

Supplementary Table 1. Panel of 83 targeted genes.

ABL1	BRCA2	FGFR2	KIT	PTCH1
AKT1	CDH1	FGFR3	KRAS	PTCH2
AKT2	CDK4	FLT3	MDM2	PTEN
AKT3	CDK6	GNA11	MET	PTPN11
ALK	CDKN2A	GNAQ	MLH1	RB1
APC	CSF1R	GNAS	MPL	RET
ARID1A	CTNNB1	HNF1A	MTOR	ROS1
ARID1B	DDR2	HRAS	NF1	SMAD4
ARID2	EGFR	IDH1	NOTCH1	SMARCB1
ATM	EPHB4	IDH2	NPM1	SMO
ATRX	ERBB2	IGF1R	NRAS	SRC
AURKA	ERBB3	ITK	NTRK1	STK11
AURKB	ERBB4	JAK1	PDGFRA	SYK
BCL2	EZH2	JAK2	PDGFRB	TOP1
BRAF	FBXW7	JAK3	PIK3CA	TP53
BRCA1	FGFR1	KDR	PIK3R1	VHL
EWSR1	TMPRSS2	TERT		

Supplementary Table 2. Patient list and characteristics

Sample	Age	Sex	Tumor location	Tumor size (cm)	Tissue acquisition site	Tissue acquisition method	Final pathology	Differentiation	KRAS	position
YPAC-2, YPAC2-PDX	M 65		Tail	2	Liver	EUS biopsy	pancreatic ductal adenocarcinoma	MD	GGT->GGT	p.Gly12Arg G12R
YPAC-5, YPAC5-PDX	M 48		head	5	Pancreas	Surgery	undifferentiated carcinoma with osteoclast-like giant cell	N/A	GGT->GAT	p.Gly12Asp G12D
YPAC-6	F 73		tail	3.2	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Val G12V
YPAC-7	F 75		head	4	Pancreas	Surgery	pancreatic ductal adenocarcinoma	PD	N/A*	N/A
YPAC-10	F 67		head	1.2	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Arg G12R
YPAC-13	M 69		head	2.7	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Val G12V
YPAC-15	F 61		tail	7	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	PD	GGT->GTT	p.Gly12Val G12V
YPAC-16	M 53		head	2	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->GAT	p.Gly12Asp G12D
YPAC-17	M 65		body	2.4	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Val G12V
YPAC-20	M 55		body	1.8	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GAT	p.Gly12Asp G12D
YPAC-21, YPAC21-PDX	F 80		tail	3.5	Pancreas	EUS-FNB	N/A**	N/A	GGT->GAT	p.Gly12Asp G12D
YPAC-23	F 81		head	3.4	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GAT	p.Gly12Asp G12D
YPAC-25	M 54		tail	2.7	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	N/A	N/A
YPAC-26	M 57		head	1.8	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	WD	GGT->TGT	p.Gly12Cys G12C
YPAC-27	F 66		head	2.8	Pancreas	Surgery	pancreatic ductal adenocarcinoma	PD	GGT->GTT	p.Gly12Val G12V
YPAC-28	F 71		tail	3.7	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Val G12V
YPAC-29	M 63		body	3.6	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	MD	GGT->GAT	p.Gly12Asp G12D
YPAC-30	M 59		body	6	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->CGT	p.Gly12Arg G12R
YPAC-31	M 62		head	5.5	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->GAT	p.Gly12Asp G12D
YPAC-32	F 58		head	2.2	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Val G12V
YPAC-33	M 67		tail	7.4	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->GTT	p.Gly12Val G12V
YPAC-34	M 62		head	2.7	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	PD	CAA->CAC	p.Gln61His Q61H
YPAC-35	M 79		body	14.9	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	PD	GGT->GTT	p.Gly12Val G12V
YPAC-37	F 61		body	6	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->GTT	p.Gly12Val G12V
YPAC-39	M 62		body	2.7	Pancreas	Surgery	pancreatic ductal adenocarcinoma	MD	GGT->GTT	p.Gly12Val G12V
YPAC-43	F 51		body	4.1	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	MD	GGT->GAT	p.Gly12Asp G12D
YPAC-44	F 74		body	1.8	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->GAT	p.Gly12Asp G12D
YPAC-46	M 72		head	2.5	Pancreas	EUS-FNB	pancreatic ductal adenocarcinoma	N/A	GGT->GTT	p.Gly12Val G12V

EUS-FNB, Endoscopic ultrasound guided fine needle biopsy

WD, well differentiation; MD, moderate differentiation; PD, poorly differentiation

N/A, not applicable

*, KRAS was confirmed with targeted sequencing. But sanger sequencing was not performed due to low amount of DNA.

**, Final pathology was not confirmed in YPAC-21 because primary biopsy did not show the presence of atypical cell and second biopsy was impossible due to old age. But, computed tomography image and tumor marker showed pancreatic ductal adenocarcinoma

Supplementary Table 3. Sample information

Patient	Control		PrimaryTumor			CRC		
	Mapping Rate	Mapping Depth	Mapping Rate	Mapping Depth	Contamination Rate	Mapping Rate	Mapping Depth	Contamination Rate
YPAC-2	99.62%	28.54	99.77%	2037.79	0.10%	99.90%	1181.78	0.10%
YPAC-5	99.80%	50.48	99.49%	1773.5	0.10%	99.92%	1304.72	0.50%
YPAC-6	99.80%	41.38	99.51%	1842.09	0.10%	99.89%	774.65	0.20%
YPAC-10	99.86%	63.95	99.52%	1175.57	0.10%	99.88%	1818.42	0.10%
YPAC-13	87.10%	88.87	99.70%	912.38	0.10%	99.70%	982	0.10%
YPAC-15	99.96%	91.46	97.77%	2562.98	0.10%	98.07%	2803.81	0.10%
YPAC-17	99.69%	45.67	99.66%	771	0.10%	99.77%	974.9	0.10%
YPAC-23	99.42%	50.24	99.73%	985.92	0.10%	99.77%	1064.17	0.10%
YPAC-26	99.97%	70.41	96.89%	2696.18	0.10%	97.37%	2417.48	0.10%

