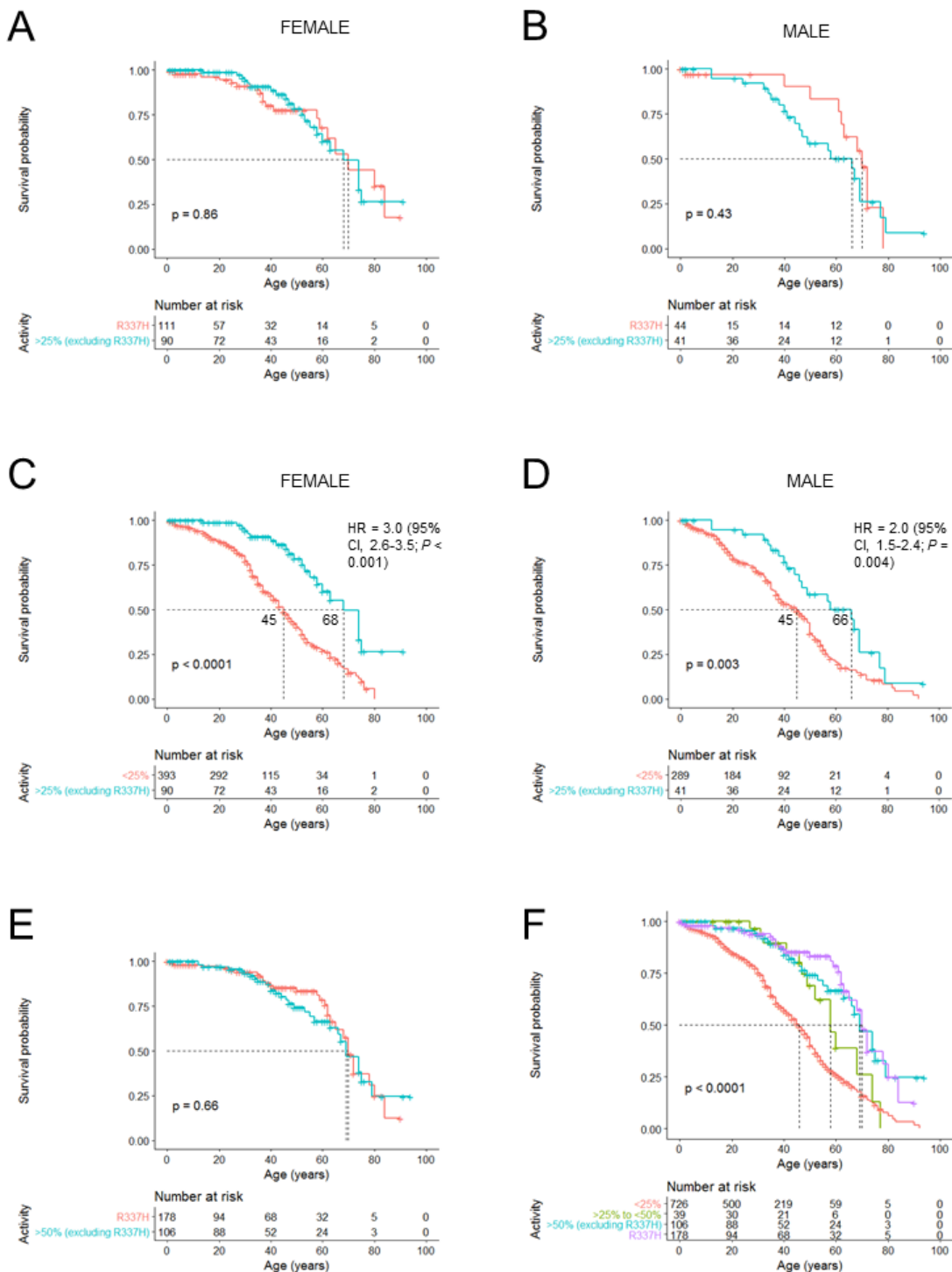


Supplemental Figure 1. Cancer-type specific survival analyses of sporadic cancer patients stratified by their mutant p53 residual transcriptional activities. The P -values (two-sided log-rank tests) for 16 cancer types at were >0.05 when comparing the survival probability of patients having p53 mutants with $>0\%$ residual transcriptional activity (relative to wild-type p53) to patients with inactive p53 mutants (0% activity). Dotted lines indicate median survival times and vertical lines on the Kaplan-Meier curves indicate patients who were censored.



