

Supplementary Table S1 Gene Set Enrichment Analysis (GSEA)

All Mutants v MCF7-WT

Pathways UP

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_INTERFERON_ALPHA_RESPONSE	82	0.6	2.3	0	0	0	2787
HALLMARK_INTERFERON_GAMMA_RESPONSE	141	0.5	2.1	0	0	0	2840
HALLMARK_ESTROGEN_RESPONSE_EARLY	198	0.4	1.8	0	0.004	0.018	1905
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	119	0.4	1.6	0	0.031	0.171	2255
HALLMARK_HEDGEHOG_SIGNALING	26	0.5	1.5	0.058	0.071	0.424	1985
HALLMARK_P53_PATHWAY	184	0.3	1.4	0.014	0.088	0.549	1574
HALLMARK_APICAL_JUNCTION	133	0.3	1.4	0.027	0.085	0.59	2532
HALLMARK_ESTROGEN_RESPONSE_LATE	193	0.3	1.4	0.024	0.122	0.771	1388
HALLMARK_APOPTOSIS	123	0.3	1.3	0.042	0.111	0.778	2713
HALLMARK_ALLOGRAFT_REJECTION	85	0.3	1.3	0.063	0.128	0.852	2573
HALLMARK_TNFA_SIGNALING_VIA_NFKB	156	0.3	1.3	0.058	0.152	0.924	2574
HALLMARK_WNT_BETA_CATENIN_SIGNALING	33	0.4	1.2	0.169	0.190	0.965	1518
HALLMARK_COAGULATION	64	0.3	1.2	0.145	0.179	0.965	1987
HALLMARK_TGF_BETA_SIGNALING	51	0.3	1.2	0.200	0.247	0.994	1696
HALLMARK_ANGIOGENESIS	23	0.4	1.1	0.348	0.409	1	1432
HALLMARK_INFLAMMATORY_RESPONSE	96	0.3	1.1	0.316	0.429	1	2769
HALLMARK_NOTCH_SIGNALING	27	0.3	1.1	0.360	0.422	1	1518
HALLMARK_IL6_JAK_STAT3_SIGNALING	46	0.3	1.0	0.401	0.438	1	2770
HALLMARK_APICAL_SURFACE	26	0.3	0.9	0.596	0.740	1	2769
HALLMARK_MITOTIC_SPINDLE	195	0.2	0.9	0.753	0.719	1	2933
HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY	45	0.2	0.8	0.734	0.807	1	3352

