

**Table S1** The DDR pathway gene set

DSB	BER	HR	FA	NER	SSB	MMR	NHEJ	DDR
RPA3	CCNO	TOP3A	USP1	LOC652857	TP53	RFC5	DNTT	LOC652857
PRKDC	OGG1	POLD3	PALB2	ERCC5	MLH1	POLD1	FEN1	LOC389901
LOC389901	MPG	RPA1	FANCD2	POLE2	HMGB2	PMS2	XRCC5	FANCE
XRCC5	MBD4	H2AFX	C17orf70	POLR2H	RPA4	POLD2	PRKDC	MBD4
TDP1	LIG3	RAD51	BRCA2	GTF2H2	MYT2	RFC3	DCLRE1C	TERF2IP
ATM	SMUG1	MUS81	ZBTB32	ERCC4	HNRNPA2B1	LIG1	MRE11A	XRCC4
NBN	XRCC1	BRIP1	UBE2T	DDB2	FUBP1	MSH6	LIG4	MSH2
BRCA2	MUTYH	MRE11A	FANCG	POLD1	RAD23B	RPA2	POLM	RPS27AP11
XRCC6	POLD1	RAD54L	RPS27AP11	RFC4	TERF2IP	PCNA	XRCC4	POLD2
RPA2	POLD3	RAD54B	FANCA	ERCC8	RPA1	RPA3	XRCC6	ATM
MRE11A	PCNA	RAD51	FANCL	TCEA1	RPA3	RFC1	LOC731751	WBP11
LIG4	FEN1	BRCA1	FANCB	XPA	POT1	POLD4	RAD50	BRCA1
MDC1	APEX1	LIG1	FANCC	GTF2H4	TREX1	RPA1	POLL	MDC1
RPA1	LIG1	RAD52	FANCF	LOC652672	ERCC4	RFC2	NHEJ1	SSBP1
LIG1	POLD2	RAD50	ATR	POLR2L	RAD51	MLH1		BRCA1
RAD50	POLB	RPA2	UBA52	POLR2F	ERCC5	RFC4		FANCC
RAD52	POLD4	RPA3	LOC651921	RFC5	PURB	MSH3		NBN
BRIP1	TDG	BLM	FANCE	POLR2A	RPA2	EXO1		ZBTB32
XRCC4	NTHL1	MDC1	FANCM	DDB1	ERCC1	MSH2		ATR
TP53BP1		POLD4	BRCA1	POLR2D	HNRNPA1	MLH3		SUB1
RAD51		EME1	RPS27A	GTF2H3	PURA	RPA4		PCBP1
LOC651610		SSBP1	LOC648152	PCNA	RAD51AP1	SSBP1		POLL
BRCA1		XRCC2	ATM	ERCC2	WBP11	POLD3		XRCC2
H2AFX		RAD50	C19orf40	RPA3	PMS2			XPC
		MRE11A	LOC651610	RAD23B	RAD23A			POLR2C
		RPA1	RPS27AP11	ERCC6	TERF2			XRCC5
		NBN		CCNH	IGHMBP2			LIG1
		RAD51C		POLE	PCBP1			POLR2B
		RAD51B		RFC3	RBMS1			RAD50
		LOC651610		ERCC3	MSH2			RAD52
		BRCA2		LIG1	SUB1			ERCC3
		NBN		POLD4	HNRPDL			OGG1
		XRCC3		RPA1	XPC			ERCC1
		POLD1		MNAT1	YBX1			RAD51AP1
		RPA2		XPC	MSH3			EME1

**Table S1** (continued)

**Table S1** (*continued*)

DSB	BER	HR	FA	NER	SSB	MMR	NHEJ	DDR
		RPA4		POLR2J				FEN1
		TP53BP1		POLD3				RAD54L
		RPA3		POLR2C				POLD2
		TOP3B		RFC2				RAD52
		BRCA2		POLD2				NBN
		ATM		POLR2E				RAD51C
		SHFM1		CDK7				GTF2H3
		POLD2		GTF2H1				XRCC3
		RAD52		ERCC1				XPA
		RAD51D		POLR2B				FANCM
				RPA2				RFC4
				XAB2				MUTYH
				POLR2G				RAD23A
				GTF2H2B				RPS27AP11
				POLR2K				MRE11A
				POLR2I				YBX1
								C19orf40
								PURA
								ERCC6
								XPC
								POLR2F
								POLD1
								RPA4
								BRCA2
								POLR2L
								MNAT1
								XAB2
								RFC1
								RAD51D
								APEX1
								POLE
								LIG3
								FANCA
								MPG

**Table S1** (*continued*)

Table S1 (continued)

DSB	BER	HR	FA	NER	SSB	MMR	NHEJ	DDR
								POLR2I
								TOP3A
								PRKDC
								BRCA2
								BRIP1
								RPA1
								POLR2K
								POLR2D
								FANCB
								XRCC4
								LOC648152
								PRKDC
								RPS27A
								MYT2
								CCNH
								ERCC1
								GTF2H2B
								XRCC6
								HNRNPA1
								TP53BP1
								GTF2H1
								DCLRE1C
								LIG4
								TDP1
								H2AFX
								LOC651610
								XRCC1
								RAD54B
								RFC3
								ERCC4
								ERCC8
								LOC652672
								FEN1
								POT1

