Supplementary Table S3: Putative *BRCA1/2* reversion mutations identified in cfDNA of ovarian and breast cancer patients using targeted massively parallel sequencing and results of amplicon re-sequencing of putative *BRCA2* reversion mutations and other somatic mutations in cfDNA and tumor tissue of metastatic breast cancers.

Putative BRCA1/2 reversion mutations identified using a custom targeted massively parallel sequencing panel.

		GERMLINE		PUTATIVE BRCA1/2 REVERSION MUTATIONS														
Cancer type	**Sample ID**	**BRCA germline mutation (BRCA1) ENST00000357654.3 (BRCA2) ENST00000380152.3**	**BRCA germline alternative annotation**	**Chrom**	**Position**	**Reference allele**	**Alternate allele**	**Mutation type**	**Coverage**	**Count**	**Mutant allele fraction**	**cDNA change**	**Wildtype protein length (AA)**	**Germline mutation protein length (AA)**	**Reversion mutation protein length (AA)**	**3' 5 bases microhomology (red)**	**5' 5 bases microhomology (red)**	**Exon**
Ovarian	OCT5C	BRCA1 c.68_69delAG	BRCA1 187delAG/185delAG	17	41267768	TG	T	frameshift_variant	2554	1	0.0392%	c.108delC	1863	38	1862	GAGAC	CTTTGT	3
Ovarian	OCT15C	BRCA1 c.68_69delAG	BRCA1 187delAG/185delAG	17	41267783	CT	C	frameshift_variant	2114	1	0.0473%	c.113delA	1863	38	1862	TTGTG	TCACAC	3
Ovarian	OCT15C	BRCA1 c.68_69delAG	BRCA1 187delAG/185delAG	17	41267791	TC	T	frameshift_variant	2046	1	0.0489%	c.85delG	1863	38	1862	CAGAC	TCAACT	3
Ovarian	OCT10C	BRCA1 c.3908dupT	BRCA1 4027insT	17	41243596	TC	T	frameshift_variant	1214	1	0.0824%	c.3951delG	1863	1328	1863	AAGAA	ACCAAT	10
Ovarian	OCT10C	BRCA1 c.3908dupT	BRCA1 4027insT	17	41243621	AT	A	frameshift_variant	1177	1	0.0850%	c.3926delA	1863	1328	1863	TTGCA	TTTGTA	10
Ovarian	OCT1C	BRCA1 c.4724delC	BRCA1 4843delC	17	41223143	TGA	T	frameshift_variant	3184	1	0.0314%	c.4786_4787delTC	1863	1599	1862	AGATGG	GAGGTT	15
Breast	L031_P2	BRCA2 c.407delA	NA	13	32899297	TTCTAAATTCTTG	T	disruptive_inframe_deletion	1761	1	0.0568%	c.402_413delTCTAAATTCTTG	3418	150	3414	TCTTA	TCCACT	4
Breast	1109_P1	BRCA2 c.755_758delACAG	NA	13	32905103	TGATAGATTTATCGCTTCTGTGACA	T	disruptive_inframe_deletion	1431	2	0.1398%	c.729_754delGATAGATTTATCGCTTCTGTGACA	3418	274	3410	GACAG	AAAAAT	9
Breast	1109_P1	BRCA2 c.755_758delACAG	NA	13	32905114	TCGCTTCTGTGACAGA	T	inframe_deletion	1383	2	0.1446%	c.740_756delCGCTTCTGTGACAGA	3418	274	3403	CAGTG	ATTTAT	9
Breast	1109_P1	BRCA2 c.755_758delACAG	NA	13	32905115	CGCTTCTGTGACAGACAGTGAAAACACAAATCAAAGA	C	disruptive_inframe_deletion	1385	1	0.0722%	c.741_778delGCTTCTGTGACAGACAGTGAAAACACAAATCAAAGA	3418	274	3406	GAAGC	TTTATC	9
Breast	1109_P1	BRCA2 c.755_758delACAG	NA	13	32905137	AAC	A	frameshift_variant	1357	1	0.0737%	c.767_768delCA	3418	274	3416	ACAAA	GTGAAA	9
Breast	1109_P1	BRCA2 c.755_758delACAG	NA	13	32905140	ACAAAT	A	frameshift_variant	1369	2	0.1461%	c.771_775delTCAAA	3418	274	3415	CAAAG	AAAACA	9
Breast	1109_P1	BRCA2 c.755_758delACAG	NA	13	32905146	CAA	C	frameshift_variant	1320	3	0.2273%	c.774_775delAA	3418	274	3416	AGAGA	CAAATC	9
Breast	1109_P2	BRCA2 c.755_758delACAG	NA	13	32905103	TGATAGATTTATCGCTTCTGTGACA	T	disruptive_inframe_deletion	1814	1	0.0551%	c.729_754delGATAGATTTATCGCTTCTGTGACA	3418	274	3410	GACAG	AAAAAT	9
Breast	1109_P2	BRCA2 c.755_758delACAG	NA	13	32905104	GAT	G	frameshift_variant	1822	1	0.0549%	c.732_733delTA	3418	274	3416	AGATT	AAAATG	9
Breast	1109_P2	BRCA2 c.755_758delACAG	NA	13	32905137	AAC	A	frameshift_variant	1778	1	0.0562%	c.767_768delCA	3418	274	3416	ACAAA	GTGAAA	9
Breast	1109_P2	BRCA2 c.755_758delACAG	NA	13	32906429	AATTCATTT	A	frameshift_variant	2122	2	0.0943%	c.814_823delATTCATTT	3418	274	3414	AAAGT	CAGGGA	10
Breast	1109_P2	BRCA2 c.755_758delACAG	NA	13	32906431	TTCATTTAA	T	frameshift_variant	2144	2	0.0933%	c.816_825delTCATTTAA	3418	274	3414	AGTAA	GGGAAT	10