Supplemental Figure 2. Lifetime cancer survival of germline *TP53* mutation carriers stratified by their mutant p53 residual transcriptional activity scores, excluding carriers of the R337H founder mutation. (A) Kaplan-Meier survival curves of female and **(B)** male patients grouped by those carrying p53 mutants with >25% transcriptional activity (excluding R337H [69% activity]) relative to wild-type p53 versus R337H carriers. **(C)** Kaplan-Meier survival curves of female and **(D)** male patients grouped by those carrying p53 mutants with <25% versus >25% transcriptional activity, excluding R337H carriers. **(E)** Kaplan-Meier survival curves of patients (pooled male and female) carrying >50% transcriptional activity (excluding R337H) versus R337H carriers. **(F)** Kaplan-Meier survival curves of patients (pooled male and female) subdivided by carriers of mutant p53 with <25% activity, >25% to <50% activity, >50% activity (excluding R337H), and R337H carriers. Dotted lines indicate median survival times and vertical lines on the Kaplan-Meier curves indicate patients who were censored. Two-sided *P*-values were calculated using the log-rank test.

Supplementary Table 1. Clinical cancer studies with *TP53* sequencing information.

Cancer study ID	Name
laml_tcga	Acute Myeloid Leukemia (TCGA, Provisional)
acyc_mskcc_2013	Adenoid Cystic Carcinoma (MSKCC, Nat Genet 2013)
ampca_bcm_2016	Ampullary Carcinoma (Baylor College of Medicine, Cell Reports 2016)
blca_mskcc_solit_2014	Bladder Cancer (MSKCC, Eur Urol 2014)
blca_mskcc_solit_2012	Bladder Cancer (MSKCC, JCO 2013)
blca_plasmacytoid_mskcc_2016	Bladder Cancer, Plasmacytoid Variant (MSKCC, Nat Genet 2016)
blca_tcga_pub	Bladder Urothelial Carcinoma (TCGA, Nature 2014)
lgg_tcga	Brain Lower Grade Glioma (TCGA, Provisional)
brca_metabric	Breast Cancer (METABRIC, Nature 2012 & Nat Commun 2016)
brca_tcga	Breast Invasive Carcinoma (TCGA, Provisional)
cesc_tcga	Cervical Squamous Cell Carcinoma and Endocervical Adenocarcinoma (TCGA, Provisional)
chol_nus_2012	Cholangiocarcinoma (National University of Singapore, Nat Genet 2012)
chol_tcga	Cholangiocarcinoma (TCGA, Provisional)
coadread_tcga	Colorectal Adenocarcinoma (TCGA, Provisional)
cscq_dfarber_2015	Cutaneous squamous cell carcinoma (DFCI, Clin Cancer Res 2015)
esca_tcga	Esophageal Carcinoma (TCGA, Provisional)
escq_icgc	Esophageal Squamous Cell Carcinoma (ICGC, Nature 2014)
egc_tmucih_2015	Gastric Adenocarcinoma (TMUCIH, PNAS 2015)
prad_cpcg_2017	Genomic Hallmarks of Prostate Adenocarcinoma (CPC-GENE, Nature 2017)
gbm_tcga_pub2013	Glioblastoma (TCGA, Cell 2013)
gbm_tcga	Glioblastoma Multiforme (TCGA, Provisional)
hnsk_tcga	Head and Neck Squamous Cell Carcinoma (TCGA, Provisional)
kich_tcga	Kidney Chromophobe (TCGA, Provisional)
kirc_tcga	Kidney Renal Clear Cell Carcinoma (TCGA, Provisional)
kirp_tcga	Kidney Renal Papillary Cell Carcinoma (TCGA, Provisional)
lihc_amc_prv	Liver Hepatocellular Carcinoma (AMC, Hepatology 2014)
lihc_tcga	Liver Hepatocellular Carcinoma (TCGA, Provisional)
lgg_ucsf_2014	Low-Grade Gliomas (UCSF, Science 2014).
luad_tcga	Lung Adenocarcinoma (TCGA, Provisional)
lusc_tcga	Lung Squamous Cell Carcinoma (TCGA, Provisional)
dlbc_tcga	Lymphoid Neoplasm Diffuse Large B-cell Lymphoma (TCGA, Provisional)
plmeso_nyu_2015	Malignant Pleural Mesothelioma (NYU, Cancer Res 2015)
mbi_icgc	Medulloblastoma (ICGC, Nature 2012)
mbi_sickkids_2016	Medulloblastoma (Sickkids, Nature 2016)
lgggbm_tcga_pub	Merged Cohort of LGG and GBM (TCGA, Cell 2016)
odg_msk_2017	NGS in Anaplastic Oligodendroglioma and Anaplastic Oligoastrocytomas tumors (MSK, Neuro Oncol 2017)

