocytoma	II	WT	0.006
PTT40	Primary tumor tissue	M	26	Astrocytoma	II	WT	0.084
PTT43	Primary tumor tissue	F	28	Astrocytoma	II	WT	0.002
PTT26	Primary tumor tissue	M	22	Diffuse Astrocytoma	II	WT	0.060
PTT18	Primary tumor tissue	M	65	Oligoastrocytoma	II	C250T	0.103
PTT2	Primary tumor tissue	M	48	Oligoastrocytoma	II	WT	0.009
PTT17	Primary tumor tissue	M	52	Oligodendroglioma	II	WT	0.071
PTT22	Primary tumor tissue	M	64	Oligodendroglioma	II	C228T	0.223
PTT33	Primary tumor tissue	M	77	Oligodendroglioma	II	WT	0.090
PTT1	Primary tumor tissue	M	53	Oligodendroglioma	II	WT	0.019
PTT3	Primary tumor tissue	M	52	Oligodendroglioma	II	C228T	0.118
PTT4	Primary tumor tissue	M	48	Oligodendroglioma	II	C228T	1.071
PTT5	Primary tumor tissue	M	25	Oligodendroglioma	II	C228T	0.035
PTT6	Primary tumor tissue	F	44	Oligodendroglioma	II	C228T	0.126
PTT7	Primary tumor tissue	M	28	Oligodendroglioma	II	C228T	0.202
PTT29	Primary tumor tissue	M	49	Anaplastic Astrocytoma	III	WT	0.048

PTT30	Primary tumor tissue	F	55	Anaplastic Astrocytoma	III	WT	0.003
PTT41	Primary tumor tissue	F	42	Anaplastic Astrocytoma	III	WT	0.003
PTT14	Primary tumor tissue	F	21	Anaplastic Oligoastrocytoma	III	WT	0.002
PTT19	Primary tumor tissue	M	45	Anaplastic Oligoastrocytoma	III	C228T	1.408
PTT42	Primary tumor tissue	M	32	Anaplastic Oligoastrocytoma	III	WT	0.023
PTT9	Primary tumor tissue	F	25	Anaplastic Oligodendroglioma	III	WT	0.002
PTT24	Primary tumor tissue	F	36	Anaplastic Oligodendroglioma	III	C250T	0.135
PTT36	Primary tumor tissue	F	36	Anaplastic Oligodendroglioma	III	C250T	0.437
PTT8	Primary tumor tissue	M	61	Glioblastoma Multiforme	IV	C228T	1.127
PTT10	Primary tumor tissue	M	46	Glioblastoma Multiforme	IV	C228T	0.575
PTT11	Primary tumor tissue	F	70	Glioblastoma Multiforme	IV	WT	0.061
PTT12	Primary tumor tissue	M	58	Glioblastoma Multiforme	IV	WT	0.234
PTT13	Primary tumor tissue	M	76	Glioblastoma Multiforme	IV	WT	0.098
PTT16	Primary tumor tissue	F	45	Glioblastoma Multiforme	IV	C228T	0.354
PTT20	Primary tumor tissue	M	45	Glioblastoma Multiforme	IV	C228T	0.344
PTT21	Primary tumor tissue	F	53	Glioblastoma Multiforme	IV	WT	0.086
PTT23	Primary	M	56	Glioblastoma Multiforme	IV	C228T	0.240

	tumor tissue						
PTT25	Primary tumor tissue	M	69	Glioblastoma Multiforme	IV	WT	0.026
PTT28	Primary tumor tissue	F	62	Glioblastoma Multiforme	IV	C228T	0.315
PTT31	Primary tumor tissue	F	22	Glioblastoma Multiforme	IV	WT	0.020
PTT32	Primary tumor tissue	F	61	Glioblastoma Multiforme	IV	C228T	0.509
PTT34	Primary tumor tissue	F	59	Glioblastoma Multiforme	IV	C228T	0.346
PTT35	Primary tumor tissue	M	46	Glioblastoma Multiforme	IV	C228T	0.089
PTT37	Primary tumor tissue	M	78	Glioblastoma Multiforme	IV	C228T	0.409
PTT38	Primary tumor tissue	M	74	Glioblastoma Multiforme	IV	C250T	0.169
PTT39	Primary tumor tissue	M	83	Glioblastoma Multiforme	IV	C250T	0.199

Recurrent *TERT* promoter mutations identified in a large-scale study of multiple tumor types are associated with increased *TERT* expression and telomerase activation

Supplementary Materials and Methods

Tissue sample collection and preparation

Tissue samples from Zhejiang Provincial People's Hospital Fresh samples were immediately frozen in -80 °C deep cryogenic freezers after surgical resection. Tissue sections reviewed by two certified pathologists to ensure that ≥50% of the cells used for DNA purification were neoplastic and to confirm the histopathological diagnosis.