Pathways DOWN

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_PROTEIN_SECRETION	93	-0.5	-2.0	0	0.002	0.001	3200
HALLMARK_CHOLESTEROL_HOMEOSTASIS	65	-0.5	-1.9	0	0.002	0.002	1719
HALLMARK_OXIDATIVE_PHOSPHORYLATION	197	-0.4	-1.9	0	0.002	0.003	3763
HALLMARK_FATTY_ACID_METABOLISM	129	-0.4	-1.8	0	0.005	0.013	1898
HALLMARK_XENOBIOTIC_METABOLISM	133	-0.4	-1.7	0	0.013	0.041	1089
HALLMARK_ANDROGEN_RESPONSE	92	-0.4	-1.6	0	0.027	0.103	1741
HALLMARK_KRAS_SIGNALING_UP	101	-0.4	-1.6	0.003	0.025	0.11	871
HALLMARK_HYPOXIA	163	-0.3	-1.6	0	0.023	0.114	1411
HALLMARK_MTORC1_SIGNALING	192	-0.3	-1.5	0	0.031	0.167	2537
HALLMARK_ADIPOGENESIS	172	-0.3	-1.5	0	0.033	0.194	1828
HALLMARK_HEME_METABOLISM	153	-0.3	-1.4	0.009	0.051	0.302	1899
HALLMARK_PEROXISOME	86	-0.3	-1.4	0.019	0.056	0.351	2295
HALLMARK_GLYCOLYSIS	178	-0.3	-1.3	0.012	0.113	0.614	2697
HALLMARK_MYC_TARGETS_V1	200	-0.3	-1.3	0.013	0.148	0.739	3635
HALLMARK_BILE_ACID_METABOLISM	67	-0.3	-1.3	0.110	0.162	0.799	2085
HALLMARK_MYOGENESIS	113	-0.3	-1.2	0.085	0.183	0.862	340
HALLMARK_IL2_STAT5_SIGNALING	133	-0.3	-1.2	0.089	0.186	0.881	990
HALLMARK_COMPLEMENT	119	-0.3	-1.2	0.117	0.189	0.901	767
HALLMARK_PI3K_AKT_MTOR_SIGNALING	88	-0.3	-1.2	0.143	0.191	0.919	1701
HALLMARK_KRAS_SIGNALING_DN	76	-0.2	-1.0	0.372	0.531	0.998	1139
HALLMARK_UV_RESPONSE_UP	136	-0.2	-1.0	0.473	0.598	1	2084
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	110	-0.2	-1.0	0.478	0.579	1	3433
HALLMARK_UV_RESPONSE_DN	124	-0.2	-1.0	0.491	0.590	1	1637
HALLMARK_G2M_CHECKPOINT	198	-0.2	-0.9	0.705	0.762	1	2806
HALLMARK_E2F_TARGETS	199	-0.2	-0.9	0.728	0.750	1	2800
HALLMARK_DNA_REPAIR	144	-0.2	-0.8	0.884	0.910	1	1491
HALLMARK_SPERMATOGENESIS	62	-0.2	-0.8	0.822	0.894	1	2444
HALLMARK_MYC_TARGETS_V2	58	-0.2	-0.7	0.958	0.972	1	2664

Supplementary Table S2 Gene Set Enrichment Analysis (GSEA)

L536R Clones 1-3 v MCF7-WT

Pathways UP

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_INTERFERON_ALPHA_RESPONSE	82	0.6	2.2	0	0	0	1830
HALLMARK_INTERFERON_GAMMA_RESPONSE	141	0.5	2.1	0	0	0	1806
HALLMARK_ESTROGEN_RESPONSE_EARLY	198	0.3	1.5	0	0.041	0.23	1720
HALLMARK_APOPTOSIS	123	0.3	1.1	0.213	0.573	0.995	2123
HALLMARK_WNT_BETA_CATENIN_SIGNALING	33	0.3	1.1	0.355	0.638	0.998	1837
HALLMARK_MITOTIC_SPINDLE	195	0.2	0.9	0.698	1.000	1	3021
HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY	45	0.2	0.8	0.879	1.000	1	3388
HALLMARK_MYC_TARGETS_V2	58	0.2	0.7	0.973	1.000	1	3614
HALLMARK_DNA_REPAIR	144	0.1	0.6	1.000	1.000	1	3737
HALLMARK_E2F_TARGETS	199	0.1	0.5	1.000	0.998	1	3832