skcm_vanderbilt_mskcc_2015	Next generation sequencing (NGS) of pre-treatment metastatic melanoma samples (MSK, JCO Precision Oncology 2017)
hnsc_mdanderson_2013	Oral Squamous Cell Carcinoma (MD Anderson, Cancer Discov 2013)
ov_tcga	Ovarian Serous Cystadenocarcinoma (TCGA, Provisional)
mel_tsam_liang_2017	Paired-exome sequencing of acral melanoma (TGEN, Genome Res 2017)
paad_tcga	Pancreatic Adenocarcinoma (TCGA, Provisional)
thyroid_mskcc_2016	Poorly-Differentiated and Anaplastic Thyroid Cancers (MSKCC, JCI 2016)
pcnsl_mayo_2015	Primary Central Nervous System Lymphoma (Mayo Clinic, Clin Cancer Res 2015)
prad_tcga	Prostate Adenocarcinoma (TCGA, Provisional)
prad_mich	Prostate Adenocarcinoma, Metastatic (Michigan, Nature 2012)
hnc_mskcc_2016	Recurrent and Metastatic Head & Neck Cancer (MSKCC, JAMA Oncol 2016)
sarc_tcga	Sarcoma (TCGA, Provisional)
skcm_tcga	Skin Cutaneous Melanoma (TCGA, Provisional)
sclc_ucologne_2015	Small Cell Lung Cancer (U Cologne, Nature 2015)
stad_tcga	Stomach Adenocarcinoma (TCGA, Provisional)
stes_tcga_pub	TCGA data for Esophagus-Stomach Cancers (TCGA, Nature 2017)
urcc_mskcc_2016	Targeted gene sequencing in 62 high-grade primary Unclassified Renal Cell Carcinoma (MSK, Nature 2016)
crc_msk_2017	Targeted sequencing of 1134 samples from metastatic colorectal cancer samples (MSK, Cancer Cell 2017)
tgct_tcga	Testicular Germ Cell Cancer (TCGA, Provisional)
thym_tcga	Thymoma (TCGA, Provisional)
ucec_tcga	Uterine Corpus Endometrial Carcinoma (TCGA, Provisional)
panet_arcnet_2017	Whole-Genome Sequencing of Pancreatic Neuroendocrine Tumors (Nature, 2017)
skcm_ucla_2016	Whole-exome sequences (WES) of pretreatment melanoma tumors (UCLA, Cell 2016)

Supplementary Table S2. Clinically observed *TP53* mutations with transcriptional activity scores.

Mutation	TA.median	TA.SE
A161D	0.0	0.5
A276D	0.0	0.1
A276G	0.0	6.1
A276P	0.0	0.1
C238F	0.0	0.6
C242G	0.0	0.0
C242R	0.0	0.1
C242S	0.0	0.0
C242Y	0.0	0.0
C275F	0.0	0.0
C275G	0.0	0.1
C275Y	0.0	0.1
C277F	0.0	0.2
D281A	0.0	0.0
D281H	0.0	0.2
D281N	0.0	0.1
D281V	0.0	0.1
E171G	0.0	0.7
E258A	0.0	0.1
F109V	0.0	0.7
F270C	0.0	0.3
F270S	0.0	0.2
G244C	0.0	0.6
G244S	0.0	0.3
G244V	0.0	0.0
G245C	0.0	0.0
G245S	0.0	3.9
G245V	0.0	0.0
G266V	0.0	0.2
I232S	0.0	0.4
I251F	0.0	5.8
I254S	0.0	0.2
K132E	0.0	0.1
K305M	0.0	0.4
L252P	0.0	0.1
L265P	0.0	0.0
L330R	0.0	0.6
M246I	0.0	17.8
M246R	0.0	0.6