The subcutaneous xenografts and the snap frozen primary tumor tissues used for RT-qPCR and telomerase activity assay were obtained from the Preston Robert Tisch Brain Tumor Center BioRepository at Duke University. The methods for subcutaneous xenograft transplantation were performed as previously reported [1]. Tissue was obtained with consent and Institutional Review Board (IRB) approval, in accordance with the Health Insurance Portability and Accountability Act (HIPAA). Tissue sections for sequencing were reviewed by board-certified pathologists to ensure that >80% cells used for DNA purification were neoplastic and confirm histopathological diagnosis.

PCR amplification for *TERT* promoter sequencing

Sequences of the *TERT* core promoter region were obtained from the human reference sequence (GRCh37 February 2009; http://genome.ucsc.edu/) and amplified by PCR. Primer pairs for PCR amplification and sequencing were generated using Primer3 Plus (http://primer3plus.com/cgi-bin/dev/primer3plus.cgi) and to minimize amplification of homologous genomic sequences, were filtered using UCSC in silico PCR (http://genome.ucsc.edu/cgi-bin/hgPcr?command=start) to

ensure pairs yielded only a single product. Primer sequences used for the amplification of the *TERT* promoter from FFPE samples were 5'-TGCCCCTTCACCTTCCAGC-3' and 5'-GGCCAGGGCTTCCCACGT-3', generating a 190 bp amplicon (chr5:1,295,120-1,295,309). For frozen tissue samples and xenograft samples, the primer sequences were 5'-M13-GGCCGATTCGACCTCTCT-3' and 5'-AGCACCTCGCGGTAGTGG-3', amplifying 489 bp of the *TERT* promoter (chr5: 1,295,040-1,295,528), where M13 is a universal sequencing primer with the sequence 5'-TGTAAAACGACGGCCAGT-3'.

PCR amplification of DNA from FFPE samples was performed in a 25 μl solution, consisting of 1 μl of DNA solution (50–200 ng/μl), 0.1 μl of KAPA2G Fast HotStart DNA polymerase (5 U/μl), 5 μl of 5X KAPA2G Buffer A, 0.5 μl of dNTP mix(10 mM each), 10% (v/v) DMSO, and 1.25 μl of each primer (10 μM). PCR was conducted using a PTC-200 thermal cycler (BIO-RAD, CA, USA) with an initial denaturation step at 95 °C for 2 min, followed by 45 cycles of denaturation at 95 °C for 15 s, annealing at 62 °C for 15 s, extension at 72 °C for 1 s, and a final extension at 72°C for 10 min.

The PCR amplification of DNA from frozen tissue samples was performed in a 50 μl solution, consisting of 1 μl of DNA solution (50–200 ng/μl), 0.5 μl of PrimeSTAR HS DNA Polymerase (2.5 U/μl), and 25 μl of 2X 2×PrimeSTAR GC Buffer, 4 μl of dNTP mixture (2.5 mM each), and 1 μl of each primer (10 μM). This amplification was performed using a PTC-200 thermal cycler with an initial denaturing step at 95 °C for 2 min, followed by 3 cycles of denaturation at 95 °C for 20 s, annealing at 64 °C for 15 s, extension at 72 °C for 5 s, and 3 cycles of denaturation at 95 °C for 20 s, annealing at 61 °C for 15 s, extension at 72 °C for 5 s, and 3 cycles of denaturation at 95 °C for 20 s, annealing at 58 °C for 15 s, and 35 cycles of denaturation at 95 °C for 20 s, annealing at 57 °C for 15 s, extension at 72 °C for 5 s, and a final extension at 72°C for 10 min.

The PCR amplification of DNA from xenograft tissue samples and primary tumor tissues was performed in a 15 µl solution, consisting of 1.5 µl of DNA solution (10–50 ng/µl), 0.06 µl of KAPA2G Fast HotStart DNA Polymerase (2.5 U/µl), and 3 µl of 5X KAPA2G Buffer A, 0.3 µl of dNTP mixture (10 mM), 0.9 µl DMSO, and 0.15 µl of each primer (100 µM). Of the seven xeongrafts used in this study, 4 cases had been analyzed in previous studies of the *TERT* promoter [2]. Amplification was performed using a Bio Rad C1000 Touch thermal cycler with an initial denaturing step at 95 °C for 2 min, followed by 3 cycles of denaturation at 95 °C for 20 s, annealing at 64 °C for 15 s, extension at 72 °C for 5 s, and 3 cycles of denaturation at 95 °C for 20 s, annealing at 61 °C for 15 s, extension at 72 °C for 5 s, and 3 cycles of denaturation at 95 °C for 20 s, annealing at 58 °C for 15 s, and 35 cycles of denaturation at 95 °C for 20 s, annealing at 57 °C for 15 s, extension at 72 °C for 5 s, and a final extension at 72°C for 5 min.