Supplementary Table 4. Single-nucleotide polymorphism list

Sample	Gene	Chromosome	Position	Reference	Alternate	Mutation Type	Primary Tumor		CRC
				Allele	Allele		Allele Frequency	Allele Frequency	Allele Frequency
YPAC-02	ATRX	chrX	76763808	C	T	3_prime_UTR_variant	0.08		0
YPAC-02	KRAS	chr12	25398285	C	G	missense_variant	0.53		0.82
YPAC-02	TP53	chr17	7578419	C	A	stop_gained	0.45		1
YPAC-05	AKT1	chr14	105236684	C	T	synonymous_variant	0.18		0.65
YPAC-05	BRAF	chr7	140494246	C	T	synonymous_variant	0.25		0.61
YPAC-05	KRAS	chr12	25398284	C	T	missense_variant	0.87		0.85
YPAC-05	TP53	chr17	7578524	G	A	stop_gained	0.39		0.99
YPAC-06	KRAS	chr12	25398284	C	A	missense_variant	0.13		0.77
YPAC-06	NTRK1	chr1	156846287	C	T	synonymous_variant	0.08		0.19
YPAC-06	TP53	chr17	7577094	G	A	missense_variant	0.15		0.96
YPAC-10	ARID1A	chr1	27087535	CG	C	frameshift_variant	0.11		0.5
YPAC-10	KRAS	chr12	25398285	C	G	missense_variant	0.12		0.44
YPAC-10	NRAS	chr1	115251293	G	GA	intron_variant	0.1		0.5
YPAC-10	SMAD4	chr18	48581304	C	CA	frameshift_variant	0.11		0.91
YPAC-10	TP53	chr17	7577120	C	T	missense_variant	0.12		0.91
YPAC-13	CDKN2A	chr9	21974695	G	GT	frameshift_variant&stop_gained	0.24		0.5
YPAC-13	KRAS	chr12	25398284	C	A	missense_variant	0.27		0.49
YPAC-13	SMAD4	chr18	48584513	TG	T	frameshift_variant	0.23		0.54
YPAC-13	TP53	chr17	7578190	T	C	missense_variant	0.22		0.53
YPAC-15	ERBB4	chr2	212495336	GA	G	intron_variant,	0.01		0.07
YPAC-15	GNAQ	chr9	80646047	G	A	synonymous_variant	0.05		0.07
YPAC-15	KIT	chr4	55593762	G	A	intron_variant	0.06		0.13
YPAC-15	KRAS	chr12	25398284	C	A	missense_variant	0.78		0.92
YPAC-15	TP53	chr17	7578263	G	A	stop_gained	0.37		0.97
YPAC-17	ARID1A	chr1	27094310	GA	G	frameshift_variant	0.18		0.5
YPAC-17	KRAS	chr12	25398284	C	A	missense_variant	0.19		0.44
YPAC-17	NPM1	chr5	170820024	G	A	intron_variant	0.33		0.02
YPAC-17	SMAD4	chr18	48603062	C	T	stop_gained	0.19		0.93
YPAC-17	TP53	chr17	7577599	C	CAA	frameshift_variant	0.22		0.96
YPAC-23	ARID2	chr12	46230554	C	CT	frameshift_variant	0.18		0.51
YPAC-23	ATM	chr11	108124566	G	T	stop_gained	0.17		0.47
YPAC-23	CDKN2A	chr9	21971193	G	GC	frameshift_variant	0.36		1
YPAC-23	KDR	chr4	55976689	G	A	missense_variant	0.17		0.5
YPAC-23	KRAS	chr12	25398284	C	T	missense_variant	0.18		0.48
YPAC-26	KRAS	chr12	25398285	C	A	missense_variant	0.37		0.68
YPAC-26	TP53	chr17	7578370	C	A	intron_variant,	0.35		1

Supplementary Table 5. Copy number variant list

Sample	Gene	Primary Tumor Copy Number	CRC Copy Number
YPAC-02	ABL1	1.82	1.82
YPAC-02	AKT1	2.18	2.38
YPAC-02	AKT2	2.41	3.13
YPAC-02	AKT3	2.21	2.32
YPAC-02	ALK	2.2	2.1
YPAC-02	APC	2.04	2.11
YPAC-02	ARID1A	2.04	2.24
YPAC-02	ARID1B	1.69	1.16
YPAC-02	ARID2	1.97	1.14
YPAC-02	ATM	2.12	2.46
YPAC-02	ATRX	1.23	1.18
YPAC-02	AURKA	2.13	2.16
YPAC-02	AURKB	1.79	1.64
YPAC-02	BCL2	1.73	1.72
YPAC-02	BRAF	2.44	2.59
YPAC-02	BRCA1	2	1.64
YPAC-02	BRCA2	2.01	1.49
YPAC-02	CDH1	1.8	1.63
YPAC-02	CDK4	1.97	2.18
YPAC-02	CDK6	2.44	2.59
YPAC-02	CDKN2A	1.65	0.96
YPAC-02	CSF1R	2.04	2.11
YPAC-02	CTNNB1	1.96	1.66
YPAC-02	DDR2	2.21	2.32
YPAC-02	EGFR	3.03	3.2
YPAC-02	EPHB4	2.44	2.59
YPAC-02	ERBB2	2	1.64
YPAC-02	ERBB3	1.97	2.18
YPAC-02	ERBB4	2.45	2.7
YPAC-02	EWSR1	2.07	2.29
YPAC-02	EZH2	2.44	2.59
YPAC-02	FBXW7	2.12	1.65
YPAC-02	FGFR1	2.24	2.22
YPAC-02	FGFR2	2.19	2.62
YPAC-02	FGFR3	1.89	1.74
YPAC-02	FLT3	2.01	1.49
YPAC-02	GNA11	1.59	1.15
YPAC-02	GNAQ	1.82	1.82
YPAC-02	GNAS	2.13	2.16

