



Supplementary Materials: Low-frequency mutational heterogeneity of invasive ductal carcinoma subtypes: information to direct precision oncology

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Table S1A *PIK3CA*, *KRAS*, *HRAS*, and *BRAF* mutant fraction measurements in HR+/HER2+ ductal carcinomas

ID	Age/Race	Max. Tumor Dim.	T Stage N Stage Hist. Grade Clinical Stage	Smoker	MP	Mutant Fraction					
						<i>PIK3CA</i>		<i>KRAS</i>		<i>HRAS</i>	<i>BRAF</i>
						H1047R	E545K	G12D	G12V	G12D	V600E
1	40/C	1.8	T1 N1 II II	N	Pre	1.99 x 10 ⁻⁶	6.99 x 10 ⁻⁶	3.37 x 10 ⁻⁶	5.88 x 10 ⁻⁷	4.94 x 10 ⁻⁵	1.72 x 10 ⁻⁵
2	85/C	3.2	T4 N0 III III	-	Post	1.16 x 10 ⁻⁷	4.37 x 10 ⁻⁶	3.22 x 10 ⁻⁵	2.29 x 10 ⁻⁶	7.26 x 10 ⁻⁶	5.71 x 10 ⁻⁶
3	56/C	4.2	T4 N2 II III	-	Post	1.11 x 10 ⁻⁷	4.06 x 10 ⁻⁶	4.23 x 10 ⁻⁵	2.57 x 10 ⁻⁷	1.14 x 10 ⁻⁵	8.62 x 10 ⁻⁶
4	69/C	1.2	T1 N- II -	N	Post	9.21 x 10 ⁻³	1.32 x 10 ⁻¹	1.56 x 10 ⁻⁵	1.06 x 10 ⁻⁴	1.44 x 10 ⁻⁶	2.07 x 10 ⁻⁵
5	43/C	1.9	T1 N0 II I	-	Pre	9.87 x 10 ⁻⁵	6.10 x 10 ⁻⁶	9.09 x 10 ⁻⁶	1.48 x 10 ⁻⁶	6.02 x 10 ⁻⁶	1.74 x 10 ⁻⁵
6	42/C	1.5	T1 N0 II I	-	-	1.08 x 10 ⁻⁷	1.36 x 10 ⁻⁵	1.91 x 10 ⁻⁵	3.65 x 10 ⁻⁷	3.00 x 10 ⁻⁵	4.99 x 10 ⁻⁶
7	47/C	1.2	T1 N0 II I	-	Pre	9.58 x 10 ⁻⁶	1.08 x 10 ⁻⁵	7.13 x 10 ⁻⁶	1.98 x 10 ⁻⁷	3.24 x 10 ⁻⁵	5.71 x 10 ⁻⁶
8	56/C	1.5	T1 N2 II III	-	Pre	1.14 x 10 ⁻⁷	9.75 x 10 ⁻⁶	1.27 x 10 ⁻⁵	1.65 x 10 ⁻⁶	9.73 x 10 ⁻⁶	1.09 x 10 ⁻⁵
9	60/C	2.5	T2 N0 II II	N	Post	4.50 x 10 ⁻⁸	1.61 x 10 ⁻⁵	1.51 x 10 ⁻⁵	1.81 x 10 ⁻⁶	1.38 x 10 ⁻⁶	8.57 x 10 ⁻⁶
10	66/C	1.2	T1 N1 III II	-	Post	3.64 x 10 ⁻⁴	7.40 x 10 ⁻⁶	1.06 x 10 ⁻⁵	4.13 x 10 ⁻⁷	9.00 x 10 ⁻⁷	4.72 x 10 ⁻⁶
11	54/C	1.2	T1 N0 III I	-	-	2.69 x 10 ⁻⁵	2.79 x 10 ⁻⁵	2.39 x 10 ⁻⁵	8.12 x 10 ⁻⁶	7.95 x 10 ⁻⁵	3.73 x 10 ⁻⁵
12	60/C	2.0	T1 N1 II II	N	Post	1.01 x 10 ⁻³	3.67 x 10 ⁻⁶	6.96 x 10 ⁻⁶	8.89 x 10 ⁻⁷	1.31 x 10 ⁻⁴	7.35 x 10 ⁻⁶
13	58/C	1.5	T1 N0 II I	-	Post	4.72 x 10 ⁻⁶	3.03 x 10 ⁻⁵	1.46 x 10 ⁻⁵	1.98 x 10 ⁻⁶	8.53 x 10 ⁻⁵	7.36 x 10 ⁻⁶
14	27/C	1.5	T1 N0 III I	-	Pre	2.15 x 10 ⁻⁴	1.27 x 10 ⁻¹	1.10 x 10 ⁻⁵	3.05 x 10 ⁻⁶	7.28 x 10 ⁻⁵	1.62 x 10 ⁻⁵
15	60/C	2.5	T2 N0 II II	N	Post	4.15 x 10 ⁻²	7.34 x 10 ⁻⁶	1.26 x 10 ⁻⁵	1.97 x 10 ⁻⁶	8.51 x 10 ⁻⁵	8.83 x 10 ⁻⁵
16	77/C	2.5	T2 N1 III II	N	Post	2.55 x 10 ⁻⁷	7.56 x 10 ⁻⁶	1.59 x 10 ⁻⁶	1.81 x 10 ⁻⁵	4.14 x 10 ⁻⁵	4.36 x 10 ⁻⁵
17	50/C	2.7	T2 N0 II II	N	Post	1.14 x 10 ⁻³	4.72 x 10 ⁻⁶	1.78 x 10 ⁻⁵	2.13 x 10 ⁻⁶	8.57 x 10 ⁻⁵	9.79 x 10 ⁻⁶
18	50/C	1.4	T1 N0 II I	-	Pre	2.58 x 10 ⁻⁵	1.09 x 10 ⁻⁵	1.72 x 10 ⁻⁵	1.67 x 10 ⁻⁶	1.67 x 10 ⁻⁵	7.38 x 10 ⁻⁶
19	66/C	5.0	T2 N0 II II	N	Post	2.17 x 10 ⁻⁸	2.04 x 10 ⁻¹	1.10 x 10 ⁻⁵	1.54 x 10 ⁻⁶	8.86 x 10 ⁻⁶	8.17 x 10 ⁻⁶
20	49/C	4.7	T2 N2 II III	Y	Pre	2.88 x 10 ⁻³	4.68 x 10 ⁻⁶	3.57 x 10 ⁻⁵	2.96 x 10 ⁻⁶	2.19 x 10 ⁻⁴	1.17 x 10 ⁻⁵
Mean ± SD						Geometric Mean MF					
55.8 ± 13.3						1.32 x 10 ⁻⁵	3.66 x 10 ⁻⁵	1.79 x 10 ⁻⁵	1.80 x 10 ⁻⁶	2.09 x 10 ⁻⁵	1.19 x 10 ⁻⁵

Table S1B. *PIK3CA*, *KRAS*, *HRAS*, and *BRAF* mutant fraction measurements in HR+/HER2- ductal carcinomas