TRAP assay

For the TRAP assay, about 20 mg of tissue sections from snap-frozen xenografts or primary tumors were homogenized in 200 µl ice-cold CHAPS lysis buffer supplemented with 150 units RNAase inhibitor by TissueLyser LT. After incubation on ice for 30 min, the lysates were centrifuged at 15,000 g for 20 min at 4 ^{o}C and the supernatants were quickly frozen and stored at -80 ^{o}C. The protein concentration of the extract was determined by the BCA method. In each TRAP experiment, 2 µl of extract containing 1 µg of protein was used. A reaction mixture with 2 µl of CHAPS lysis buffer or HeLa cell lysate (instead of tissue extract) were used as negative and positive controls, respectively. As an internal negative control, several tissue extracts were randomly selected and heat-inactivated at 85 ^{o}C for 10 min. The PCR reaction mixture was incubated at 30 °C for 30 min for telomerase-mediated extension of TS primer, followed by 94 ^{o}C for 3 min to inactivate the telomerase and activate the Taq polymerase. This mixture was then

subjected to 33 PCR cycles at 94 ^{o}C for 30 s, 59 ^{o}C for 30 s, and 72 ^{o}C for 60 s.

RT-qPCR for measurement of *TERT* mRNA expression

Real time quantitative PCR was done using SensiFAST SYBR® No-ROX Kit (Bioline, USA) in triplicate using the following primers for *TERT* mRNA expression:

- Forward: 5'-CCGATTGTGAACATGGACTACG-3'
- Reverse: 5'-CACGCTGAACAGTGCCTTC-3'

GAPDH was used as an internal standard to which all *TERT* mRNA expression levels were normalized:

- Forward: 5'-AGCCACATCGCTCAGACAC-3'
- Reverse: 5'-GAGGCATTGCTGATGATCTTG-3

One brain stem glioma cell line, SF7761, which has been transduced with *TERT* and therefore overexpresses *TERT*, was used as a reference [3].

DNA constructs and site-directed mutagenesis

The promoter fragment of *TERT* (-424 to +65) was amplified from normal blood genomic DNA using the primers:

- Forward: 5'-CGGGGTACCGGCCGATTCGACCTCTCT-3'
- Reverse: 5'-CCGCTCGAGAGCACCTCGCGGTAGTGG-3'

Mutagenesis primers used with the QuikChange II XL Site-Directed Mutagenesis Kit (Stratagene, USA) were:

- C228T:

    - Forward: 5'-GAGGGCCCGGAAGGGGCTGGGCC-3'
    - Reverse: 5'-GGCCCAGCCCCTTCCGGGCCCTC-3'
- C250T:
    - Forward: 5’-CCGTCCCGACCCCTTCCGGGTCC-3’
    - Reverse: 5’-GGACCCGGAAGGGGTCGGGACGG-3’
- A161C:
    - Forward: 5’-CAGCGCTGCCGGAAACTCGCGCCG-3’
    - Reverse: 5’-CGGCGCGAGTTTCCGGCAGCGCTG-3’
- C242T+C243T:
    - Forward: 5’-CTGGGCCGGAAACCCGGGAGGGGTCGGG-3’
    - Reverse: 5’-CCCGACCCCTCCCGGGTTTCCGGCCCAG-3’

PCR program used for site-directed mutagenesis was:

Mutagenesis PCR was performed using a Bio Rad C1000 Touch thermal cycler with an initial denaturing step at 95 °C for 1 min, followed by 17 cycles of denaturation at 95 °C for 50 s, annealing at 60 °C for 50 s, extension at 68 °C for 5 min and 30 s, and a final extension at 68 °C for 7 min.

References

[1] Bota DA, Alexandru D, Keir ST, Bigner D, Vredenburgh J, Friedman HS. Proteasome inhibition with bortezomib induces cell death in GBM stem-like cells and temozolomide-resistant glioma cell lines, but stimulates GBM stem-like cells' VEGF production and angiogenesis. J Neurosurg 2013;119(6):1415-23.
[2] Killela PJ, Reitman ZJ, Jiao Y, Bettegowda C, Agrawal N, Diaz LA, Jr., et al. TERT promoter mutations occur frequently in gliomas and a subset of tumors derived from cells with low rates of self-renewal. Proc Natl Acad Sci U S A 2013;110(15):6021-6.
[3] Hashizume R, Smirnov I, Liu S, Phillips JJ, Hyer J, McKnight TR, et al. Characterization of a diffuse intrinsic pontine glioma cell line: implications for future investigations and treatment. J Neurooncol 2012;110(3):305-13.