YPAC-02	HNF1A	1.97	2.18
YPAC-02	HRAS	2.03	2.27
YPAC-02	IDH1	2.45	2.7
YPAC-02	IDH2	2.32	1.81
YPAC-02	IGF1R	2.32	1.81
YPAC-02	ITK	2.04	2.11
YPAC-02	JAK1	2.04	2.24
YPAC-02	JAK2	1.65	0.96
YPAC-02	JAK3	1.59	1.15
YPAC-02	KDR	2.12	1.65
YPAC-02	KIT	2.12	1.65
YPAC-02	KRAS	3.89	3.96
YPAC-02	MDM2	1.97	2.18
YPAC-02	MET	2.44	2.59
YPAC-02	MLH1	1.96	1.66
YPAC-02	MPL	2.04	2.24
YPAC-02	MTOR	2.04	2.24
YPAC-02	NF1	2	1.64
YPAC-02	NOTCH1	1.82	1.82
YPAC-02	NPM1	2.04	2.11
YPAC-02	NRAS	2.04	2.24
YPAC-02	NTRK1	2.21	2.32
YPAC-02	PDGFRA	2.12	1.65
YPAC-02	PDGFRB	2.04	2.11
YPAC-02	PIK3CA	2.1	2.79
YPAC-02	PIK3R1	2.04	2.11
YPAC-02	PTCH1	1.82	1.82
YPAC-02	PTCH2	2.04	2.24
YPAC-02	PTEN	2.19	2.62
YPAC-02	RB1	2.01	1.49
YPAC-02	RET	2.19	2.62
YPAC-02	ROS1	1.69	1.16
YPAC-02	SMAD4	1.73	1.72
YPAC-02	SMARCB1	2.07	2.29
YPAC-02	SMO	2.44	2.59
YPAC-02	SRC	2.13	2.16
YPAC-02	STK11	1.59	1.15
YPAC-02	SYK	1.82	1.82
YPAC-02	TERT	2.09	2.11
YPAC-02	TMPRSS2	2.01	2.06
YPAC-02	TOP1	2.13	2.16
YPAC-02	TP53	1.79	1.64
YPAC-02	VHL	1.96	1.66

YPAC-05	ABL1	2.02	3.11
YPAC-05	AKT1	1.97	2.35
YPAC-05	AKT2	2.06	2.41
YPAC-05	AKT3	1.92	2.17
YPAC-05	ALK	2.27	2.4
YPAC-05	APC	2.23	2.44
YPAC-05	ARID1A	1.86	1.58
YPAC-05	ARID1B	2.2	2.85
YPAC-05	ARID2	1.94	1.48
YPAC-05	ATM	1.71	0.92
YPAC-05	ATRX	1.28	1.5
YPAC-05	AURKA	2.02	2.05
YPAC-05	AURKB	1.91	2.41
YPAC-05	BCL2	1.83	1.65
YPAC-05	BRAF	2.04	1.86
YPAC-05	BRCA1	2.03	2.14
YPAC-05	BRCA2	2.16	2.11
YPAC-05	CDH1	1.83	2.11
YPAC-05	CDK4	1.94	1.48
YPAC-05	CDK6	2.04	1.86
YPAC-05	CDKN2A	2.32	0.01
YPAC-05	CSF1R	2.23	2.44
YPAC-05	CTNNB1	1.92	2.16
YPAC-05	DDR2	1.92	2.17
YPAC-05	EGFR	2.23	2.05
YPAC-05	EPHB4	2.04	1.86
YPAC-05	ERBB2	2.03	2.14
YPAC-05	ERBB3	1.94	1.48
YPAC-05	ERBB4	2.17	1.44
YPAC-05	EWSR1	1.84	2.12
YPAC-05	EZH2	2.04	1.86
YPAC-05	FBXW7	1.92	1.51
YPAC-05	FGFR1	1.78	2.23
YPAC-05	FGFR2	2.35	2.33
YPAC-05	FGFR3	2.34	3.08
YPAC-05	FLT3	2.16	2.11
YPAC-05	GNA11	1.92	1.35
YPAC-05	GNAQ	2.02	3.11
YPAC-05	GNAS	2.02	2.05
YPAC-05	HNF1A	1.94	1.48
YPAC-05	HRAS	2.12	2.11
YPAC-05	IDH1	2.17	1.44
YPAC-05	IDH2	2.16	2.26

YPAC-05	IGF1R	2.16	2.26
YPAC-05	ITK	2.23	2.44
YPAC-05	JAK1	1.86	1.51
YPAC-05	JAK2	2.32	3.42
YPAC-05	JAK3	1.92	1.35
YPAC-05	KDR	1.92	1.51
YPAC-05	KIT	1.92	1.51
YPAC-05	KRAS	8.06	6.25
YPAC-05	MDM2	1.94	1.48
YPAC-05	MET	2.04	1.86
YPAC-05	MLH1	1.92	2.16
YPAC-05	MPL	1.86	3.17
YPAC-05	MTOR	1.86	1.58
YPAC-05	NF1	2.03	2.14
YPAC-05	NOTCH1	2.02	3.11
YPAC-05	NPM1	2.23	2.44
YPAC-05	NRAS	1.86	1.51
YPAC-05	NTRK1	1.92	2.17
YPAC-05	PDGFRA	1.92	1.51
YPAC-05	PDGFRB	2.23	2.44
YPAC-05	PIK3CA	2.1	2.81
YPAC-05	PIK3R1	2.23	2.44
YPAC-05	PTCH1	2.02	3.11
YPAC-05	PTCH2	1.86	3.17
YPAC-05	PTEN	2.35	2.33
YPAC-05	RB1	2.16	2.11
YPAC-05	RET	2.35	2.33
YPAC-05	ROS1	2.2	2.85
YPAC-05	SMAD4	1.83	1.65
YPAC-05	SMARCB1	2.05	1.91
YPAC-05	SMO	2.04	1.86
YPAC-05	SRC	2.02	2.05
YPAC-05	STK11	1.92	1.35
YPAC-05	SYK	2.02	3.11
YPAC-05	TMPRSS2	1.96	2.46
YPAC-05	TOP1	2.02	2.05
YPAC-05	TP53	1.91	2.41
YPAC-05	VHL	1.92	2.16
YPAC-06	ABL1	1.96	1.44
YPAC-06	AKT1	2.1	2.16
YPAC-06	AKT2	2.02	3.45
YPAC-06	AKT3	2.29	3.36
YPAC-06	ALK	2.4	2.93