ID	Age/Race	Max. Tumor Dim.	T Stage N Stage Hist. Grade Clinical Stage	Smoker	MP	Mutant Fraction					
						<i>PIK3CA</i>		<i>KRAS</i>		<i>HRAS</i>	<i>BRAF</i>
						H1047R	E545K	G12D	G12V	G12D	V600E
21	58/AA	15.7	T3 N3 II III	Y	-	1.55 x 10 ⁻⁷	4.91 x 10 ⁻⁶	8.32 x 10 ⁻⁶	2.76 x 10 ⁻⁷	3.66 x 10 ⁻⁵	7.46 x 10 ⁻⁴
22	63/C	1.9	T1 N2 II III	N	Post	9.45 x 10 ⁻⁸	1.92 x 10 ⁻⁶	3.55 x 10 ⁻⁶	2.29 x 10 ⁻⁷	3.16 x 10 ⁻⁵	5.01 x 10 ⁻⁵
23	65/C	5.8	T3 N2 II III	Y	Post	6.92 x 10 ⁻³	6.71 x 10 ⁻⁵	3.50 x 10 ⁻⁶	1.19 x 10 ⁻⁷	4.15 x 10 ⁻⁵	1.67 x 10 ⁻⁴
24	56/C	3.9	T2 N1 II II	Y	-	3.88 x 10 ⁻³	7.09 x 10 ⁻⁶	6.62 x 10 ⁻⁵	2.36 x 10 ⁻⁶	4.21 x 10 ⁻⁵	1.85 x 10 ⁻⁵
25	61/C	2.7	T2 N0 III II	N	Post	2.80 x 10 ⁻⁷	1.14 x 10 ⁻⁵	8.17 x 10 ⁻⁶	6.53 x 10 ⁻⁷	4.11 x 10 ⁻⁵	8.19 x 10 ⁻⁵
26	67/C	4.0	T2 N3 III III	N	Post	8.74 x 10 ⁻⁵	5.79 x 10 ⁻⁶	4.71 x 10 ⁻⁶	1.45 x 10 ⁻⁷	6.03 x 10 ⁻⁵	5.32 x 10 ⁻⁵
27	70/C	2.5	T2 N1 III II	N	-	2.53 x 10 ⁻⁵	3.00 x 10 ⁻³	1.31 x 10 ⁻⁵	1.48 x 10 ⁻⁷	2.26 x 10 ⁻⁵	1.85 x 10 ⁻⁵
28	30/C	2.2	T2 N1 I II	Y	Pre	3.85 x 10 ⁻⁸	3.61 x 10 ⁻³	5.31 x 10 ⁻⁶	3.43 x 10 ⁻⁷	5.68 x 10 ⁻⁵	3.49 x 10 ⁻⁵
29	57/AA	3.5	T2 N0 III II	N	Post	2.06 x 10 ⁻⁷	1.87 x 10 ⁻⁵	9.07 x 10 ⁻⁶	5.50 x 10 ⁻⁷	1.29 x 10 ⁻⁵	9.20 x 10 ⁻⁵
30	68/C	3.2	T2 N0 III II	Y	Post	2.29 x 10 ⁻⁶	1.56 x 10 ⁻⁶	1.66 x 10 ⁻⁶	1.02 x 10 ⁻⁷	2.32 x 10 ⁻⁵	4.45 x 10 ⁻⁵
31	69/S.Am.	4.5	T2 N2 II III	N	Post	1.38 x 10 ⁻⁶	6.60 x 10 ⁻⁶	3.01 x 10 ⁻⁶	3.28 x 10 ⁻⁵	3.87 x 10 ⁻⁵	7.41 x 10 ⁻⁵
32	49/?	4.5	T2 N3 I III	Y	Pre	2.06 x 10 ⁻⁷	4.52 x 10 ⁻⁷	2.01 x 10 ⁻⁵	5.28 x 10 ⁻⁷	6.15 x 10 ⁻⁴	2.46 x 10 ⁻⁵
33	55/C	3.5	T2 N0 III II	N	Post	6.65 x 10 ⁻²	5.07 x 10 ⁻⁶	2.57 x 10 ⁻⁶	4.68 x 10 ⁻⁸	1.69 x 10 ⁻⁵	1.90 x 10 ⁻⁵
34	53/C	4.8	T2 N0 I II	N	Post	3.17 x 10 ⁻²	2.48 x 10 ⁻³	1.29 x 10 ⁻⁵	2.95 x 10 ⁻⁸	1.68 x 10 ⁻⁵	2.32 x 10 ⁻⁵
35	42/C	3.2	T2 N2 III III	N	-	1.82 x 10 ⁻⁴	4.95 x 10 ⁻⁷	4.70 x 10 ⁻⁶	1.26 x 10 ⁻⁷	8.27 x 10 ⁻⁵	3.18 x 10 ⁻⁵
36	28/AA	2.7	T2 N0 I II	N	Pre	5.11 x 10 ⁻⁸	6.82 x 10 ⁻⁶	6.04 x 10 ⁻⁶	6.21 x 10 ⁻⁷	1.10 x 10 ⁻⁵	1.80 x 10 ⁻⁵
37	65/C	2.5	T2 N0 II II	N	Post	7.43 x 10 ⁻⁴	5.35 x 10 ⁻⁶	7.22 x 10 ⁻⁶	6.39 x 10 ⁻⁸	1.25 x 10 ⁻⁵	2.58 x 10 ⁻⁴
38	86/AA	10.5	T3 N2 - III	-	Post	6.20 x 10 ⁻⁸	4.66 x 10 ⁻⁶	9.06 x 10 ⁻⁶	3.96 x 10 ⁻⁸	1.29 x 10 ⁻⁵	5.33 x 10 ⁻⁵
39	49/C	4.2	T2 N0 II II	N	Pre	2.40 x 10 ⁻⁴	1.56 x 10 ⁻¹	3.30 x 10 ⁻⁵	5.59 x 10 ⁻⁷	6.10 x 10 ⁻⁵	7.36 x 10 ⁻⁵
40	38/C	1.4	T3 N3 II III	Y	-	1.42 x 10 ⁻⁵	3.35 x 10 ⁻⁵	7.81 x 10 ⁻⁶	3.89 x 10 ⁻⁶	1.11 x 10 ⁻⁴	7.91 x 10 ⁻⁶
Mean ± SD						Geometric Mean MF					
56.5 ± 14.2						1.20 x 10 ⁻⁵	2.29 x 10 ⁻⁵	7.43 x 10 ⁻⁶	3.05 x 10 ⁻⁷	3.59 x 10 ⁻⁵	4.84 x 10 ⁻⁵

Table S1C. *PIK3CA*, *KRAS*, *HRAS*, and *BRAF* mutant fraction measurements in HR-/HER2+ ductal carcinomas