M246V	0.0	7.0
N247I	0.0	1.6
P278H	0.0	0.1
P278T	0.0	0.6
R213L	0.0	0.5
R213Q	0.0	0.5
R248G	0.0	0.1
R248L	0.0	0.1
R248Q	0.0	0.2
R248W	0.0	0.1
R249G	0.0	0.5
R249M	0.0	0.0
R249T	0.0	0.3
R249W	0.0	1.4
R267P	0.0	0.3
R273H	0.0	2.0
R273L	0.0	0.2
R273P	0.0	0.2
R280T	0.0	0.1
R282G	0.0	0.1
R282P	0.0	0.0
R282W	0.0	0.1
R283H	0.0	0.2
S241C	0.0	0.1
S241F	0.0	0.1
S241T	0.0	2.9
S241Y	0.0	1.3
V173G	0.0	0.5
V173L	0.0	0.8
V216G	0.0	0.4
V274D	0.0	0.3
V274F	0.0	0.2
Y220N	0.0	0.2
Y220S	0.0	0.3
Y234N	0.0	0.4
E286G	0.1	0.4
R280I	0.1	0.1
I251L	0.1	2.7
Y234H	0.1	0.4
G244D	0.2	16.4
C277Y	0.2	0.2

G279E	0.2	0.8
R267G	0.2	3.6
M237I	0.4	1.4
R273C	0.4	0.3
C238R	0.4	5.9
Y236C	0.5	2.9
Y220D	0.5	0.6
R280K	0.7	0.2
G245R	0.8	1.9
Y234S	0.8	0.7
N239T	0.9	0.8
V272G	0.9	0.7
I232N	1.0	0.5
R267W	1.0	10.8
G266E	1.2	0.7
V216M	1.2	1.6
S215R	1.2	0.4
P278R	1.4	0.7
P278S	1.4	1.0
Y220H	1.4	0.7
G244R	1.8	0.9
G199V	2.0	0.8
Y220C	2.3	1.0
R283P	2.4	1.7
I251S	2.4	0.9
P278L	2.4	0.6
R213G	2.6	9.0
E286A	2.7	0.7
D281E	2.8	0.6
R213P	3.0	4.2
C275R	3.0	0.9
G245D	3.1	1.4
Y236D	3.1	1.5
G279R	3.2	14.4
L194P	3.5	1.2
V274G	3.5	1.2
P250L	4.2	2.0
E285K	4.4	0.7
V274L	4.4	0.9
I232T	4.6	1.3
I255F	4.6	2.2

P151S	5.2	1.9
E258K	5.4	1.1
Y163C	5.6	3.4
V274A	5.8	1.7
D281Y	6.3	1.5
C135Y	6.6	2.0
P151A	6.6	2.9
R248P	6.6	1.5
F134L	6.6	2.1
S127P	6.6	2.0
C176S	6.7	2.7
P151R	6.7	1.8
V216L	6.7	1.8
F113V	6.8	2.5
H178P	7.1	2.7
K132Q	7.1	2.5
K132T	7.1	2.5
C242F	7.1	2.5
C141R	7.2	2.1
D259Y	7.2	1.8
L111R	7.2	1.4
R156P	7.2	1.4
R158P	7.2	2.1
S127C	7.2	1.7
C135F	7.3	2.1
K132N	7.3	2.1
V143E	7.3	2.2
A159D	7.5	2.2
D208V	7.5	1.2
Y163N	7.5	1.9
V143M	7.5	2.3
C176R	7.6	2.3
F134V	7.6	2.2
H178D	7.6	2.4
T125K	7.6	2.7
A159P	7.7	2.2
M133R	7.7	2.0
V157D	7.7	1.5
V157G	7.7	1.7
V173M	7.7	2.1
P151H	7.8	1.8

T125P	7.8	1.8
F134C	7.8	2.0
F341S	7.9	1.9
Y126D	7.9	2.1
G105V	7.9	1.9
T125R	7.9	2.6
C135R	8.0	1.5
A138P	8.1	2.1
C141Y	8.1	1.9
L130P	8.1	2.1
R337P	8.1	0.8
Y126N	8.1	2.1
H214R	8.3	2.2
L111P	8.3	1.7
Y205C	8.3	2.0
K132M	8.4	2.8
L194H	8.6	2.2
I255S	8.6	2.3
L145R	8.6	2.1
R175G	8.6	2.5
H193R	8.7	2.0
T155P	8.7	1.2
C176W	8.8	2.8
E285V	8.9	2.6
D281G	9.0	2.0
H193L	9.0	2.0
T155N	9.0	1.4
L111Q	9.1	1.3
R175H	9.2	2.2
Y205S	9.2	2.0
R110P	9.2	1.6
Y126S	9.2	1.9
L344P	9.3	2.1
R273G	9.3	2.9
I255T	9.3	2.3
N131I	9.3	1.8
R337S	9.4	1.9
Y205N	9.4	1.9
I195S	9.5	2.3
Y126C	9.6	1.8
R196P	9.6	2.0