Putative BRCA2 reversion mutations in serial plasma samples of case L031 (amplicon-resequencing)

	RUN 1		RUN 2	
	BRCA2 reversion 1 c.403_413delTCTAAATTCTTG	BRCA2 reversion 2 c.389_406delTTTCCTGTCCACTTCTAA	BRCA2 reversion 1 c.403_413delTCTAAATTCTTG	BRCA2 reversion 2 c.389_406delTTTCCTGTCCACTTCTAA
	Variant Allele Frequency		**Variant Allele Frequency**	
Plasma 1	0.003082	0	0.002080	0.000067
Plasma 2	0.000604	0	0.000862	0
Plasma 3	0.013141	0.004984	0.005766	0.003093

Mean Depth	
RUN1	**RUN2**
9308 X	564259 X

Putative BRCA2 reversion mutations in plasma sample of case 1109 (amplicon re-sequencing)

	RUN 1	**RUN 2**
Putative *BRCA2* reversion mutations	**Variant Allele Frequency**	
c.728_738delATGATAGATTT	0.001137	0.000082
c.730_753delGATAGATTTATCGCTTCTGTGACA	0.000286	0.000231
c.731_732delAT	0.001147	0.000296
c.735insT	0.003237	0.000739
c.739_762delATCGCTTCTGTGACAGACAGTGAA	0.001609	0.000603
c.763insC	0.000534	-
c.764_765delAC	0.001064	0.001108
c.768insG	0.000531	-
c.773_774delAA	0.000547	-

Mean Depth	
RUN1	**RUN2**
3651 X	147132 X

Variant allele fractions of somatic mutations in the pre-treatment tumor and post-treatment plasma sample from patient 1109 (amplicon re-sequencing)

	Plasma (post-treatment)	**Tumor (pre-treatment)**
	Variant Allele Frequency	
***FAT3* c.13447 A>T**	0.110357	0.160037
***ERCC4* c.749 A>G**	0.382705	0.518661
***KDM5C* c.2221 A>G**	0.328663	0.555681

Mean Depth	
Mean Depth	219132 X

Percentages of ctDNA and variant allele fractions of somatic mutations and reversion mutations in cfDNA in the samples from the four ovarian cancer patients harboring putative BRCA1 reversion mutations.

Tumor sample	**Fraction ctDNA in cfDNA (%)**	**Variant allele fractions in cfDNA**		**Putative *BRCA1* reversion mutations variant allele fractions in cfDNA (Reversion mut - %)**
		Mutation type (gene - mutation)	**(%)**	
OCT1	NA	*NF1*-H1143Y	0.0293	Rev1 - 0.0314
OCT5	NA	*FAT3*-D2595Y	0.0749	Rev1 - 0.0392
OCT10	0.26	*TP53*-E339*	0.1312	Rev1 - 0.0850
				Rev2 - 0.0824
OCT15	0.31	*PRKDC*-Q3083*	0.0484	Rev1 - 0.0489
		TP53-T211Ifs	0.3096	Rev2 - 0.0473