YPAC-06	APC	1.9	2.01
YPAC-06	ARID1A	1.88	2.1
YPAC-06	ARID1B	2.2	2.79
YPAC-06	ARID2	1.82	2.07
YPAC-06	ATM	2.12	2.24
YPAC-06	ATRX	2.19	1.73
YPAC-06	AURKA	1.97	2.06
YPAC-06	AURKB	1.9	1.47
YPAC-06	BCL2	1.96	0.81
YPAC-06	BRAF	2.03	1.55
YPAC-06	BRCA1	2.14	2.73
YPAC-06	BRCA2	2.42	2.28
YPAC-06	CDH1	1.99	2.59
YPAC-06	CDK4	1.82	2.07
YPAC-06	CDK6	2.03	1.55
YPAC-06	CDKN2A	1.95	0.06
YPAC-06	CSF1R	1.9	2.01
YPAC-06	CTNNB1	1.88	1.5
YPAC-06	DDR2	2.29	3.36
YPAC-06	EGFR	2.35	2.94
YPAC-06	EPHB4	2.03	1.55
YPAC-06	ERBB2	2.14	2.73
YPAC-06	ERBB3	1.82	2.07
YPAC-06	ERBB4	2.37	2.92
YPAC-06	EWSR1	1.95	2.04
YPAC-06	EZH2	2.03	1.55
YPAC-06	FBXW7	2.15	2.13
YPAC-06	FGFR1	2.21	2.64
YPAC-06	FGFR2	2.13	2.07
YPAC-06	FGFR3	2.01	2.09
YPAC-06	FLT3	2.42	2.28
YPAC-06	GNA11	1.68	1.42
YPAC-06	GNAQ	1.96	1.44
YPAC-06	GNAS	1.97	2.06
YPAC-06	HNF1A	1.82	2.07
YPAC-06	HRAS	2	2.13
YPAC-06	IDH1	2.37	2.92
YPAC-06	IDH2	2.15	2.19
YPAC-06	IGF1R	2.15	2.19
YPAC-06	ITK	1.9	2.01
YPAC-06	JAK1	1.88	2.1
YPAC-06	JAK2	1.95	1.37
YPAC-06	JAK3	1.68	1.42

YPAC-06	KDR	2.01	2.09
YPAC-06	KIT	2.01	2.09
YPAC-06	KRAS	2.11	3.37
YPAC-06	MDM2	1.82	2.07
YPAC-06	MET	2.03	1.55
YPAC-06	MLH1	1.88	1.5
YPAC-06	MPL	1.88	2.1
YPAC-06	MTOR	1.88	2.1
YPAC-06	NF1	2.14	2.73
YPAC-06	NOTCH1	1.96	1.44
YPAC-06	NPM1	1.9	2.01
YPAC-06	NRAS	1.88	2.1
YPAC-06	NTRK1	2.29	3.36
YPAC-06	PDGFRA	2.01	2.09
YPAC-06	PDGFRB	1.9	2.01
YPAC-06	PIK3CA	2.2	2.24
YPAC-06	PIK3R1	1.9	2.01
YPAC-06	PTCH1	1.96	1.44
YPAC-06	PTCH2	1.88	2.1
YPAC-06	PTEN	2.13	2.07
YPAC-06	RB1	2.42	2.28
YPAC-06	RET	2.13	2.07
YPAC-06	ROS1	2.2	2.79
YPAC-06	SMAD4	1.96	0.81
YPAC-06	SMARCB1	2.34	2.17
YPAC-06	SMO	2.03	1.55
YPAC-06	SRC	1.97	2.06
YPAC-06	STK11	1.68	1.42
YPAC-06	SYK	1.96	1.44
YPAC-06	TMPRSS2	1.89	1.82
YPAC-06	TOP1	1.97	2.06
YPAC-06	TP53	1.9	1.47
YPAC-06	VHL	1.88	1.5
YPAC-10	ABL1	2.14	2.19
YPAC-10	AKT1	1.9	1.22
YPAC-10	AKT2	1.78	1.97
YPAC-10	AKT3	2.15	2.22
YPAC-10	ALK	2.28	2.3
YPAC-10	APC	2.06	2.16
YPAC-10	ARID1A	2.01	2.1
YPAC-10	ARID1B	2.19	2.17
YPAC-10	ARID2	2.06	2.14
YPAC-10	ATM	2.21	2.29