ID	Age/Race	Max. Tumor Dim.	T Stage N Stage Hist. Grade Clinical Stage	Smoker	MP	Mutant Fraction					
						<i>PIK3CA</i>		<i>KRAS</i>		<i>HRAS</i>	<i>BRAF</i>
						H1047R	E545K	G12D	G12V	G12D	V600E
41	48/C	3.4	T2 N1 III II	N	Pre	1.54 x 10 ⁻⁷	4.08 x 10 ⁻⁶	5.33 x 10 ⁻⁶	1.90 x 10 ⁻⁷	3.18 x 10 ⁻⁵	9.95 x 10 ⁻⁵
42	48/C	1.9	T1 N0 III I	-	Pre	9.67 x 10 ⁻⁹	2.98 x 10 ⁻⁶	3.10 x 10 ⁻⁶	5.51 x 10 ⁻⁸	1.08 x 10 ⁻⁵	1.73 x 10 ⁻⁵
43	85/AA	1.8	T1 N1 III I	Y	Post	1.67 x 10 ⁻⁴	3.37 x 10 ⁻⁶	7.30 x 10 ⁻⁶	2.08 x 10 ⁻⁵	2.83 x 10 ⁻⁵	3.80 x 10 ⁻⁵
44	53/C	3.5	T2 N0 III II	Y	Post	6.84 x 10 ⁻²	1.50 x 10 ⁻⁵	2.56 x 10 ⁻⁵	7.72 x 10 ⁻⁷	5.36 x 10 ⁻⁵	5.42 x 10 ⁻⁶
45	60/C	1.5	T1 N1 - II	N	Post	4.29 x 10 ⁻⁶	4.58 x 10 ⁻⁶	8.27 x 10 ⁻⁵	2.44 x 10 ⁻⁶	4.44 x 10 ⁻⁵	4.94 x 10 ⁻⁶
46	54/C	1.6	T1 N- III I	N	Post	1.19 x 10 ⁻⁷	3.54 x 10 ⁻⁶	1.51 x 10 ⁻¹	2.58 x 10 ⁻⁴	2.14 x 10 ⁻⁵	5.45 x 10 ⁻⁶
47	55/C	0.6	T1 N0 III I	-	Post	8.60 x 10 ⁻⁵	2.93 x 10 ⁻⁶	4.04 x 10 ⁻⁵	1.81 x 10 ⁻⁴	1.66 x 10 ⁻⁵	8.16 x 10 ⁻⁶
48	53/C	1.2	T1 N2 II III	-	Post	7.92 x 10 ⁻⁷	5.83 x 10 ⁻⁶	1.77 x 10 ⁻⁵	2.75 x 10 ⁻⁶	2.04 x 10 ⁻⁵	5.42 x 10 ⁻⁶
49	57/C	2.4	T2 N0 III II	-	Post	5.71 x 10 ⁻⁸	7.77 x 10 ⁻⁶	5.12 x 10 ⁻⁵	1.48 x 10 ⁻⁷	1.29 x 10 ⁻⁵	5.93 x 10 ⁻⁶
50	43/C	1.2	T1 N0 - I	-	Post	2.28 x 10 ⁻⁶	4.19 x 10 ⁻⁶	5.05 x 10 ⁻⁴	2.78 x 10 ⁻⁶	1.17 x 10 ⁻⁵	5.26 x 10 ⁻⁶
51	62/C	2.5	T2 N1 III II	N	Post	5.94 x 10 ⁻⁸	3.92 x 10 ⁻⁶	2.36 x 10 ⁻⁵	4.56 x 10 ⁻⁵	2.46 x 10 ⁻⁵	6.34 x 10 ⁻⁶
52	55/C	1.7	T1 N0 II I	Y	Post	8.32 x 10 ⁻⁴	7.23 x 10 ⁻⁶	6.80 x 10 ⁻⁵	3.93 x 10 ⁻⁶	1.48 x 10 ⁻⁵	1.54 x 10 ⁻⁵
53	50/C	2.5	T2 N1 III II	-	Post	7.60 x 10 ⁻⁸	4.46 x 10 ⁻⁶	5.17 x 10 ⁻⁵	1.98 x 10 ⁻⁶	9.17 x 10 ⁻⁵	1.56 x 10 ⁻⁵
54	51/C	2.2	T2 N0 III II	N	Post	3.80 x 10 ⁻⁵	7.02 x 10 ⁻⁶	1.68 x 10 ⁻⁵	1.27 x 10 ⁻⁶	6.24 x 10 ⁻⁵	8.00 x 10 ⁻⁵
55	44/C	2.5	T2 N2 III III	N	Pre	2.37 x 10 ⁻⁶	1.34 x 10 ⁻¹	1.07 x 10 ⁻⁵	3.89 x 10 ⁻⁷	4.11 x 10 ⁻⁶	8.63 x 10 ⁻⁶
56	72/C	1.7	T1 N0 II I	N	Post	3.80 x 10 ⁻²	1.66 x 10 ⁻⁷	4.36 x 10 ⁻⁵	5.02 x 10 ⁻⁶	2.38 x 10 ⁻⁶	1.16 x 10 ⁻⁵
57	71/C	3.0	T2 N2 III III	N	Post	2.36 x 10 ⁻⁶	5.52 x 10 ⁻⁶	1.68 x 10 ⁻⁵	3.19 x 10 ⁻⁵	7.84 x 10 ⁻⁵	7.62 x 10 ⁻⁶
58	67/C	2.2	T2 N2 III III	N	Post	6.75 x 10 ⁻²	6.45 x 10 ⁻⁶	1.57 x 10 ⁻⁵	1.04 x 10 ⁻⁴	8.54 x 10 ⁻⁵	7.51 x 10 ⁻⁶
59	78/C	8.0	T4 N0 III III	-	Post	7.98 x 10 ⁻²	3.87 x 10 ⁻⁵	1.73 x 10 ⁻⁵	2.25 x 10 ⁻⁶	7.50 x 10 ⁻⁵	7.01 x 10 ⁻⁵
60	48/C	3.2	T2 N1 - II	-	Pre	1.75 x 10 ⁻⁵	6.00 x 10 ⁻⁶	1.19 x 10 ⁻⁵	1.58 x 10 ⁻⁶	1.67 x 10 ⁻⁴	7.78 x 10 ⁻⁶
61	69/C	4.0	T2 N0 III II	Y	Post	4.20 x 10 ⁻²	8.60 x 10 ⁻⁶	8.74 x 10 ⁻⁶	1.76 x 10 ⁻⁶	7.15 x 10 ⁻⁵	8.12 x 10 ⁻⁶
Mean ± SD						Geometric Mean MF					
55.2 ± 11.5						2.15 x 10 ⁻⁵	7.94 x 10 ⁻⁶	3.47 x 10 ⁻⁵	3.57 x 10 ⁻⁶	2.54 x 10 ⁻⁵	1.19 x 10 ⁻⁵

Table S1D. *PIK3CA*, *KRAS*, *HRAS*, and *BRAF* mutant fraction measurements in HR+/HER2- (TNBC) ductal carcinomas