S215G	9.6	1.7
C141G	9.8	1.5
S127Y	9.8	2.3
F109S	9.9	1.9
L145P	10.0	4.8
L194R	10.0	2.3
V216E	10.0	3.7
I195N	10.1	2.3
F113C	10.1	1.7
I195F	10.1	2.1
K132R	10.1	2.5
R249S	10.1	2.7
K120E	10.2	3.2
R280G	10.2	3.6
Y107D	10.2	2.1
Y163H	10.2	1.9
I255N	10.3	2.6
R273S	10.3	3.1
R342P	10.3	2.0
E258D	10.3	2.0
M133K	10.5	1.9
S127F	10.5	2.0
Y234C	10.6	1.9
L145Q	10.6	2.1
K164E	10.7	3.5
V197E	10.7	2.6
F270I	10.7	1.9
D259V	10.8	2.0
L257Q	11.0	2.1
V157F	11.0	1.8
L330P	11.1	3.3
V143A	11.1	2.2
N239I	11.1	5.8
G262V	11.3	2.0
H193D	11.3	2.4
Q136E	11.3	2.5
V217G	11.3	2.4
I195T	11.4	2.1
G154V	11.5	1.4
P278A	11.5	2.5
H193P	11.8	2.2

L257V	11.9	3.1
R280S	11.9	3.3
R158G	11.9	1.8
Y236H	11.9	2.6
L194F	12.0	8.8
P177R	12.0	9.5
C277G	12.1	2.9
I254T	12.1	2.9
G266R	12.3	1.8
L344R	12.3	3.4
S127T	12.4	1.7
R110L	12.6	1.9
S240G	12.6	13.7
C238S	12.8	2.5
C176G	12.9	5.2
R158S	13.0	8.8
R249K	13.0	7.5
C238G	13.1	2.2
R156G	13.1	1.2
F109C	13.2	3.0
C176Y	13.2	7.9
V143G	13.2	1.9
C141W	13.3	2.8
L265R	13.4	1.8
P177L	13.5	4.3
Y236S	13.6	2.3
G105R	13.7	5.3
E286Q	13.7	2.0
G105C	13.8	4.3
L350P	13.8	3.4
Y205F	13.8	2.4
S215N	14.1	2.5
N239D	14.2	3.1
R181P	14.2	2.7
H168P	14.3	1.5
P152R	14.4	1.6
R158L	14.4	1.7
V197G	14.4	1.9
C238Y	14.5	2.4
F270V	14.5	2.8
H193N	14.6	1.9

T125M	14.6	3.2
C124R	14.6	1.9
Y205H	14.8	2.5
R337C	15.2	3.0
C135G	15.3	1.1
L257P	15.4	2.4
H193Y	15.6	3.5
P151T	15.6	1.0
T155I	15.6	1.2
V172G	15.6	3.4
P152Q	15.7	1.5
E286K	15.8	2.4
S215I	15.9	1.1
K120N	16.0	12.6
I162F	16.0	5.4
H168L	16.1	2.1
P152L	16.1	1.7
N239S	16.1	2.5
A159V	16.3	2.1
H178Q	16.5	8.5
A347D	16.6	8.1
P27L	16.7	6.9
H179Q	16.8	8.7
L130R	16.8	2.1
H168R	17.0	1.7
E271V	17.0	5.0
T253A	17.1	3.6
V272M	17.2	1.8
M237K	17.4	2.0
R337L	17.6	3.8
I254F	17.7	3.8
C135S	18.0	2.6
L130F	18.0	1.2
K351E	18.1	9.9
R306P	18.1	3.9
V157L	18.1	3.6
L130V	18.3	1.4
F270L	18.5	1.8
K139N	18.5	10.0
V172F	18.6	2.2
Y126H	18.7	3.9