YPAC-10	ATRX	1.71	1.09
YPAC-10	AURKA	1.99	2.1
YPAC-10	AURKB	1.9	1.18
YPAC-10	BCL2	1.99	1.24
YPAC-10	BRAF	2.07	2.12
YPAC-10	BRCA1	1.78	1.14
YPAC-10	BRCA2	2.2	2.07
YPAC-10	CDH1	2.03	2.04
YPAC-10	CDK4	2.06	2.14
YPAC-10	CDK6	2.07	2.12
YPAC-10	CDKN2A	2.07	0.15
YPAC-10	CSF1R	2.06	2.16
YPAC-10	CTNNB1	2	2.17
YPAC-10	DDR2	2.15	2.22
YPAC-10	EGFR	2.45	2.58
YPAC-10	EPHB4	2.07	2.12
YPAC-10	ERBB2	1.78	1.14
YPAC-10	ERBB3	2.06	2.14
YPAC-10	ERBB4	2.23	2.24
YPAC-10	EWSR1	1.82	1.11
YPAC-10	EZH2	2.07	2.12
YPAC-10	FBXW7	2.15	2.13
YPAC-10	FGFR1	1.86	1.14
YPAC-10	FGFR2	2.1	2.1
YPAC-10	FGFR3	2.01	2.1
YPAC-10	FLT3	2.2	2.07
YPAC-10	GNA11	1.84	1.94
YPAC-10	GNAQ	2.14	2.19
YPAC-10	GNAS	1.99	2.1
YPAC-10	HNF1A	2.06	2.14
YPAC-10	HRAS	2.05	2.18
YPAC-10	IDH1	2.23	2.24
YPAC-10	IDH2	2.13	2.1
YPAC-10	IGF1R	2.13	2.1
YPAC-10	ITK	2.06	2.16
YPAC-10	JAK1	2.01	2.1
YPAC-10	JAK2	2.07	2.09
YPAC-10	JAK3	1.84	1.94
YPAC-10	KDR	2.01	2.1
YPAC-10	KIT	2.01	2.1
YPAC-10	KRAS	2.12	2.19
YPAC-10	MDM2	2.06	2.14
YPAC-10	MET	2.07	2.12

YPAC-10	MLH1	2	2.17
YPAC-10	MPL	2.01	2.1
YPAC-10	MTOR	2.01	2.1
YPAC-10	NF1	1.78	1.14
YPAC-10	NOTCH1	2.14	2.19
YPAC-10	NPM1	2.06	2.16
YPAC-10	NRAS	2.01	2.1
YPAC-10	NTRK1	2.15	2.22
YPAC-10	PDGFRA	2.01	2.1
YPAC-10	PDGFRB	2.06	2.16
YPAC-10	PIK3CA	2.15	2.22
YPAC-10	PIK3R1	2.06	2.16
YPAC-10	PTCH1	2.14	2.19
YPAC-10	PTCH2	2.01	2.1
YPAC-10	PTEN	2.1	2.1
YPAC-10	RB1	2.2	2.19
YPAC-10	RET	2.1	1.96
YPAC-10	ROS1	2.19	2.17
YPAC-10	SMAD4	1.99	1.24
YPAC-10	SMARCB1	2.06	1.63
YPAC-10	SMO	2.07	2.12
YPAC-10	SRC	1.99	2.1
YPAC-10	STK11	1.84	1.94
YPAC-10	SYK	2.14	2.19
YPAC-10	TMPRSS2	1.96	1.33
YPAC-10	TOP1	1.99	2.1
YPAC-10	TP53	1.9	1.18
YPAC-10	VHL	2	2.17
YPAC-13	ABL1	2.1	2.08
YPAC-13	AKT1	2.34	2.96
YPAC-13	AKT2	1.71	1.83
YPAC-13	AKT3	2.19	2.17
YPAC-13	ALK	2.21	2.26
YPAC-13	APC	2.15	2.15
YPAC-13	ARID1A	2.07	2.08
YPAC-13	ARID1B	1.82	1.48
YPAC-13	ARID2	2.09	2.11
YPAC-13	ATM	2.23	2.26
YPAC-13	ATRX	1.21	1.25
YPAC-13	AURKA	1.98	2.01
YPAC-13	AURKB	1.68	1.37
YPAC-13	BCL2	1.87	1.51
YPAC-13	BRAF	2.09	2.27

YPAC-13	BRCA1	1.65	1.36
YPAC-13	BRCA2	2.03	2.1
YPAC-13	CDH1	1.93	2.04
YPAC-13	CDK4	2.09	2.11
YPAC-13	CDK6	2.09	2.27
YPAC-13	CDKN2A	1.8	1.5
YPAC-13	CSF1R	2.15	2.15
YPAC-13	CTNNB1	2.12	2.11
YPAC-13	DDR2	2.19	2.17
YPAC-13	EGFR	2.22	2.46
YPAC-13	EPHB4	2.09	2.27
YPAC-13	ERBB2	1.65	1.36
YPAC-13	ERBB3	2.09	2.11
YPAC-13	ERBB4	2.25	2.26
YPAC-13	EWSR1	2.03	2.12
YPAC-13	EZH2	2.09	2.27
YPAC-13	FBXW7	2.22	2.16
YPAC-13	FGFR1	1.69	1.42
YPAC-13	FGFR2	2.08	2.08
YPAC-13	FGFR3	2.01	2.12
YPAC-13	FLT3	2.03	2.1
YPAC-13	GNA11	1.76	1.85
YPAC-13	GNAQ	2.1	2.08
YPAC-13	GNAS	1.98	2.01
YPAC-13	HNF1A	2.09	2.11
YPAC-13	HRAS	2.07	2.2
YPAC-13	IDH1	2.25	2.26
YPAC-13	IDH2	2.21	2.16
YPAC-13	IGF1R	2.21	2.16
YPAC-13	ITK	2.15	2.15
YPAC-13	JAK1	2.07	2.08
YPAC-13	JAK2	1.8	1.5
YPAC-13	JAK3	1.76	1.85
YPAC-13	KDR	2.01	2.12
YPAC-13	KIT	2.01	2.12
YPAC-13	KRAS	1.87	2.67
YPAC-13	MDM2	2.09	2.11
YPAC-13	MET	2.09	2.27
YPAC-13	MLH1	2.12	2.11
YPAC-13	MPL	2.07	2.08
YPAC-13	MTOR	2.07	2.08
YPAC-13	NF1	1.65	1.36
YPAC-13	NOTCH1	2.1	2.08