Pathways DOWN

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_HYPOXIA	163	-0.5	-2.1	0	0.003	0.002	1728
HALLMARK_KRAS_SIGNALING_UP	101	-0.5	-2.1	0	0.001	0.002	1480
HALLMARK_CHOLESTEROL_HOMEOSTASIS	65	-0.5	-2.0	0	9.19E-04	0.002	1890
HALLMARK_ANDROGEN_RESPONSE	92	-0.5	-2.0	0	6.90E-04	0.002	2438
HALLMARK_PROTEIN_SECRETION	93	-0.5	-1.9	0	0.002	0.005	2470
HALLMARK_FATTY_ACID_METABOLISM	129	-0.5	-1.8	0.002	0.001	0.006	1911
HALLMARK_GLYCOLYSIS	178	-0.4	-1.8	0	0.001	0.006	1728
HALLMARK_XENOBIOTIC_METABOLISM	133	-0.4	-1.8	0	0.002	0.011	1308
HALLMARK_OXIDATIVE_PHOSPHORYLATION	197	-0.4	-1.7	0	0.006	0.035	3571
HALLMARK_TNFA_SIGNALING_VIA_NFKB	156	-0.4	-1.7	0	0.006	0.038	1332
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	119	-0.4	-1.6	0.002	0.018	0.126	1194
HALLMARK_MTORC1_SIGNALING	192	-0.4	-1.6	0.003	0.018	0.14	2235
HALLMARK_ESTROGEN_RESPONSE_LATE	193	-0.4	-1.5	0.002	0.024	0.198	844
HALLMARK_COAGULATION	64	-0.4	-1.5	0.021	0.030	0.259	1078
HALLMARK_ANGIOGENESIS	23	-0.5	-1.5	0.053	0.037	0.319	2003
HALLMARK_MYOGENESIS	113	-0.4	-1.4	0.023	0.064	0.523	1016
HALLMARK_ADIPOGENESIS	172	-0.3	-1.4	0.016	0.065	0.548	1733
HALLMARK_COMPLEMENT	119	-0.3	-1.4	0.022	0.067	0.583	1682
HALLMARK_IL2_STAT5_SIGNALING	133	-0.3	-1.4	0.038	0.080	0.679	1728
HALLMARK_KRAS_SIGNALING_DN	76	-0.4	-1.3	0.065	0.108	0.781	893
HALLMARK_INFLAMMATORY_RESPONSE	96	-0.3	-1.3	0.062	0.114	0.809	1871
HALLMARK_BILE_ACID_METABOLISM	67	-0.4	-1.3	0.118	0.140	0.883	2232
HALLMARK_PEROXISOME	86	-0.3	-1.3	0.100	0.136	0.884	2371
HALLMARK_UV_RESPONSE_DN	124	-0.3	-1.3	0.075	0.142	0.906	1705
HALLMARK_PI3K_AKT_MTOR_SIGNALING	88	-0.3	-1.2	0.103	0.158	0.929	3475
HALLMARK_P53_PATHWAY	184	-0.3	-1.2	0.064	0.152	0.929	1396
HALLMARK_TGF_BETA_SIGNALING	51	-0.4	-1.2	0.164	0.183	0.963	1114
HALLMARK_HEME_METABOLISM	153	-0.3	-1.2	0.108	0.192	0.971	2244
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	110	-0.3	-1.2	0.174	0.251	0.996	2916
HALLMARK_IL6_JAK_STAT3_SIGNALING	46	-0.3	-1.1	0.262	0.263	0.998	2243
HALLMARK_UV_RESPONSE_UP	136	-0.3	-1.1	0.247	0.309	0.998	2275
HALLMARK_APICAL_JUNCTION	133	-0.3	-1.0	0.401	0.476	1	1090
HALLMARK_NOTCH_SIGNALING	27	-0.3	-1.0	0.440	0.510	1	1479
HALLMARK_APICAL_SURFACE	26	-0.3	-1.0	0.426	0.505	1	1803
HALLMARK_SPERMATOGENESIS	62	-0.3	-0.9	0.606	0.709	1	2110
HALLMARK_HEDGEHOG_SIGNALING	26	-0.3	-0.9	0.598	0.700	1	1549
HALLMARK_MYC_TARGETS_V1	200	-0.2	-0.8	0.876	0.858	1	3764
HALLMARK_ALLOGRAFT_REJECTION	85	-0.2	-0.8	0.840	0.865	1	2156
HALLMARK_G2M_CHECKPOINT	198	-0.1	-0.5	1.000	0.998	1	2862

Supplementary Table S3 Gene Set Enrichment Analysis (GSEA)