M133T	18.8	1.7
V272L	18.8	3.2
Q136H	19.1	6.1
R306Q	19.2	3.3
H179R	19.3	7.0
R158H	19.4	5.6
R174W	19.5	2.5
F113L	19.9	5.8
G105D	20.1	7.8
N268I	20.3	3.5
A161S	20.6	9.6
T211I	21.2	1.3
R267Q	21.5	14.0
A161T	21.6	4.3
H179L	22.0	11.1
H179Y	22.0	5.7
G154C	22.2	5.7
H179D	22.3	3.9
E180K	22.8	9.0
G154S	22.8	7.2
T211A	23.4	3.1
E271K	23.4	2.4
C176F	23.7	13.3
H179N	23.8	4.8
S227P	24.9	5.7
R174G	25.1	12.0
P190L	25.3	1.8
R267L	25.7	15.0
V197L	25.8	3.9
H178N	26.1	5.6
A189D	26.5	5.6
P177S	26.9	19.0
C124G	27.1	3.6
E258Q	27.2	3.2
F341V	27.5	2.2
R158C	27.9	11.2
H179P	28.0	8.4
M237V	28.1	7.0
T256I	28.3	4.3
C141S	28.8	9.7
T125A	29.8	6.3

R282Q	30.5	14.7
V197M	30.6	4.7
C229R	30.7	4.2
N345D	32.4	2.5
R181C	32.4	13.8
P190R	34.7	6.0
T253I	35.5	6.2
V272A	35.6	6.3
N235D	37.6	5.6
C135W	38.5	7.5
R175L	38.9	7.9
P190T	39.5	8.5
G334W	41.5	3.1
R181H	42.2	13.6
Q144H	45.5	15.3
G334V	45.9	2.7
M169I	46.4	6.6
S106R	47.3	5.9
E271Q	50.3	5.9
R156H	52.7	18.1
F338I	53.0	5.3
Q144L	54.6	15.4
R110H	55.0	13.7
R196Q	55.7	13.3
F134Y	61.4	10.4
Q167K	63.3	16.6
S240C	64.5	15.2
L188P	65.1	7.2
A138V	68.0	14.5
T170M	68.4	17.6
R337H	69.0	6.1
G187C	71.0	5.6
R175C	72.5	17.6
P71S	72.7	11.2
V157I	74.7	15.4
P82L	76.2	9.3
M169T	76.4	10.7
G187R	77.7	4.9
R379H	77.8	7.0
R282L	77.9	10.9
G187S	78.7	6.5

E358V	80.6	4.7
S378P	81.0	6.2
S366A	81.7	5.5
A189V	83.5	7.1
R202C	83.6	9.0
Q331H	84.8	8.5
G334R	86.6	5.8
L137Q	87.1	12.1
K351N	88.7	6.0
S376C	89.4	7.4
P72S	90.8	11.7
M340T	93.4	4.8
P72R	93.6	9.1
S227T	93.8	5.9
A138S	97.6	8.7
D48N	98.4	17.6
R283C	99.2	17.8
K139E	100.4	12.4
D352Y	101.0	6.1
R342L	101.6	6.5
C124Y	102.0	10.1
R333C	102.3	6.1
P222L	102.9	22.2
G325V	104.4	8.9
P27S	105.8	12.0
V31I	108.8	10.3
E224D	108.8	7.4
Q317R	109.1	11.9
G293W	112.5	12.7
P77L	114.4	13.9
E11K	116.3	10.6
E285Q	118.6	9.9
D324G	122.4	16.0
V218G	123.2	17.7
N235S	123.2	12.2
R335S	127.4	8.0
E11Q	128.9	14.6
R290L	138.6	15.8
R290H	140.9	20.7
N210Y	143.5	21.6
T284S	148.3	13.2

P309S	151.2	15.5
L289F	184.8	15.3

Supplementary Table S3. Clinically observed sporadic and germline *TP53* mutations in cancer patients corresponding to risk groups identified by the residual transcriptional activity score of mutant p53 proteins relative to wild-type p53