YPAC-13	NPM1	2.15	2.15
YPAC-13	NRAS	2.07	2.08
YPAC-13	NTRK1	2.19	2.17
YPAC-13	PDGFRA	2.01	2.12
YPAC-13	PDGFRB	2.15	2.15
YPAC-13	PIK3CA	2.22	2.23
YPAC-13	PIK3R1	2.15	2.15
YPAC-13	PTCH1	2.1	2.08
YPAC-13	PTCH2	2.07	2.08
YPAC-13	PTEN	2.08	2.08
YPAC-13	RB1	2.15	2.18
YPAC-13	RET	2.08	2.08
YPAC-13	ROS1	1.82	1.48
YPAC-13	SMAD4	1.87	1.51
YPAC-13	SMARCB1	2.03	2.12
YPAC-13	SMO	2.09	2.27
YPAC-13	SRC	1.98	2.01
YPAC-13	STK11	1.76	1.85
YPAC-13	SYK	2.1	2.08
YPAC-13	TMPRSS2	1.83	1.87
YPAC-13	TOP1	1.98	2.01
YPAC-13	TP53	1.68	1.37
YPAC-13	VHL	2.12	2.11
YPAC-15	ABL1	1.36	1.44
YPAC-15	AKT1	2.26	2.69
YPAC-15	AKT2	1.63	1.77
YPAC-15	AKT3	2.49	2.8
YPAC-15	ALK	2.01	2.03
YPAC-15	APC	2.16	2.53
YPAC-15	ARID1A	1.63	1.55
YPAC-15	ARID1B	2.72	2.81
YPAC-15	ARID2	0.71	0.65
YPAC-15	ATM	1.74	1.44
YPAC-15	ATRX	1.55	1.41
YPAC-15	AURKA	2.74	3.9
YPAC-15	AURKB	1.77	1.56
YPAC-15	BCL2	1.65	1.23
YPAC-15	BRAF	1.92	2.34
YPAC-15	BRCA1	1.89	2
YPAC-15	BRCA2	2.11	2.43
YPAC-15	CDH1	2.08	2.16
YPAC-15	CDK4	0.71	0.65
YPAC-15	CDK6	2.21	2.23

YPAC-15	CDKN2A	2.21	0.03
YPAC-15	CSF1R	2.16	2.53
YPAC-15	CTNNB1	1.68	1.42
YPAC-15	DDR2	2.49	2.8
YPAC-15	EGFR	2.23	2.3
YPAC-15	EPHB4	0	0
YPAC-15	ERBB2	1.89	2
YPAC-15	ERBB3	0.71	0.65
YPAC-15	ERBB4	2.02	2.05
YPAC-15	EWSR1	0.44	0.32
YPAC-15	EZH2	1.92	2.34
YPAC-15	FBXW7	1.7	1.39
YPAC-15	FGFR1	1.61	1.45
YPAC-15	FGFR2	2.03	2.28
YPAC-15	FGFR3	1.87	1.95
YPAC-15	FLT3	2.11	2.43
YPAC-15	GNA11	1.61	1.79
YPAC-15	GNAQ	2.54	2.22
YPAC-15	GNAS	2.74	3.9
YPAC-15	HNF1A	0.71	0.65
YPAC-15	HRAS	1.88	2.01
YPAC-15	IDH1	2.02	2.05
YPAC-15	IDH2	2.32	2.53
YPAC-15	IGF1R	2.32	2.53
YPAC-15	ITK	0	2.53
YPAC-15	JAK1	1.94	1.99
YPAC-15	JAK2	2.21	2.47
YPAC-15	JAK3	1.61	1.79
YPAC-15	KDR	1.87	1.95
YPAC-15	KIT	1.87	1.95
YPAC-15	KRAS	8.31	18.69
YPAC-15	MDM2	0.71	0.65
YPAC-15	MET	1.92	2.34
YPAC-15	MLH1	1.65	0
YPAC-15	MPL	1.63	1.55
YPAC-15	MTOR	1.63	1.55
YPAC-15	NF1	1.89	2
YPAC-15	NOTCH1	1.36	1.44
YPAC-15	NPM1	2.16	2.54
YPAC-15	NRAS	1.94	1.99
YPAC-15	NTRK1	2.49	2.8
YPAC-15	PDGFRA	1.87	1.95
YPAC-15	PDGFRB	2.16	2.53

YPAC-15	PIK3CA	2.53	3.79
YPAC-15	PIK3R1	2.16	2.53
YPAC-15	PTCH1	0	2.22
YPAC-15	PTCH2	0	0
YPAC-15	PTEN	2.03	2.28
YPAC-15	RB1	2.11	2.43
YPAC-15	RET	2.03	2.28
YPAC-15	ROS1	2.72	2.81
YPAC-15	SMAD4	1.65	1.23
YPAC-15	SMARCB1	0.44	0.32
YPAC-15	SMO	1.92	2.34
YPAC-15	SRC	2.74	3.9
YPAC-15	STK11	1.61	1.79
YPAC-15	SYK	2.54	2.22
YPAC-15	TMPRSS2	1.41	1.19
YPAC-15	TOP1	2.74	3.9
YPAC-15	TP53	1.77	1.56
YPAC-15	VHL	1.65	1.52
YPAC-17	ABL1	2.18	2.31
YPAC-17	AKT1	2.54	2.99
YPAC-17	AKT2	1.72	1.83
YPAC-17	AKT3	2.05	1.32
YPAC-17	ALK	2.31	2.45
YPAC-17	APC	2.13	2.23
YPAC-17	ARID1A	2.08	2.19
YPAC-17	ARID1B	2.17	2.09
YPAC-17	ARID2	2.09	2.2
YPAC-17	ATM	2.29	2.42
YPAC-17	ATRX	1.09	0.46
YPAC-17	AURKA	1.97	2
YPAC-17	AURKB	1.66	1.19
YPAC-17	BCL2	1.93	1.33
YPAC-17	BRAF	2.06	2.09
YPAC-17	BRCA1	2.01	2.15
YPAC-17	BRCA2	2	2.12
YPAC-17	CDH1	1.95	2.05
YPAC-17	CDK4	2.09	2.2
YPAC-17	CDK6	2.06	2.09
YPAC-17	CDKN2A	1.8	0.03
YPAC-17	CSF1R	2.13	2.23
YPAC-17	CTNNB1	2.2	2.3
YPAC-17	DDR2	2.05	2.36
YPAC-17	EGFR	2.78	4.55