Y537C Clones 1, 2 v MCF7-WT

Pathways UP

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	119	0.4	1.6	0.002	0.049	0.07	1685
HALLMARK_APICAL_JUNCTION	133	0.4	1.5	0.005	0.068	0.179	1736
HALLMARK_HEDGEHOG_SIGNALING	26	0.5	1.4	0.057	0.108	0.378	1684
HALLMARK_ANGIOGENESIS	23	0.5	1.4	0.089	0.144	0.568	1465
HALLMARK_INTERFERON_GAMMA_RESPONSE	141	0.3	1.3	0.044	0.194	0.761	1847
HALLMARK_UV_RESPONSE_DN	124	0.3	1.3	0.059	0.183	0.803	1161
HALLMARK_ALLOGRAFT_REJECTION	85	0.3	1.2	0.109	0.225	0.897	1991
HALLMARK_TGF_BETA_SIGNALING	51	0.3	1.2	0.189	0.227	0.931	1875
HALLMARK_INTERFERON_ALPHA_RESPONSE	82	0.3	1.2	0.197	0.264	0.966	1908
HALLMARK_WNT_BETA_CATENIN_SIGNALING	33	0.3	1.1	0.291	0.318	0.996	1440
HALLMARK_MITOTIC_SPINDLE	195	0.2	1.1	0.303	0.431	1	3015
HALLMARK_APICAL_SURFACE	26	0.3	1.1	0.373	0.398	1	1259
HALLMARK_SPERMATOGENESIS	62	0.3	0.9	0.559	0.619	1	1289
HALLMARK_G2M_CHECKPOINT	198	0.1	0.7	1.000	0.988	1	3231

Pathways DOWN

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_OXIDATIVE_PHOSPHORYLATION	197	-0.5	-2.0	0	0.002	0.002	3268
HALLMARK_XENOBIOTIC_METABOLISM	133	-0.5	-1.9	0	0.001	0.002	1241
HALLMARK_ANDROGEN_RESPONSE	92	-0.5	-1.9	0	0.001	0.003	2336
HALLMARK_PROTEIN_SECRETION	93	-0.5	-1.8	0	0.001	0.005	3236
HALLMARK_FATTY_ACID_METABOLISM	129	-0.4	-1.8	0	0.002	0.008	2160
HALLMARK_HYPOXIA	163	-0.4	-1.7	0	0.009	0.042	1441
HALLMARK_ESTROGEN_RESPONSE_LATE	193	-0.4	-1.6	0	0.015	0.079	983
HALLMARK_GLYCOLYSIS	178	-0.4	-1.6	0.002	0.014	0.085	1961
HALLMARK_IL2_STAT5_SIGNALING	133	-0.4	-1.6	0	0.028	0.183	1603
HALLMARK_ADIPOGENESIS	172	-0.4	-1.5	0.003	0.030	0.215	2182
HALLMARK_KRAS_SIGNALING_UP	101	-0.4	-1.5	0.011	0.029	0.228	1229
HALLMARK_HEME_METABOLISM	153	-0.4	-1.5	0	0.029	0.25	1617
HALLMARK_MYC_TARGETS_V1	200	-0.4	-1.5	0.003	0.030	0.273	4520
HALLMARK_PEROXISOME	86	-0.4	-1.5	0.018	0.036	0.341	1186
HALLMARK_MTORC1_SIGNALING	192	-0.4	-1.5	0.002	0.039	0.377	2813
HALLMARK_ESTROGEN_RESPONSE_EARLY	198	-0.3	-1.4	0.005	0.069	0.598	1013
HALLMARK_BILE_ACID_METABOLISM	67	-0.4	-1.3	0.065	0.101	0.76	1231
HALLMARK_CHOLESTEROL_HOMEOSTASIS	65	-0.4	-1.3	0.075	0.101	0.781	2420
HALLMARK_KRAS_SIGNALING_DN	76	-0.4	-1.3	0.062	0.096	0.783	834
HALLMARK_MYC_TARGETS_V2	58	-0.4	-1.3	0.085	0.106	0.829	3171
HALLMARK_TNFA_SIGNALING_VIA_NFKB	156	-0.3	-1.3	0.038	0.103	0.834	1560
HALLMARK_UV_RESPONSE_UP	136	-0.3	-1.3	0.064	0.137	0.921	1681
HALLMARK_COAGULATION	64	-0.3	-1.2	0.171	0.217	0.987	1359
HALLMARK_COMPLEMENT	119	-0.3	-1.2	0.155	0.255	0.993	1116
HALLMARK_MYOGENESIS	113	-0.3	-1.2	0.180	0.246	0.994	781
HALLMARK_P53_PATHWAY	184	-0.3	-1.1	0.220	0.322	1	1622
HALLMARK_PI3K_AKT_MTOR_SIGNALING	88	-0.3	-1.1	0.334	0.423	1	2888
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	110	-0.3	-1.0	0.377	0.459	1	3554
HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY	45	-0.3	-1.0	0.469	0.566	1	2350
HALLMARK_INFLAMMATORY_RESPONSE	96	-0.3	-1.0	0.481	0.573	1	1439
HALLMARK_NOTCH_SIGNALING	27	-0.3	-1.0	0.468	0.555	1	1563
HALLMARK_IL6_JAK_STAT3_SIGNALING	46	-0.3	-1.0	0.502	0.543	1	2014
HALLMARK_APOPTOSIS	123	-0.2	-0.9	0.598	0.626	1	1449
HALLMARK_DNA_REPAIR	144	-0.2	-0.8	0.939	0.927	1	2362
HALLMARK_E2F_TARGETS	199	-0.1	-0.3	1.000	1.000	1	4035