Sporadic <i>TP53</i> mutations	Germline <i>TP53</i> mutations
0% Transcriptional Activity	<25% Transcriptional Activity
A161D A276D A276G A276P C238F C242G C242R C242S C242Y C275F C275G C275Y C277F D281A D281H D281N D281V E171G E258A F109V F270C F270S G244C G244S G245C G245S G245V G266V I232S I251F I254S K132E L252P L265P L330R M246I M246R M246V N247I P278H P278T R213L R213Q R248G R248L R248Q R248W R249G R249M R249T R249W R267P R273H R273L R273P R280T R282G R282P R282W R283H S241C S241F S241Y V173G V173L V216G V274D V274F Y220N Y220S Y234N	A138P A347D C141Y C238G C238S C238Y C242R C242Y C275F C275Y C277Y D281E D281G D281N D281V D281Y E180K E258K E271V E285K E285V E286A E286K G105C G154V G199V G244D G244S G244V G245C G245D G245S G245V G266E G279R H178D H178Q H179Q H179Y H193P H193R H193Y H214R H233D I162F I162N I195T I232T I254T K132E K132Q K305M L130F L130H L130P L194F L257Q L265P L344P M133R M133T M237I M246T M246V N131I P151A P151S P151T P152L P177R P219S P278A P278L P278S R110L R110P R158G R158H R158L R175G R175H R181P R196P R213P R213Q R248L R248Q R248W R267Q R267W R273C R273G R273H R273L R273S R280K R280T R282G R282W R283H R306P R306Q R337C R337P R342P S127T S241F S241T S241Y T125P T125R T155I T155N V143A V143M V157D V172F V173M V197E V272L V274A Y126C Y163C Y220C Y220S Y234C Y234H Y236C
>0% to <5% Transcriptional Activity	>25% to <50% Transcriptional Activity
C238R C275R D281E E285K E286A E286G G199V G244D G244R G245D G245R G266E G279E G279R I232N I232T I251L I251S I255F L194P M237I N239T P250L P278L P278R P278S R213G R213P R267G R267W R273C R280I R280K R283P S215R V216M V272G V274G V274L Y220C Y220D Y220H Y234H Y234S Y236C Y236D	A189D C229R G108S I251M K321E N235D P190L P359L R158C R174G R175L R181C R181H R282Q S106R T256I V197M
>5% Transcriptional Activity	>50% Transcriptional Activity
A138V A159D A159P A159V A161S A161T C124G C124R C124Y C135F C135G C135R C135S C135WC135Y C141G C141R C141S C141WC141Y C176F C176G C176R C176S C176WC176Y C238G C238S C238Y C242F C277G D208V D259V D259Y D281G D281Y D324G D352Y D48N E11K E11Q E180K E224D E258D E258K E258Q E271K E271Q E271V E285V E286K E286Q F109C F109S F113C F113L F113V F134C F134L F134V F270I F270L F270V F338I F341S F341V G105C G105D G105R G105V G154C G154S G154V G187C G187R G187S G262V G266R G334V G334W H168L H168P H168R H178D H178N H178P H178Q H179D H179L H179N H179P H179Q H179R H179Y H193D H193L H193N H193P H193R H193Y H214R I162F I195F I195N I195S I195T I254F I255N I255S I255T K120E K120N K132M K132N K132R K132T K139E K139N K164E K351E K351N L111P L111Q L111R L130F L130P L130R L130V L137Q L145P L145Q L145R L194F L194H L194R L257P L257Q L257V L265R L289F L330P L344R L350P M133K M133T M169I M169T M237K M237V M340T N131I N239D N239I N239S N268I N345D P151A P151H P151R P151S P151T P152L P152Q P152R P177L P177R P177S P190L P190R P190T P278A P27L P27S P71S P72R P72S P77L Q136E Q136H Q144H Q144L Q317R Q331H R110H R110L R110P R156G R156P R158C R158G R158H R158L R158P R158S R174W R175C R175G R175H R175L R181C R181H R181P R196P R248P R249K R249S R267L R273G R273S R280G R280S R282L R282Q R335S R337C R337H R337L R337S R342L R342P S106R S127C S127F S127P S127Y S215G S215I S215N S227P S240C S240G S376C S378P T125A T125K T125M T125P T125R T155I T155N T155P T211A T211I T253A T253I T256I V143A V143E V143G V143M V157D V157F V157G V157L V172F V172G V173M V197E V197G V197L V197M V216E V216L V217G V218G V272A V272L V272M V274A Y107D Y126C Y126D Y126H Y126N Y126S Y163C Y163H Y163N Y205C Y205F Y205H Y205N Y205S Y234C Y236H Y236S	A138S A138V A189V E11Q E224D E285Q E298K E358V F134Y G293W G325V G334R H365Y K292I L188P N210Y N235S P222L P309S P82L Q144L Q167K Q317H R110H R156H R181L R196Q R202C R283C R290H R290L R333C R337H R379H S185N S227T S366A T170M T284S V157I V31I V97I Y107H