
Supplementary information

Individualized mRNA vaccines evoke durable T cell immunity in adjuvant TNBC

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Supplementary Information

Individualized mRNA vaccine-induced neoantigen-specific T-cell responses in post (neo)adjuvant TNBC

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Supplementary Table 1. Immunogenicity of INDELs used as neoantigen vaccine targets

Patient	Gene	INDEL sequence	Effect	Post-IVS CD4+ response	Post-IVS CD+8 response	<i>Ex vivo</i> response
P01	TP53	SGNLLGRNSFEVRVCA <u>A</u> CPGRDRRTEENLR	In-frame insertion	<i>de novo</i>	-	-
P03	KDM5A	LVPDDERSVQHAEPHVFSLLSHVPVILSGLVSTIQLICAPAPCRRNVL	Frameshift deletion	-	<i>de novo</i> *	-
	VAMP1	CAIIVVVIVSKYRGSCW WGEEVGRSWS	Loss of stop codon by substitution; readthrough mutation	<i>de novo</i>	-	-
P05	DUSP1	CSTPLYDQGGNPALSVP GGQCVSRFPQGHAGCLGHHC LQRLS QLSQPF	Frameshift deletion	-	-	-
	POLI	LFSRNHTTDSHKQQTLMKDLQ KIESQILLMRKLLSLLTILKFS MNYQKQ	Frameshift deletion	n.e.	amplified	<i>de novo</i>
	MALT1	DLEHQGTYWCHVYND <u>R</u> DSKKVEIIIGRTDEA	In-frame deletion	n.e.	-	-
P07	FAM116A	EDLQGILLKTGMTLYLPR FSSQKGLCI	Substitution; readthrough mutation	n.d.	n.d.	<i>de novo</i>
P08	ZNF331	NVGRPSIVAITSLSTRESTQAKPRINVR SVGR LSFMDRAS	Frameshift insertion	-	-	-
	RAB3GAP2	LKTVKPLSLFDSKGKK KCIFQRP NFNSVIT	Frameshift deletion	-	-	-
P09	WDFY3	KSSSSYHCSIAMKTLTRHDYIFKDVFREVG	In-frame deletion	n.d.	n.d.	-
	FLRT2	VSLNNDQLLKGD FRLQPF TP QMGALITQTAISPTTCDTATAACQ	Frameshift deletion	n.d.	n.d.	-
P11	EFCAB4A	RRRESEHEREVRALYEEQLREQSRRPPSQVG	In-frame deletion	n.d.	n.d.	-
P12	PLXNB2	NIDSKLHVTLYNCSFAAATAACAGPLPTTGVRGAGARAGACMRP	Frameshift deletion	n.d.	n.d.	-
P13	TP53	APAPAPSWPLS FFCPF ENLP GGQLRFP SGLLAFWDSQVCDLHVLPC PQD	Frameshift insertion	n.d.	n.d.	<i>de novo</i>
P14	CTNNA1	PDPGSQELDECCGADSEGILRRLYQIPKVTGYGFPQ PSCCVMEDEGTREK	Frameshift deletion	-	-	-
	CTNNA1	PAGLPATHRPLPPAEHLQGGQGRGAESRRGACCLWEL	Frameshift deletion	-	-	-

Vaccine-encoded INDELs and T-cell responses identified by post-IVS and *ex vivo* ELISpot analysis. * two different HLA alleles were found to be restriction elements of CD8+ T cells against this INDEL (Fig. S2D). New polypeptide sequences are highlighted in bold, amino acids affected by an in-frame frameshift are underscored. - = no response, n.d. = not done, n.e. = not evaluable, INDEL = insertion/deletion.

Supplementary Table 2. Neoantigen-specific TCR- α/β chains cloned from single T cells of three patients