Supplementary Table S4 Gene Set Enrichment Analysis (GSEA)

Y537N Clones 1-3 v MCF7-WT

Pathways UP

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_INTERFERON_ALPHA_RESPONSE	82	0.6	2.3	0	0	0	3027
HALLMARK_INTERFERON_GAMMA_RESPONSE	141	0.5	2.1	0	0	0	3071
HALLMARK_ESTROGEN_RESPONSE_EARLY	198	0.5	2.0	0	0	0	1805
HALLMARK_APOPTOSIS	123	0.5	2.0	0	2.80E-04	0.001	1870
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	119	0.5	1.9	0	4.19E-04	0.002	1921
HALLMARK_HYPOXIA	163	0.4	1.7	0	0.004	0.024	1685
HALLMARK_ESTROGEN_RESPONSE_LATE	193	0.4	1.7	0	0.004	0.025	1898
HALLMARK_TNFA_SIGNALING_VIA_NFKB	156	0.4	1.7	0	0.004	0.033	2238
HALLMARK_COAGULATION	64	0.5	1.7	0.003	0.007	0.061	817
HALLMARK_IL6_JAK_STAT3_SIGNALING	46	0.5	1.7	0.006	0.007	0.065	2203
HALLMARK_IL2_STAT5_SIGNALING	133	0.4	1.6	0.001	0.009	0.088	1906
HALLMARK_GLYCOLYSIS	178	0.4	1.6	0	0.008	0.092	2928
HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY	45	0.5	1.5	0.017	0.021	0.234	2872
HALLMARK_P53_PATHWAY	184	0.4	1.5	0.001	0.031	0.334	1835
HALLMARK_INFLAMMATORY_RESPONSE	96	0.4	1.5	0.012	0.035	0.388	1399
HALLMARK_COMPLEMENT	119	0.4	1.4	0.024	0.056	0.57	2800
HALLMARK_UV_RESPONSE_DN	124	0.4	1.4	0.022	0.057	0.601	1771
HALLMARK_NOTCH_SIGNALING	27	0.5	1.4	0.068	0.058	0.623	2820
HALLMARK_ALLOGRAFT_REJECTION	85	0.3	1.3	0.082	0.148	0.937	2472
HALLMARK_UV_RESPONSE_UP	136	0.3	1.3	0.070	0.161	0.958	2624
HALLMARK_TGF_BETA_SIGNALING	51	0.3	1.2	0.236	0.317	0.999	2084
HALLMARK_XENOBIOTIC_METABOLISM	133	0.3	1.2	0.173	0.307	0.999	2299
HALLMARK_APICAL_SURFACE	26	0.4	1.1	0.265	0.353	1	601
HALLMARK_KRAS_SIGNALING_UP	101	0.3	1.1	0.221	0.348	1	1865
HALLMARK_HEME_METABOLISM	153	0.3	1.1	0.279	0.423	1	2605
HALLMARK_PEROXISOME	86	0.3	1.1	0.326	0.434	1	2417
HALLMARK_APICAL_JUNCTION	133	0.3	1.1	0.311	0.442	1	2100
HALLMARK_BILE_ACID_METABOLISM	67	0.3	1.1	0.344	0.452	1	2276
HALLMARK_ADIPOGENESIS	172	0.2	1.0	0.444	0.567	1	1978
HALLMARK_PI3K_AKT_MTOR_SIGNALING	88	0.3	1.0	0.460	0.573	1	3347
HALLMARK_ANDROGEN_RESPONSE	92	0.3	1.0	0.506	0.595	1	2362
HALLMARK_KRAS_SIGNALING_DN	76	0.2	0.9	0.713	0.846	1	2083
HALLMARK_ANGIOGENESIS	23	0.3	0.9	0.686	0.857	1	2158
HALLMARK_PROTEIN_SECRETION	93	0.2	0.9	0.738	0.833	1	2313
HALLMARK_MTORC1_SIGNALING	192	0.2	0.8	0.938	0.946	1	2577
HALLMARK_OXIDATIVE_PHOSPHORYLATION	197	0.2	0.7	0.996	1.000	1	2910
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	110	0.2	0.6	0.999	0.994	1	2696