ID	Age/Race	Max. Tumor Dim.	T Stage N Stage Hist. Grade Clinical Stage		Smoker	MP	Mutant Fraction					
							<i>PIK3CA</i>		<i>KRAS</i>		<i>HRAS</i>	<i>BRAF</i>
							H1047R	E545K	G12D	G12V	G12D	V600E
62	64/C	1.8	T1 N2 III III	-	Post	4.44 x 10 ⁻⁴	4.25 x 10 ⁻⁵	3.63 x 10 ⁻⁶	2.75 x 10 ⁻⁶	3.48 x 10 ⁻⁵	3.64 x 10 ⁻⁵	
63	38/C	2.2	T2 N0 III II	Y	Pre	1.17 x 10 ⁻⁸	7.89 x 10 ⁻⁶	3.26 x 10 ⁻⁶	1.86 x 10 ⁻⁷	1.85 x 10 ⁻⁵	2.18 x 10 ⁻³	
64	45/C	1.8	T1 N0 III I	-	-	4.31 x 10 ⁻⁸	6.01 x 10 ⁻⁶	3.86 x 10 ⁻⁶	1.41 x 10 ⁻⁶	7.83 x 10 ⁻⁶	1.66 x 10 ⁻⁵	
65	80/?	4.2	T2 N1 II II	Y	Post	3.15 x 10 ⁻⁴	4.58 x 10 ⁻²	6.28 x 10 ⁻⁵	1.31 x 10 ⁻⁷	4.01 x 10 ⁻⁴	1.25 x 10 ⁻⁴	
66	54/C	2.2	T2 N0 III II	Y	Post	7.66 x 10 ⁻⁸	7.11 x 10 ⁻⁶	2.90 x 10 ⁻⁵	3.25 x 10 ⁻⁸	1.72 x 10 ⁻⁵	8.07 x 10 ⁻⁵	
67	70/C	2.7	T2 N1 III II	-	-	4.67 x 10 ⁻⁸	9.42 x 10 ⁻⁶	1.19 x 10 ⁻⁵	1.30 x 10 ⁻⁶	1.44 x 10 ⁻⁵	1.90 x 10 ⁻⁵	
68	52/C	3.0	T2 N0 III II	Y	Post	1.05 x 10 ⁻⁶	6.49 x 10 ⁻⁶	8.33 x 10 ⁻⁶	1.70 x 10 ⁻⁷	1.45 x 10 ⁻⁵	3.96 x 10 ⁻⁵	
69	52/C	1.7	T1 N0 I I	N	Post	9.28 x 10 ⁻⁷	1.13 x 10 ⁻⁵	3.32 x 10 ⁻⁵	1.19 x 10 ⁻⁶	5.56 x 10 ⁻⁵	6.10 x 10 ⁻⁶	
70	48/C	1.8	T1 N0 II I	N	Pre	7.94 x 10 ⁻⁸	3.63 x 10 ⁻⁶	1.47 x 10 ⁻⁵	1.23 x 10 ⁻⁷	1.12 x 10 ⁻⁵	5.03 x 10 ⁻⁶	
71	55/C	3.0	T2 N- II II	N	Post	3.23 x 10 ⁻⁸	8.05 x 10 ⁻⁷	1.07 x 10 ⁻⁵	5.09 x 10 ⁻⁸	3.18 x 10 ⁻⁵	1.05 x 10 ⁻⁵	
72	45/C	1.8	T1 N0 III I	-	Pre	2.40 x 10 ⁻⁸	2.95 x 10 ⁻⁶	1.72 x 10 ⁻⁵	1.59 x 10 ⁻⁶	1.98 x 10 ⁻⁵	5.25 x 10 ⁻⁵	
73	67/C	1.5	T1 N2 III III	-	Post	1.60 x 10 ⁻⁴	2.02 x 10 ⁻⁵	6.37 x 10 ⁻⁶	4.85 x 10 ⁻⁶	6.89 x 10 ⁻⁵	1.91 x 10 ⁻⁵	
74	40/C	1.1	T2 N0 III II	-	Pre	2.57 x 10 ⁻⁴	1.52 x 10 ⁻⁴	1.49 x 10 ⁻⁵	4.25 x 10 ⁻⁶	1.15 x 10 ⁻⁵	1.01 x 10 ⁻⁵	
75	54/C	1.3	T1 N1 III II	-	Post	1.54 x 10 ⁻⁶	5.33 x 10 ⁻⁴	1.27 x 10 ⁻⁵	3.25 x 10 ⁻⁶	1.11 x 10 ⁻⁵	1.16 x 10 ⁻⁵	
76	67/C	3.5	T2 N0 III II	Y	Post	1.04 x 10 ⁻⁷	5.89 x 10 ⁻⁶	2.03 x 10 ⁻⁵	1.62 x 10 ⁻⁶	3.73 x 10 ⁻⁵	7.46 x 10 ⁻⁶	
77	74/C	2.2	T2 N0 III II	-	Post	1.29 x 10 ⁻⁷	5.15 x 10 ⁻⁶	1.16 x 10 ⁻⁵	1.42 x 10 ⁻⁶	6.33 x 10 ⁻⁵	6.86 x 10 ⁻⁶	
78	59/His.	-	T- N- - -	-	-	1.46 x 10 ⁻⁶	1.43 x 10 ⁻⁵	1.60 x 10 ⁻⁵	3.03 x 10 ⁻⁶	2.94 x 10 ⁻⁵	7.53 x 10 ⁻⁶	
79	49/C	3.4	T2 N0 III II	Y	-	4.16 x 10 ⁻⁶	1.08 x 10 ⁻⁵	7.44 x 10 ⁻⁶	9.67 x 10 ⁻⁷	1.35 x 10 ⁻⁴	7.88 x 10 ⁻⁶	
80	62/C	3.8	T2 N0 III II	Y	-	6.07 x 10 ⁻⁷	1.43 x 10 ⁻⁵	8.95 x 10 ⁻⁶	1.70 x 10 ⁻⁶	5.66 x 10 ⁻⁵	7.87 x 10 ⁻⁶	
81	43/C	4.0	T2 N0 III II	-	-	9.53 x 10 ⁻⁸	7.54 x 10 ⁻⁶	1.32 x 10 ⁻⁵	7.51 x 10 ⁻⁶	2.23 x 10 ⁻⁴	7.50 x 10 ⁻⁶	
Mean ± SD							Geometric Mean MF					
55.90 ± 11.6							7.64 x 10 ⁻⁷	1.68 x 10 ⁻⁵	1.18 x 10 ⁻⁵	8.57 x 10 ⁻⁷	3.34 x 10 ⁻⁵	1.96 x 10 ⁻⁵