Patient	Mutation	TCR name	TRA	TRB	HLA restriction	Recognized peptide	Pre-existing
P01	HEATR2(R47Q)	TCRCD8-P01-#1	V6 J32*03 C	V14 D J1-6*02 C1	B*07:02	KPGRQRALEAL	+
	HEATR2(R47Q)	TCRCD8-P01-#3	V6 J21 C	V5-1 D J2-1 C2	B*07:02	KPGRQRALEAL	+
	HEATR2(R47Q)	TCRCD8-P01-#14	V19 J41 C	V7-9*03 D J2-2 C2	B*07:02	KPGRQRALEAL	+
	HEATR2(R47Q)	TCRCD8-P01-#17	V21 J24 C	V15*02 D J2-3 C2	B*07:02	KPGRQRALEAL	-
	HEATR2(R47Q)	TCRCD8-P01-#21	V6 J28 C	V28 D J1-2 C1	B*07:02	KPGRQRALEAL	-
	HEATR2(R47Q)	TCRCD8-P01-#25	V6 J45 C	V2 D J2-7 C2	B*07:02	KPGRQRALEAL	-
	PPP1R15B(S278T)	TCRCD8-P01-#11	V19 J28 C	V20-1 D J2-1 C2	B*58:01	LSAELIPATW	+
	PPP1R15B(S278T)	TCRCD8-P01-#13	V19 J36 C	V4-1 D J2-7 C2	B*58:01	LSAELIPATW	-
	PPP1R15B(S278T)	TCRCD8-P01-#16	V14/DV4 J46 C	V2 D J1-5 C1	B*58:01	LSAELIPATW	-
	PPP1R15B(S278T)	TCRCD8-P01-#18	V38-1 J29 C	V4-1 D J1-4 C1	B*58:01	LSAELIPATW	-
	PPP1R15B(S278T)	TCRCD8-P01-#19	V26-1 J49 C	V7-9*03 D J2-7 C2	B*58:01	LSAELIPATW	-
	PPP1R15B(S278T)	TCRCD8-P01-#20	V26-1 J49 C	V2 D J1-1 C1	B*58:01	LSAELIPATW	-
	PPP1R15B(S278T)	TCRCD8-P01-#22	V19 J7 C	V4-1 D J2-7 C2	B*58:01	LSAELIPATW	-
	PTCD3(I448T)	TCRCD8-P01-#23	V12-3 J34 C	V28 D J2-3 C2	B*58:01	KTGDNWKFTG	-
	PTCD3(I448T)	TCRCD8-P01-#24	V17 J45 C	V4-1 D J2-5 C2	B*58:01	KTGDNWKFTG	-
	PTCD3(I448T)	TCRCD8-P01-#26	V5 J16 C	V5-8 D J2-7 C2	B*58:01	KTGDNWKFTG	+
	EIF4G3(R795Q)	TCRCD4-P01-#14	V13-1 J6 C	V9 D J2-2 C2	DRB1*08:04	ENIKTQELFRKVS	+
	PPP1R15B(S278T)	TCRCD4-P01-#19	V8-4 J54 C	V18 D J2-1 C2	n.d.	n.d.	-
P12	GPR39(I173M)	TCRCD8-P12-#1	V35 J41 C	V6-2 D J1-2 C1	A*03:01	-	+
	GPR39(I173M)	TCRCD8-P12-#3	V35 J28 C	V11-2 D J2-3 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#4	V38-1 J39 C	V3-1 D J2-3 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#5	V10 J20 C	V27 D J2-7 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#6	V8-6*02 J54 C	V20-1 D J2-7 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#7	V9-2*02 J12 C	V28 D J2-5 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#8	V8-6*02 J20 C	V20-1 D J2-1 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#10	V12-1 J9 C	V19 D J2-5 C2	A*03:01	-	-
	GPR39(I173M)	TCRCD8-P12-#12	V27 J9 C	V6-1 D J2-1 C2	A*03:01	-	-
	PEX6(L409F)	TCRCD8-P12-#2	V17 J56 C	V6-6*02 D J2-3 C2	C*03:03	-	+
	PEX6(L409F)	TCRCD8-P12-#9	V24 J49 C	V6-2 D J2-2 C2	C*03:03	-	-
P13	ADD2(Y304S)	TCRCD8-P13-#1	V35 J58 C	V13 D J2-7 C2	A*68:01	-	+
	ADD2(Y304S)	TCRCD8-P13-#10	V9-2*02 J7C	V12-4 D J1-1 C1	A*68:01	-	-
	ADD2(Y304S)	TCRCD8-P13-#11	V14/DV4 J31 C	V2 D J2-5 C2	A*68:01	-	-
	SLC25A18(C229Y)	TCRCD8-P13-#9	V5 J39 C	V12-4 D J2-2 C2	A*02:01	-	+
	SLC25A18(C229Y)	TCRCD8-P13-#17	V20 J40 C	V12-4 D J2-3 C2	A*02:01	-	-
	SLC25A18(C229Y)	TCRCD8-P13-#18	V12-1 J23 C	V28 D J2-1 C2	A*02:01	-	-

SSH1(R96C)	TCRCD8-P13-#2	V29/DV5 J48 C	V27 D J1-5 C1	B*14:02	-	+
SSH1(R96C)	TCRCD8-P13-#19	V26-2 J48 C	V27 D J2-1 C2	B*14:02	-	-
SSH1(R96C)	TCRCD8-P13-#20§	V19 J44 C	V19 D J1-4 C1	B*14:02	-	-
TP53	TCRCD8-P13-#12	V14/DV4 J7 C	V5-1 D J1-1 C1	B*14:02	-	-

The TCR V(D)J genes are indicated in IMGT-nomenclature. V, variable; D, diversity; J, joining; C, constant; n.d.; not determined; -, not investigated.

§ TCR_{CD8}-P13-#20 was not selected based on vaccine-induced clonotype enrichment in the periphery, but due to its presence in relapsing tumor tissue.