Pathways DOWN

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_E2F_TARGETS	199	-0.5	-2.3	0	0	0	3731
HALLMARK_G2M_CHECKPOINT	198	-0.4	-2.2	0	0	0	2706
HALLMARK_CHOLESTEROL_HOMEOSTASIS	65	-0.4	-1.5	0.006	0.033	0.117	2294
HALLMARK_MYC_TARGETS_V1	200	-0.3	-1.4	0	0.063	0.268	4032
HALLMARK_MYC_TARGETS_V2	58	-0.3	-1.3	0.103	0.188	0.67	3745
HALLMARK_MYOGENESIS	113	-0.3	-1.2	0.075	0.197	0.762	644
HALLMARK_MITOTIC_SPINDLE	195	-0.2	-1.2	0.079	0.269	0.9	2359
HALLMARK_HEDGEHOG_SIGNALING	26	-0.3	-1.0	0.363	0.530	0.998	34
HALLMARK_FATTY_ACID_METABOLISM	129	-0.2	-1.0	0.374	0.505	0.998	625
HALLMARK_WNT_BETA_CATENIN_SIGNALING	33	-0.3	-1.0	0.420	0.494	0.999	1793
HALLMARK_SPERMATOGENESIS	62	-0.2	-0.9	0.715	0.828	1	2196
HALLMARK_DNA_REPAIR	144	-0.2	-0.7	0.988	0.956	1	2556

Supplementary Table S5 Gene Set Enrichment Analysis (GSEA)