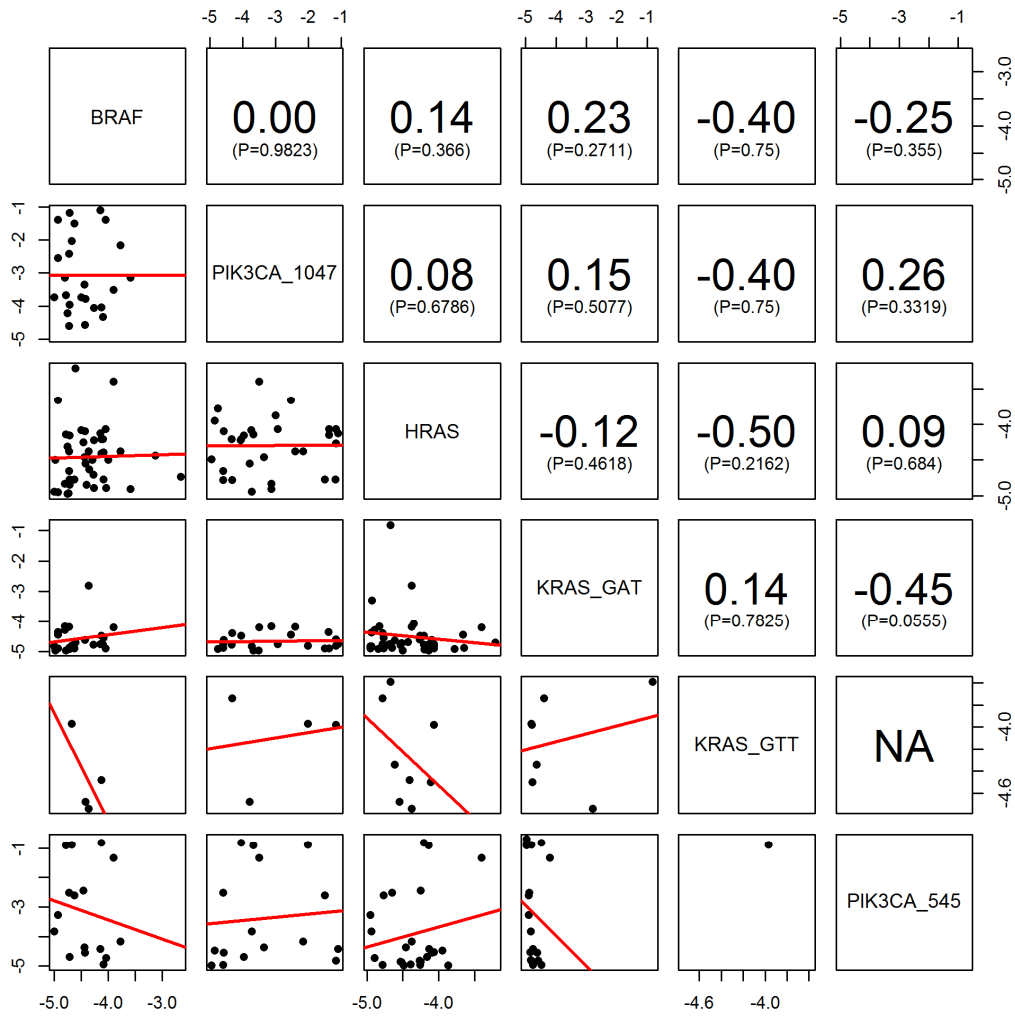


Figure S1A. Correlation matrix of MFs in ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

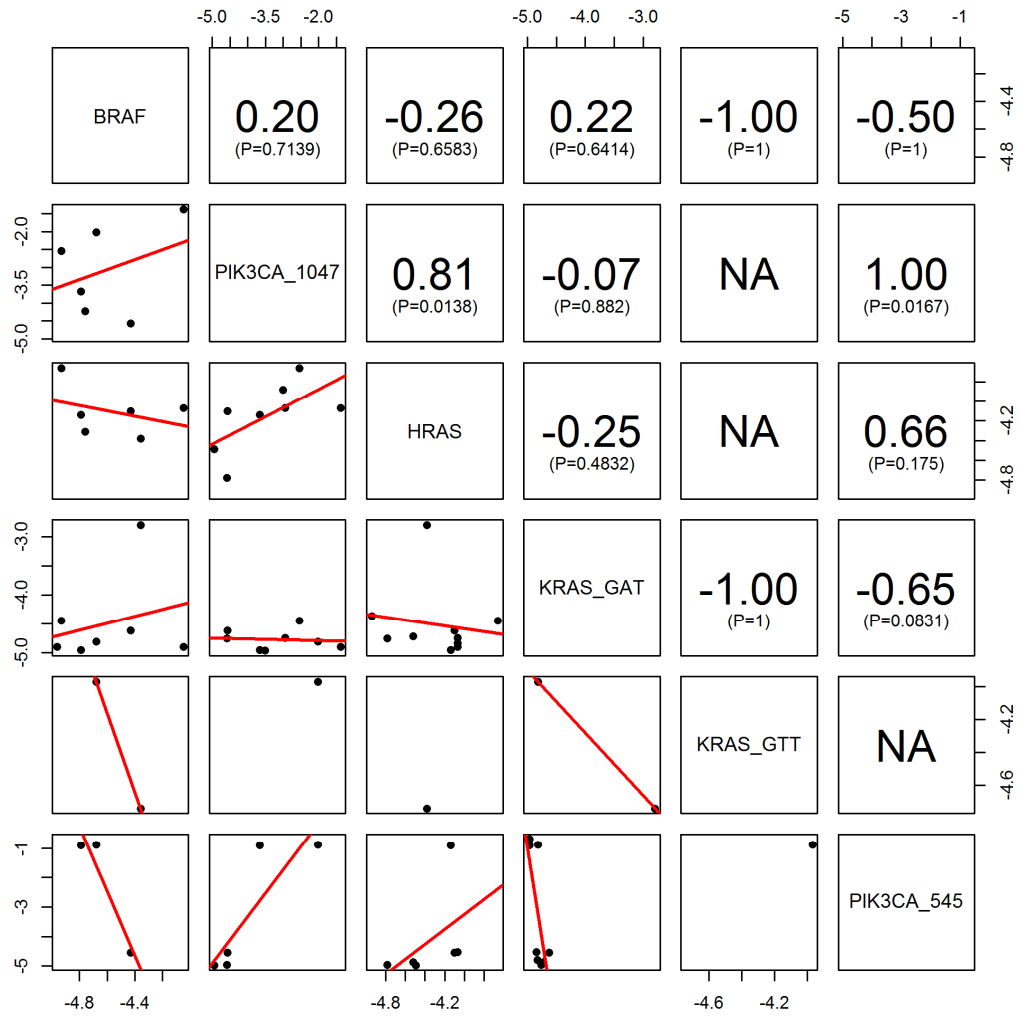


Figure S1B. Correlation matrix of MFs in HR+/HER2+ ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

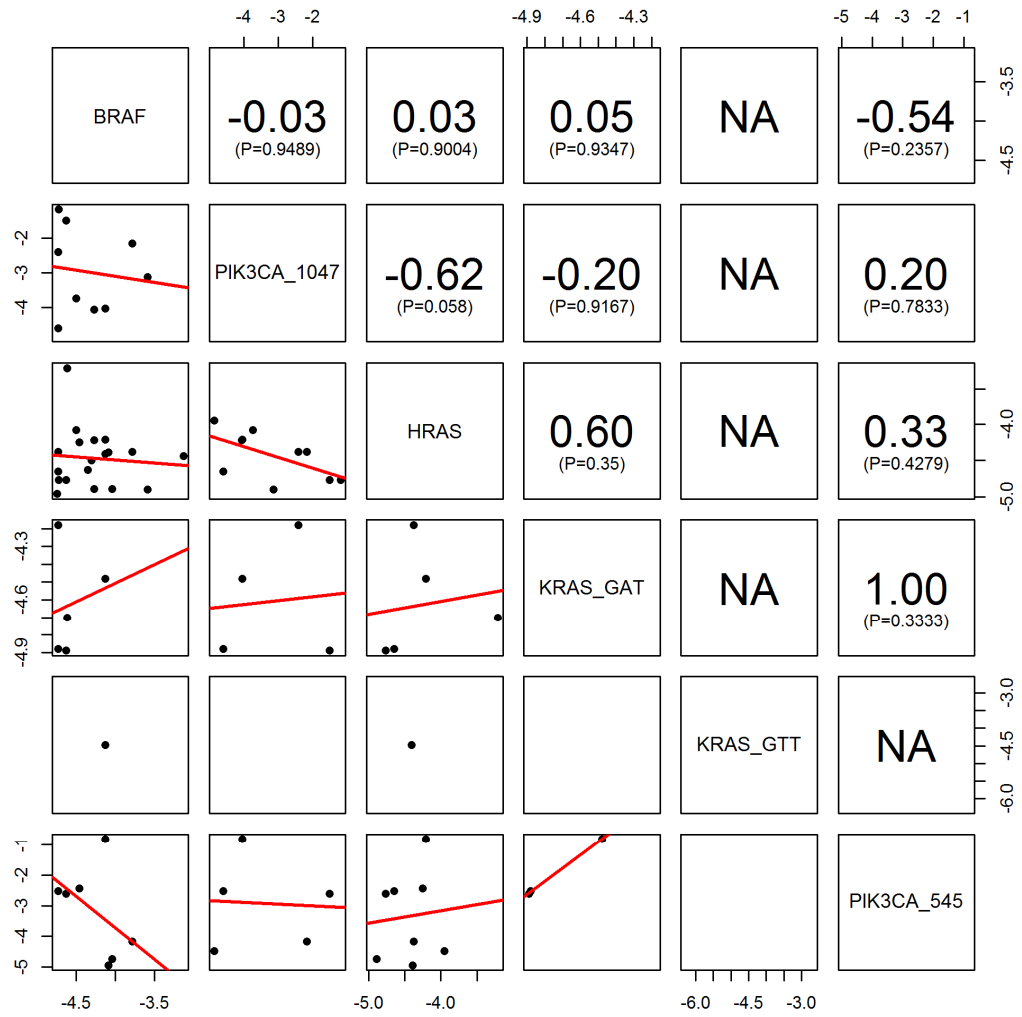


Figure S1C. Correlation matrix of MFs in HR+/HER2- ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