Table S1 (continued)

**Table S1** (*continued*)

DSB	BER	HR	FA	NER	SSB	MMR	NHEJ	DDR
								GTF2H2
								RPA3
								PCNA
								POLD3
								FANCD2
								POLE2
								RFC5
								BLM
								HMGB2
								POLM
								DNTT
								TOP3B
								LOC651921
								PALB2
								RPA3
								USP1
								CCNO
								RAD51B
								MSH3
								MUS81
								FUBP1
								BRCA2
								LIG1
								SHFM1
								PMS2
								TP53
								XRCC6
								PURB
								ERCC4
								ERCC5
								LOC731751
								RAD23B
								UBA52
								MLH1

**Table S1** (*continued*)

**Table S1** (*continued*)

DSB	BER	HR	FA	NER	SSB	MMR	NHEJ	DDR
								POLD4
								RAD23B
								LOC651610
								GTF2H4
								POLR2E
								POLR2A
								LIG4
								RAD51
								SMUG1
								C17orf70
								MLH3
								ERCC2
								POLD3
								RAD51
								UBE2T
								RFC2
								POLR2G
								ATM
								TDG
								DDB1
								NTHL1
								IGHMBP2
								MSH6
								XRCC5
								FANCL
								TERF2
								MRE11A
								HNRNPA2B1
								DDB2
								SSBP1
								FANCG
								ERCC5
								POLR2J
								POLB

**Table S1** (*continued*)

**Table S1** (continued)

DSB	BER	HR	FA	NER	SSB	MMR	NHEJ	DDR
								TCEA1
								RPA2
								POLR2H
								HNRPDL
								EXO1
								RPA4
								RPA1
								CDK7
								NHEJ1
								POLD1
								FANCF
								RBMS1
								RPA2
								RAD50
								POLD4
								TREX1

**Table S2** Information on the antibodies and their dilution concentrations

Marker	CD8	PDL1	CD4	CD68
Item No.	ZA0508	ZA0629	ZA-0519	ZM0060
Manufacturers	ZSGB-BIO ZS	ZSGB-BIO ZS	ZSGB-BIO ZS	ZSGB-BIO ZS
Dilution ratio	100	25	100	500

**Table S3** The detailed mutation frequencies in the ICIs cohort

Symbol	Group1	Group2	n mutated group1	n mutated group2	p value	OR	OR low	OR high
LRP1B	MT	WT	14 of 15	0 of 44	1.13E-12	Inf	4.68E+01	Inf
RYR2	MT	WT	14 of 15	11 of 44	3.88E-06	39.0658172	4.95E+00	1.81E+03
ANK2	MT	WT	9 of 15	3 of 44	6.18E-05	18.8674339	3.53E+00	1.40E+02
RELN	MT	WT	8 of 15	3 of 44	3.22E-04	14.5475461	2.71E+00	1.07E+02
USH2A	MT	WT	10 of 15	7 of 44	4.51E-04	10.0029111	2.31E+00	5.08E+01
PCDH15	MT	WT	8 of 15	4 of 44	4.21E-05	10.7609266	2.21E+00	6.37E+01
MUC16	MT	WT	11 of 15	10 of 44	1.11E-03	8.91733163	2.09E+00	4.73E+01
MUC17	MT	WT	8 of 15	5 of 44	1.90E-03	8.46722874	1.85E+00	4.43E+01
TP53	MT	WT	12 of 15	15 of 44	2.76E-03	7.45013229	1.67E+00	4.74E+01
ZFHX4	MT	WT	8 of 15	6 of 44	3.86E-03	6.9224803	1.58E+00	3.36E+01
XIRP2	MT	WT	8 of 15	6 of 44	3.86E-03	6.9224803	1.58E+00	3.36E+01
TTN	MT	WT	11 of 15	13 of 44	5.24E-03	6.32504988	1.53E+00	3.25E+01
OBSCN	MT	WT	9 of 15	8 of 44	6.12E-03	6.47723884	1.56E+00	2.97E+01
FLNC	MT	WT	7 of 15	6 of 44	1.31E-02	5.3399034	1.90E-01	2.56E+01
SPTA1	MT	WT	6 of 15	5 of 44	2.29E-02	5.0177315	1.03E+00	2.63E+01
CACNA1E	MT	WT	6 of 15	5 of 44	2.29E-02	5.0177315	1.03E+00	2.63E+01
LAMA2	MT	WT	6 of 15	5 of 44	2.29E-02	5.0177315	1.03E+00	2.63E+01
CSMD3	MT	WT	6 of 15	6 of 44	5.75E-02	4.09720584	8.75E-01	1.98E+01
KRAS	MT	WT	8 of 15	15 of 44	2.28E-01	2.17853529	5.68E-01	8.63E+00
FAT3	MT	WT	5 of 15	7 of 44	2.63E-01	2.59323324	5.31E-01	1.21E+01
DNAH5	MT	WT	4 of 15	7 of 44	4.46E-01	1.89879987	3.43E-01	9.28E+00
FLG	MT	WT	4 of 15	10 of 44	7.38E-01	1.23176254	2.34E-01	5.47E+00

ICIs, immune checkpoint inhibitors; MT, mutated type; WT, wild type; OR, odds ratio.