YPAC-17	EPHB4	2.06	2.09
YPAC-17	ERBB2	2.01	2.15
YPAC-17	ERBB3	2.09	2.2
YPAC-17	ERBB4	2.27	2.39
YPAC-17	EWSR1	1.99	2.18
YPAC-17	EZH2	2.06	2.09
YPAC-17	FBXW7	2.15	2.29
YPAC-17	FGFR1	1.73	1.24
YPAC-17	FGFR2	2.17	1.85
YPAC-17	FGFR3	1.24	1.1
YPAC-17	FLT3	2	2.12
YPAC-17	GNA11	1.77	1.95
YPAC-17	GNAQ	2.18	2.31
YPAC-17	GNAS	1.97	2
YPAC-17	GNF1A	2.09	2.2
YPAC-17	HRAS	2.16	2.22
YPAC-17	IDH1	2.27	2.39
YPAC-17	IDH2	1.82	1.33
YPAC-17	IGF1R	1.82	1.33
YPAC-17	ITK	2.13	2.23
YPAC-17	JAK1	2.08	2.19
YPAC-17	JAK2	1.8	1.07
YPAC-17	JAK3	1.77	1.95
YPAC-17	KDR	2.04	2.14
YPAC-17	KIT	2.04	2.14
YPAC-17	KRAS	2.17	2.24
YPAC-17	MDM2	2.09	2.2
YPAC-17	MET	2.06	2.09
YPAC-17	MLH1	2.2	2.3
YPAC-17	MPL	2.08	2.19
YPAC-17	MTOR	2.08	2.19
YPAC-17	NF1	2.01	2.15
YPAC-17	NOTCH1	2.18	2.31
YPAC-17	NPM1	2.13	2.23
YPAC-17	NRAS	2.08	2.19
YPAC-17	NTRK1	2.05	2.36
YPAC-17	PDGFRA	2.04	2.14
YPAC-17	PDGFRB	2.13	2.23
YPAC-17	PIK3CA	2.23	2.36
YPAC-17	PIK3R1	2.13	2.23
YPAC-17	PTCH1	2.18	2.31
YPAC-17	PTCH2	2.08	2.19
YPAC-17	PTEN	2.17	1.85

YPAC-17	RB1	2	2.12
YPAC-17	RET	2.17	1.85
YPAC-17	ROS1	2.17	2.09
YPAC-17	SMAD4	1.93	1.33
YPAC-17	SMARCB1	1.99	2.18
YPAC-17	SMO	2.06	2.09
YPAC-17	SRC	1.97	2
YPAC-17	STK11	1.77	1.95
YPAC-17	SYK	2.18	2.31
YPAC-17	TMPRSS2	1.81	1.89
YPAC-17	TOP1	1.97	2
YPAC-17	TP53	1.66	1.19
YPAC-17	VHL	2.2	2.3
YPAC-23	ABL1	2.21	1.89
YPAC-23	AKT1	2.22	2.29
YPAC-23	AKT2	1.84	1.48
YPAC-23	AKT3	2.13	2
YPAC-23	ALK	2.23	2.34
YPAC-23	APC	2.08	1.65
YPAC-23	ARID1A	1.92	1.11
YPAC-23	ARID1B	1.92	2.06
YPAC-23	ARID2	2	2.16
YPAC-23	ATM	2.19	2.37
YPAC-23	ATRX	1.87	1.07
YPAC-23	AURKA	1.98	2.04
YPAC-23	AURKB	2.01	1.16
YPAC-23	BCL2	1.75	1.22
YPAC-23	BRAF	2.01	1.09
YPAC-23	BRCA1	1.99	3.1
YPAC-23	BRCA2	2	1.64
YPAC-23	CDH1	1.94	2.02
YPAC-23	CDK4	2	2.16
YPAC-23	CDK6	2.01	1.09
YPAC-23	CDKN2A	2.08	1.8
YPAC-23	CSF1R	2.08	1.65
YPAC-23	CTNNB1	2.17	2.21
YPAC-23	DDR2	2.13	2
YPAC-23	EGFR	2.2	1.21
YPAC-23	EPHB4	2.01	1.09
YPAC-23	ERBB2	1.99	3.1
YPAC-23	ERBB3	2	2.16
YPAC-23	ERBB4	2.42	2.17
YPAC-23	EWSR1	2.03	2.22

YPAC-23	EZH2	2.01	1.09
YPAC-23	FBXW7	2.1	2.15
YPAC-23	FGFR1	2.05	2.15
YPAC-23	FGFR2	2.07	2.46
YPAC-23	FGFR3	2.18	2.16
YPAC-23	FLT3	2	1.64
YPAC-23	GNA11	1.51	1.53
YPAC-23	GNAQ	2.21	1.89
YPAC-23	GNAS	1.98	2.04
YPAC-23	GNF1A	2	2.16
YPAC-23	HRAS	2.13	2.21
YPAC-23	IDH1	2.42	2.17
YPAC-23	IDH2	2.12	2.17
YPAC-23	IGF1R	2.12	2.17
YPAC-23	ITK	2.08	1.65
YPAC-23	JAK1	1.92	2.25
YPAC-23	JAK2	2.08	1.8
YPAC-23	JAK3	1.51	1.53
YPAC-23	KDR	2.18	2.16
YPAC-23	KIT	2.18	2.16
YPAC-23	KRAS	1.99	2.24
YPAC-23	MDM2	2	2.16
YPAC-23	MET	2.01	1.09
YPAC-23	MLH1	2.17	2.21
YPAC-23	MPL	1.92	2.25
YPAC-23	MTOR	1.92	1.11
YPAC-23	NF1	1.99	3.1
YPAC-23	NOTCH1	2.21	1.89
YPAC-23	NPM1	2.08	1.65
YPAC-23	NRAS	1.92	2.25
YPAC-23	NTRK1	2.13	2
YPAC-23	PDGFRA	2.18	2.16
YPAC-23	PDGFRB	2.08	1.65
YPAC-23	PIK3CA	2.15	2.28
YPAC-23	PIK3R1	2.08	1.65
YPAC-23	PTCH1	2.21	1.89
YPAC-23	PTCH2	1.92	2.25
YPAC-23	PTEN	2.07	2.46
YPAC-23	RB1	2.11	1.77
YPAC-23	RET	2.07	2.46
YPAC-23	ROS1	1.92	2.06
YPAC-23	SMAD4	1.75	0
YPAC-23	SMARCB1	2.03	2.22