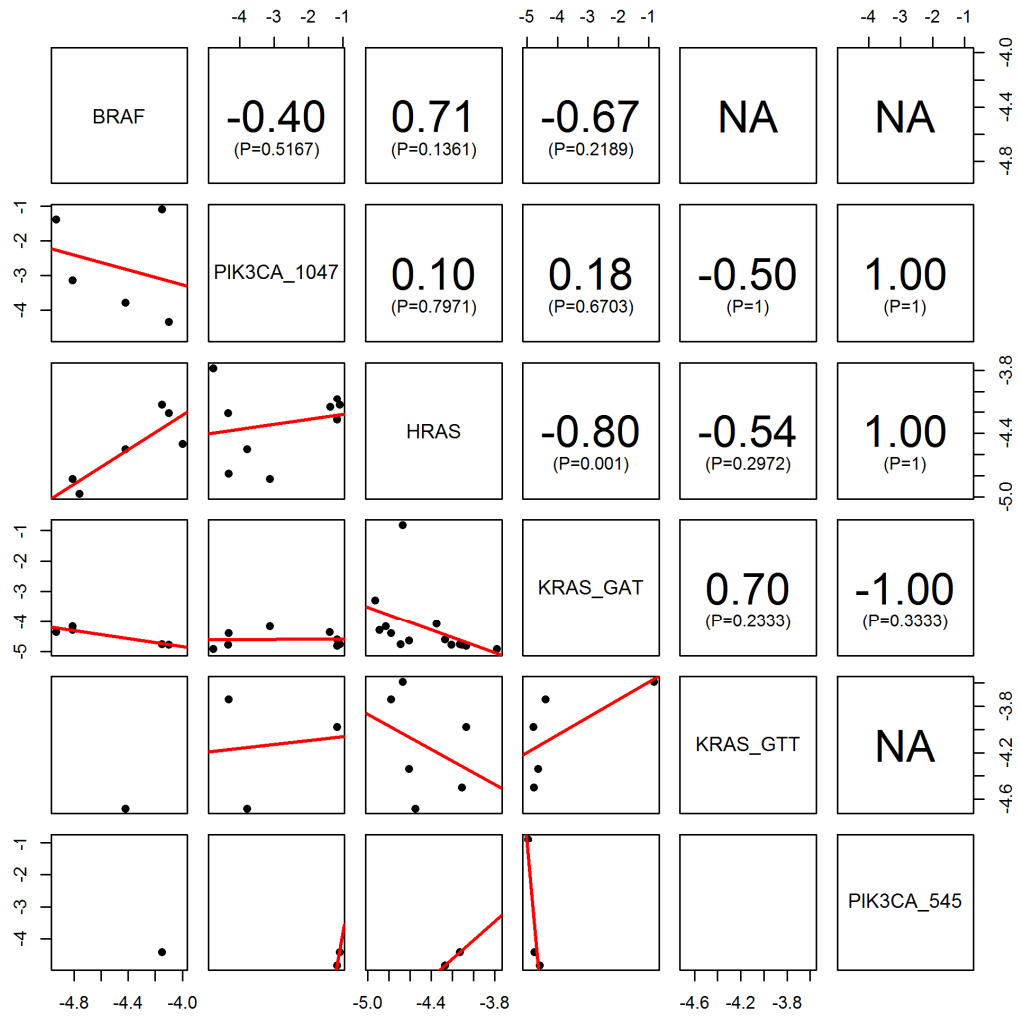


Figure S1D. Correlation matrix of MFs in HR-/HER2+ ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

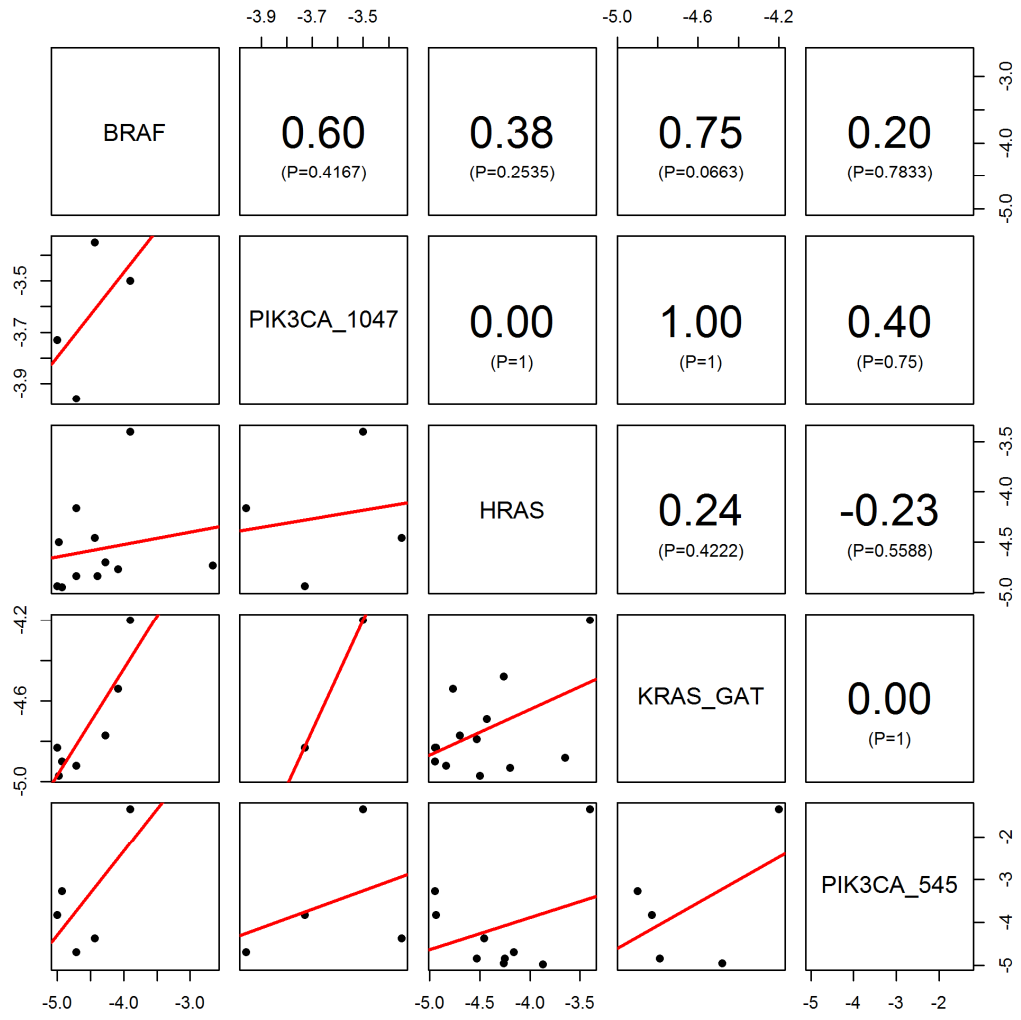


Figure S1E. Correlation matrix of MFs in HR-/HER2- (TNBC) ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (GTT), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