Y5375 Clones 1-3 v MCF7-WT

Pathways UP

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_INTERFERON_ALPHA_RESPONSE	82	0.6	2.4	0	0	0	1720
HALLMARK_INTERFERON_GAMMA_RESPONSE	141	0.5	2.2	0	0	0	1720
HALLMARK_ESTROGEN_RESPONSE_EARLY	198	0.5	2.1	0	0	0	1863
HALLMARK_ESTROGEN_RESPONSE_LATE	193	0.4	1.8	0	0.003	0.014	1849
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	119	0.4	1.8	0	0.002	0.014	2026
HALLMARK_TNFA_SIGNALING_VIA_NFKB	156	0.4	1.6	0.003	0.011	0.082	2199
HALLMARK_ALLOGRAFT_REJECTION	85	0.4	1.6	0.002	0.015	0.123	1973
HALLMARK_P53_PATHWAY	184	0.3	1.5	0.003	0.044	0.359	1325
HALLMARK_WNT_BETA_CATENIN_SIGNALING	33	0.4	1.4	0.055	0.050	0.434	2313
HALLMARK_APICAL_JUNCTION	133	0.3	1.4	0.020	0.054	0.494	1283
HALLMARK_TGF_BETA_SIGNALING	51	0.4	1.4	0.036	0.057	0.543	663
HALLMARK_ANGIOGENESIS	23	0.5	1.4	0.077	0.054	0.553	2522
HALLMARK_COAGULATION	64	0.3	1.3	0.064	0.092	0.789	1969
HALLMARK_INFLAMMATORY_RESPONSE	96	0.3	1.3	0.074	0.131	0.907	1973
HALLMARK_IL6_JAK_STAT3_SIGNALING	46	0.4	1.3	0.140	0.136	0.933	2348
HALLMARK_APOPTOSIS	123	0.3	1.2	0.122	0.201	0.99	2308
HALLMARK_APICAL_SURFACE	26	0.4	1.2	0.210	0.192	0.991	2749
HALLMARK_KRAS_SIGNALING_DN	76	0.3	1.1	0.237	0.293	0.998	1912
HALLMARK_UV_RESPONSE_DN	124	0.3	1.1	0.271	0.325	1	2209
HALLMARK_HEDGEHOG_SIGNALING	26	0.4	1.1	0.372	0.328	1	2601
HALLMARK_MITOTIC_SPINDLE	195	0.2	1.0	0.388	0.445	1	2920
HALLMARK_NOTCH_SIGNALING	27	0.3	0.9	0.620	0.718	1	2027
HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY	45	0.2	0.8	0.840	0.893	1	1075

Pathways DOWN

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_PROTEIN_SECRETION	93	-0.4	-1.9	0	0.005	0.004	3674
HALLMARK_ANDROGEN_RESPONSE	92	-0.4	-1.9	0	0.003	0.005	1274
HALLMARK_FATTY_ACID_METABOLISM	129	-0.4	-1.9	0	0.002	0.005	2466
HALLMARK_OXIDATIVE_PHOSPHORYLATION	197	-0.4	-1.8	0	0.004	0.011	2741
HALLMARK_CHOLESTEROL_HOMEOSTASIS	65	-0.4	-1.7	0.002	0.006	0.024	1553
HALLMARK_XENOBIOTIC_METABOLISM	133	-0.4	-1.7	0	0.008	0.034	905
HALLMARK_PEROXISOME	86	-0.4	-1.6	0	0.023	0.116	1288
HALLMARK_MTORC1_SIGNALING	192	-0.3	-1.5	0	0.026	0.15	2405
HALLMARK_KRAS_SIGNALING_UP	101	-0.3	-1.5	0.024	0.030	0.189	967
HALLMARK_GLYCOLYSIS	178	-0.3	-1.5	0.005	0.029	0.204	2114
HALLMARK_HYPOXIA	163	-0.3	-1.4	0.008	0.049	0.348	1327
HALLMARK_HEME_METABOLISM	153	-0.3	-1.4	0.012	0.049	0.371	1696
HALLMARK_ADIPOGENESIS	172	-0.3	-1.4	0.002	0.047	0.379	2710
HALLMARK_MYOGENESIS	113	-0.3	-1.4	0.031	0.077	0.569	1158
HALLMARK_BILE_ACID_METABOLISM	67	-0.3	-1.4	0.046	0.073	0.573	1274
HALLMARK_IL2_STAT5_SIGNALING	133	-0.3	-1.2	0.103	0.192	0.93	1195
HALLMARK_MYC_TARGETS_V1	200	-0.2	-1.2	0.134	0.248	0.969	3281
HALLMARK_PI3K_AKT_MTOR_SIGNALING	88	-0.3	-1.2	0.196	0.255	0.977	2114
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	110	-0.3	-1.1	0.205	0.293	0.99	3447
HALLMARK_COMPLEMENT	119	-0.2	-1.0	0.326	0.445	0.999	1132
HALLMARK_UV_RESPONSE_UP	136	-0.2	-1.0	0.462	0.554	1	2257
HALLMARK_E2F_TARGETS	199	-0.2	-1.0	0.542	0.608	1	2861
HALLMARK_SPERMATOGENESIS	62	-0.2	-1.0	0.518	0.605	1	2723
HALLMARK_G2M_CHECKPOINT	198	-0.2	-0.9	0.885	0.853	1	2943
HALLMARK_DNA_REPAIR	144	-0.2	-0.7	0.982	0.987	1	2676
HALLMARK_MYC_TARGETS_V2	58	-0.2	-0.7	0.977	0.987	1	3256