YPAC-23	SMO	2.01	1.09
YPAC-23	SRC	1.98	2.04
YPAC-23	STK11	1.51	1.53
YPAC-23	SYK	2.21	1.89
YPAC-23	TMPRSS2	1.86	1.75
YPAC-23	TOP1	1.98	2.04
YPAC-23	TP53	2.01	1.16
YPAC-23	VHL	2.17	2.21
YPAC-26	ABL1	1.31	1.06
YPAC-26	AKT1	2.19	2.25
YPAC-26	AKT2	1.68	1.81
YPAC-26	AKT3	2.18	2.21
YPAC-26	ALK	2.2	2.35
YPAC-26	APC	1.78	2.25
YPAC-26	ARID1A	1.38	1.14
YPAC-26	ARID1B	1.76	1.37
YPAC-26	ARID2	2	0.98
YPAC-26	ATM	2.14	2.33
YPAC-26	ATRX	1.19	1.32
YPAC-26	AURKA	2.4	3.23
YPAC-26	AURKB	1.61	1.19
YPAC-26	BCL2	1.64	0.56
YPAC-26	BRAF	1.84	1.93
YPAC-26	BRCA1	1.98	2.05
YPAC-26	BRCA2	2.08	1.8
YPAC-26	CDH1	1.94	2.17
YPAC-26	CDK4	2	0.98
YPAC-26	CDK6	2.07	2.12
YPAC-26	CDKN2A	1.57	1.03
YPAC-26	CSF1R	1.78	2.25
YPAC-26	CTNNB1	2.02	2.01
YPAC-26	DDR2	2.18	2.21
YPAC-26	EGFR	2.2	2.13
YPAC-26	EPHB4	0	0
YPAC-26	ERBB2	1.98	2.05
YPAC-26	ERBB3	2	0.98
YPAC-26	ERBB4	2.1	2.31
YPAC-26	EWSR1	2.05	0.51
YPAC-26	EZH2	1.84	0
YPAC-26	FBXW7	2.03	2.07
YPAC-26	FGFR1	2.02	2.19
YPAC-26	FGFR2	1.97	1.88
YPAC-26	FGFR3	2.07	2.07

YPAC-26	FLT3	2.08	1.8
YPAC-26	GNA11	1.72	1.73
YPAC-26	GNAQ	1.99	1.5
YPAC-26	GNAS	2.4	3.23
YPAC-26	HNF1A	0	0.98
YPAC-26	HRAS	2.03	2.3
YPAC-26	IDH1	2.1	2.31
YPAC-26	IDH2	2.17	2.19
YPAC-26	IGF1R	2.17	2.19
YPAC-26	ITK	1.78	0
YPAC-26	JAK1	1.6	1.2
YPAC-26	JAK2	1.57	1.03
YPAC-26	JAK3	1.72	1.73
YPAC-26	KDR	2.07	2.07
YPAC-26	KIT	2.07	2.07
YPAC-26	KRAS	2.45	3.08
YPAC-26	MDM2	2	0.98
YPAC-26	MET	1.84	1.93
YPAC-26	MLH1	0	0
YPAC-26	MPL	1.38	1.14
YPAC-26	MTOR	1.38	1.14
YPAC-26	NF1	1.98	2.05
YPAC-26	NOTCH1	1.31	1.06
YPAC-26	NPM1	1.81	2.27
YPAC-26	NRAS	1.6	1.2
YPAC-26	NTRK1	2.18	2.21
YPAC-26	PDGFRA	2.07	2.07
YPAC-26	PDGFRB	1.78	2.25
YPAC-26	PIK3CA	2.07	2.09
YPAC-26	PIK3R1	1.78	1.3
YPAC-26	PTCH1	0	0
YPAC-26	PTCH2	0	0
YPAC-26	PTEN	1.97	1.88
YPAC-26	RB1	2.08	1.96
YPAC-26	RET	1.97	1.88
YPAC-26	ROS1	1.76	1.37
YPAC-26	SMAD4	1.64	0.56
YPAC-26	SMARCB1	0	0.51
YPAC-26	SMO	1.84	1.93
YPAC-26	SRC	2.4	3.23
YPAC-26	STK11	1.72	1.73
YPAC-26	SYK	1.99	1.5
YPAC-26	TMPRSS2	1.86	1.97

YPAC-26	TOP1	2.4	3.23
YPAC-26	TP53	1.61	1.19
YPAC-26	VHL	2.18	2.2

Supplementary Table 6. Colony assay analysis

	Large colony (n=5)	Small colony (n=8)
Tumor size, cm, median (range)	4 (2~14.9)	2.95 (1.2~7)
Unresectable status, n (%)	5 (100%)	4 (50%)
Metastasis, n (%)	3 (60%)	1 (12.5%)

*Large colony, YPAC-2,5,26,35,46

*Small colony, YPAC-10,15,16,23,25,29,30,34