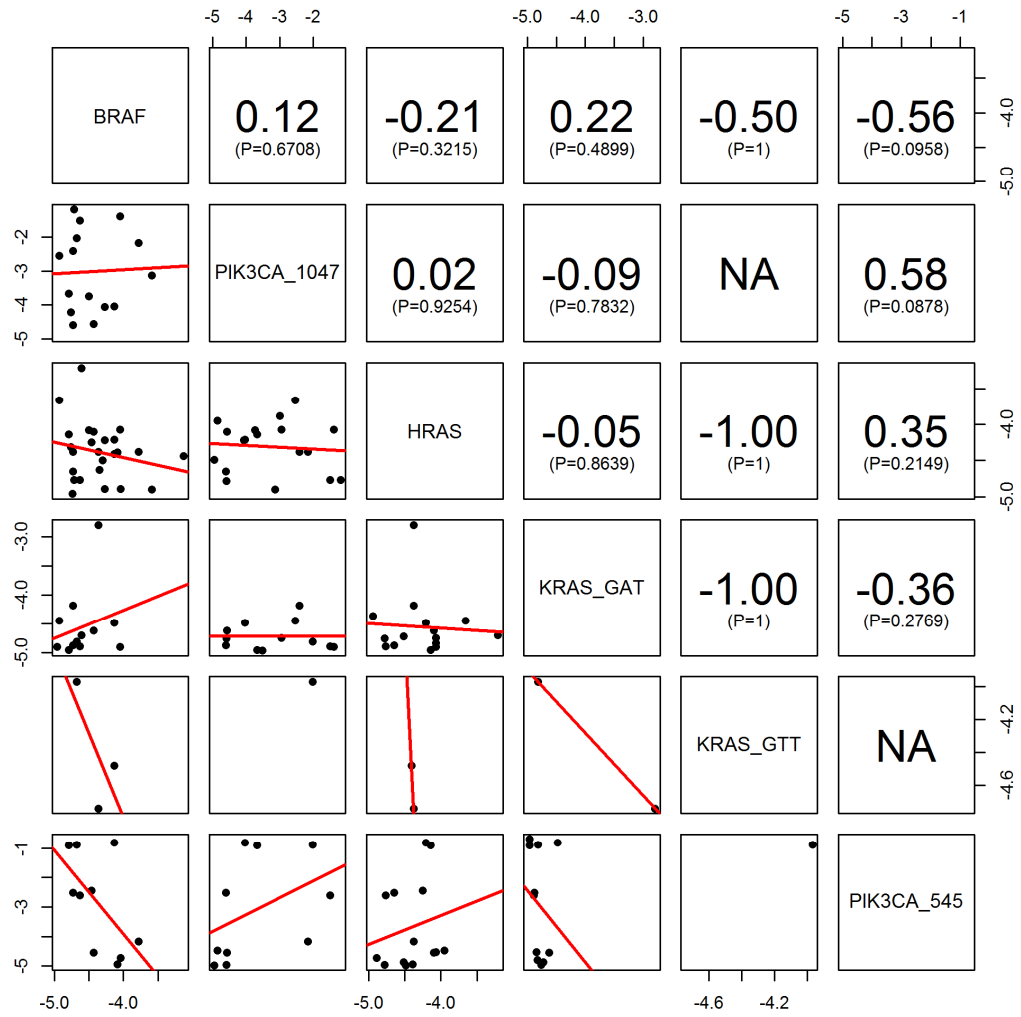


Figure S1F. Correlation matrix of MFs in ER+ ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

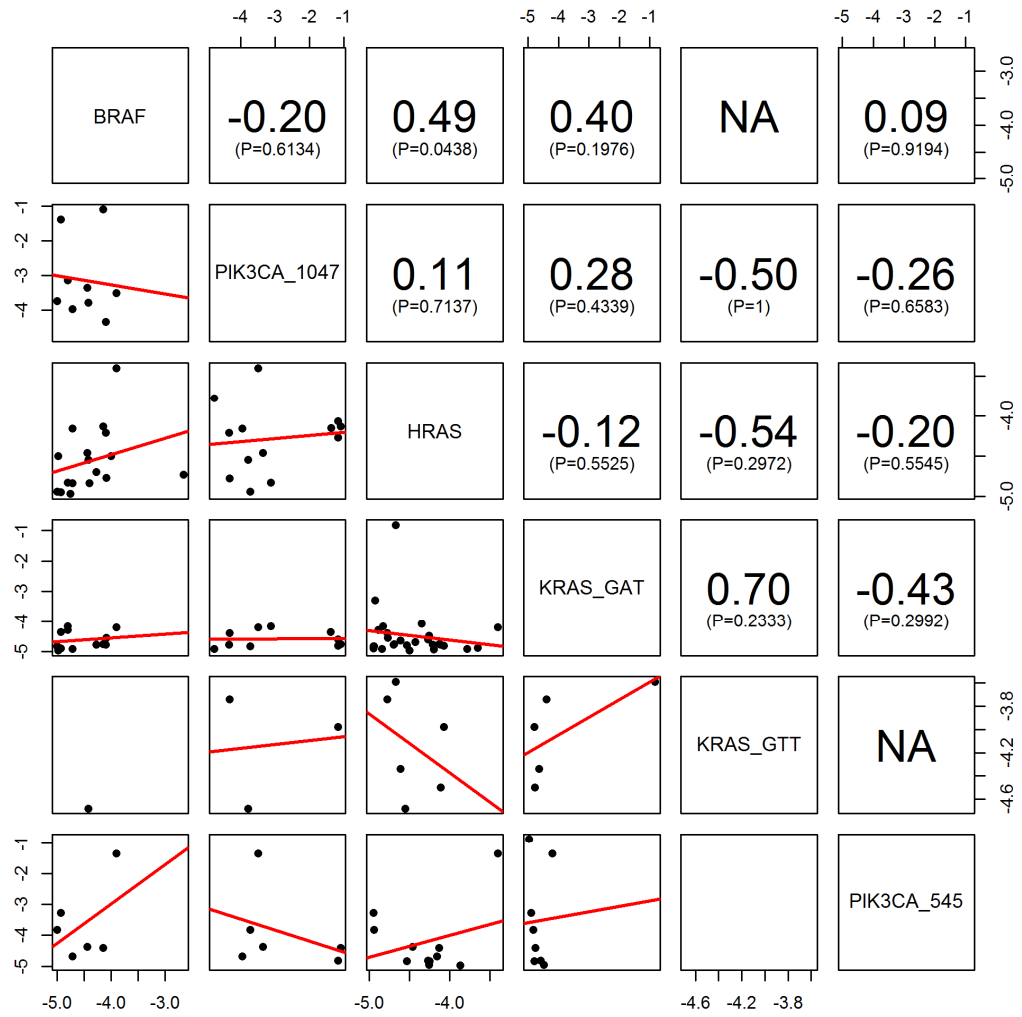


Figure S1G. Correlation matrix of MFs in ER- ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

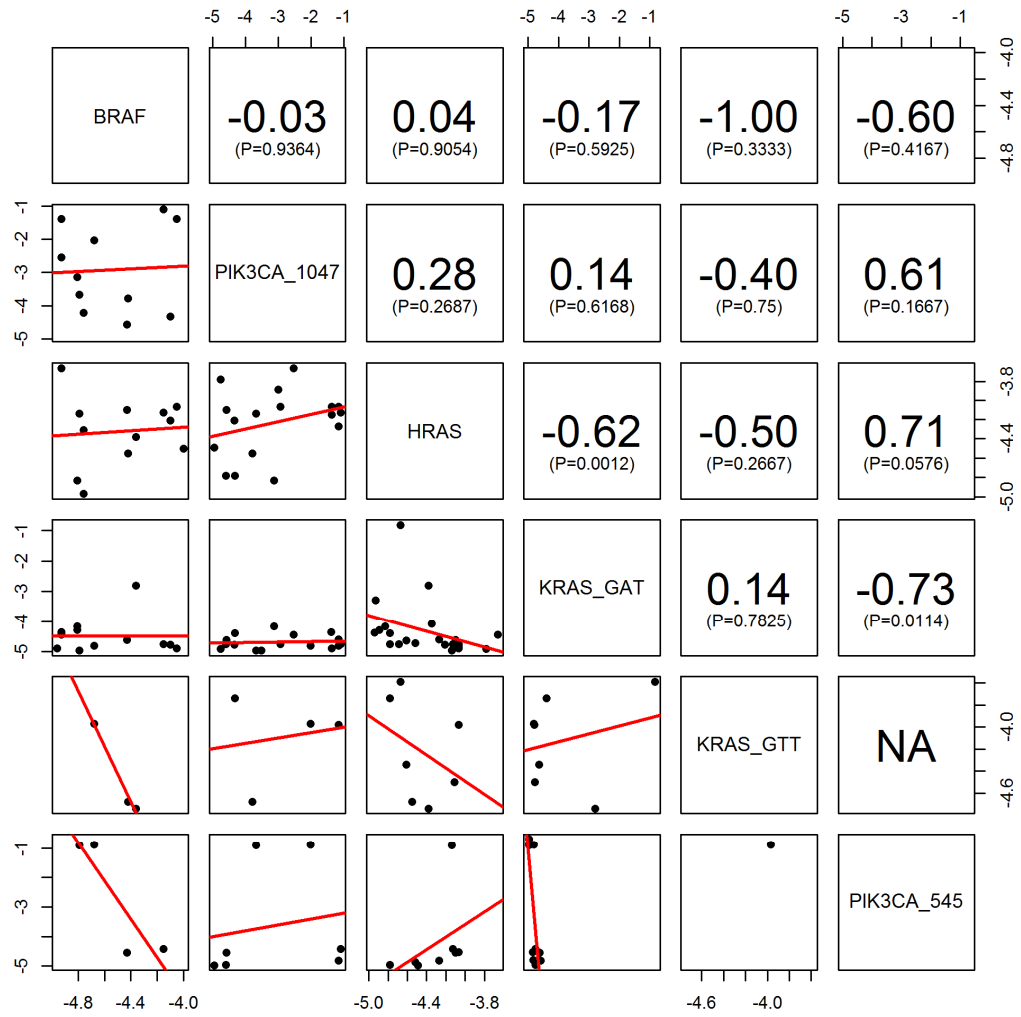


Figure S1H. Correlation matrix of MFs in HER2+ ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).

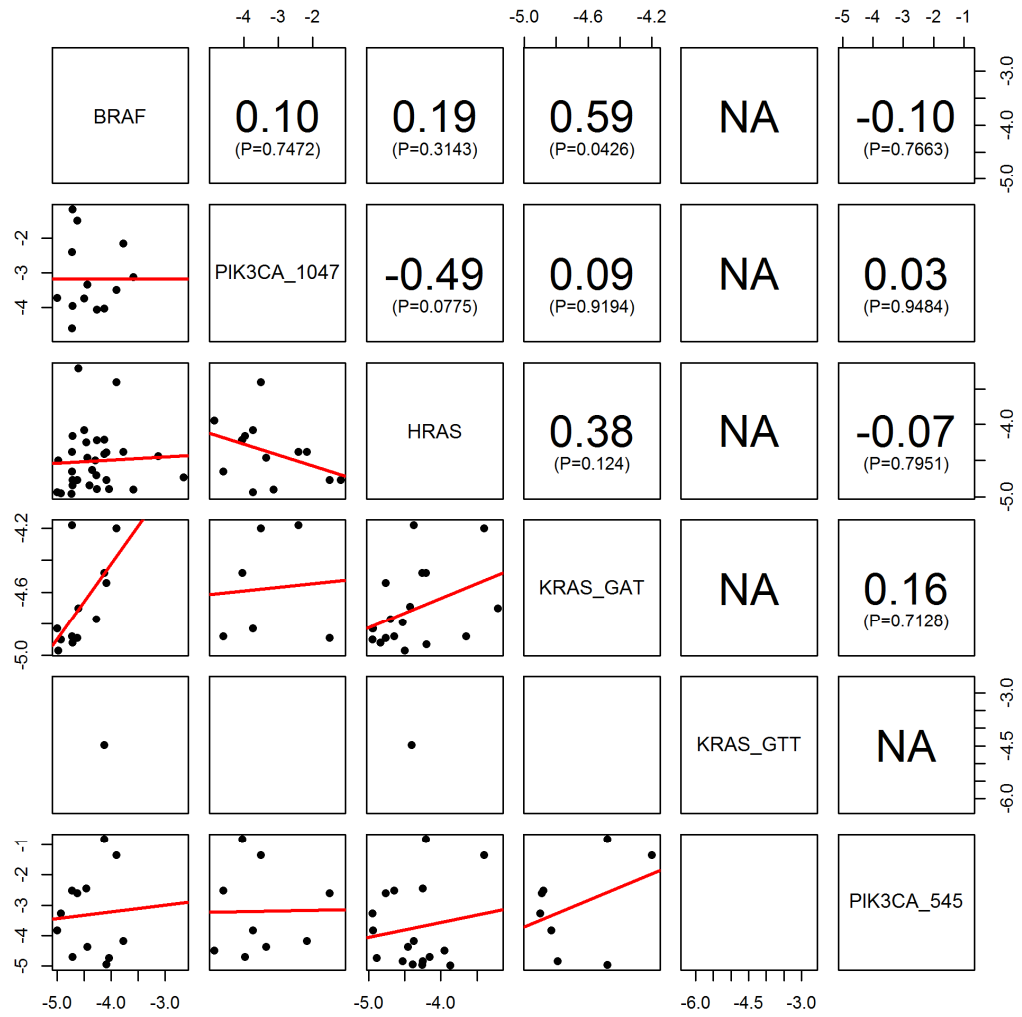


Figure S11. Correlation matrix of MFs in HER2- ductal carcinomas: *PIK3CA* H1047R (*PIK3CA_1047*) and E545K (*PIK3CA_545*), *KRAS* G12D (*KRAS_GAT*) and G12V (*GTT*), *HRAS* G12D (*HRAS*), and *BRAF* V600E (*BRAF*).