Supplementary Table S6 Gene Set Enrichment Analysis (GSEA)

D538G Clones 1-4 v MCF7-WT

Pathways UP

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_INTERFERON_ALPHA_RESPONSE	82	0.7	2.8	0	0	0	1755
HALLMARK_INTERFERON_GAMMA_RESPONSE	141	0.6	2.4	0	0	0	1670
HALLMARK_ALLOGRAFT_REJECTION	85	0.4	1.5	0.013	0.044	0.154	2358
HALLMARK_ESTROGEN_RESPONSE_EARLY	198	0.3	1.4	0.018	0.114	0.43	1282
HALLMARK_HEDGEHOG_SIGNALING	26	0.4	1.4	0.071	0.119	0.527	1791
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	119	0.3	1.3	0.022	0.103	0.543	580
HALLMARK_APICAL_JUNCTION	133	0.3	1.3	0.056	0.126	0.68	2105
HALLMARK_P53_PATHWAY	184	0.3	1.2	0.047	0.187	0.848	1547
HALLMARK_APOPTOSIS	123	0.3	1.2	0.146	0.288	0.961	2292
HALLMARK_TGF_BETA_SIGNALING	51	0.3	1.1	0.238	0.273	0.966	770
HALLMARK_INFLAMMATORY_RESPONSE	96	0.3	1.1	0.199	0.266	0.972	2175
HALLMARK_IL6_JAK_STAT3_SIGNALING	46	0.3	1.1	0.311	0.307	0.987	1491
HALLMARK_ANGIOGENESIS	23	0.3	0.9	0.526	0.675	1	1373
HALLMARK_UNFOLDED_PROTEIN_RESPONSE	110	0.2	0.9	0.739	0.797	1	566
HALLMARK_MYC_TARGETS_V2	58	0.2	0.7	0.969	0.979	1	3388

Pathways DOWN

NAME	SIZE	ES	NES	NOM p-val	FDR q-val	FWER p-val	RANK AT MAX
HALLMARK_PROTEIN_SECRETION	93	-0.5	-1.9	0	0.001	0.001	2063
HALLMARK_FATTY_ACID_METABOLISM	129	-0.5	-1.9	0	0.003	0.005	2688
HALLMARK_HYPOXIA	163	-0.5	-1.8	0	0.002	0.007	1658
HALLMARK_XENOBIOTIC_METABOLISM	133	-0.5	-1.8	0	0.002	0.007	1231
HALLMARK_GLYCOLYSIS	178	-0.4	-1.8	0	0.002	0.01	1960
HALLMARK_OXIDATIVE_PHOSPHORYLATION	197	-0.4	-1.8	0	0.003	0.014	3199
HALLMARK_ANDROGEN_RESPONSE	92	-0.5	-1.7	0.002	0.004	0.024	1642
HALLMARK_ADIPOGENESIS	172	-0.4	-1.6	0.003	0.018	0.114	2853
HALLMARK_KRAS_SIGNALING_UP	101	-0.4	-1.6	0.003	0.023	0.162	1255
HALLMARK_HEME_METABOLISM	153	-0.4	-1.6	0.002	0.021	0.165	1705
HALLMARK_IL2_STAT5_SIGNALING	133	-0.4	-1.5	0.005	0.029	0.242	1354
HALLMARK_KRAS_SIGNALING_DN	76	-0.4	-1.5	0.020	0.035	0.308	1291
HALLMARK_CHOLESTEROL_HOMEOSTASIS	65	-0.4	-1.5	0.024	0.041	0.383	2707
HALLMARK_NOTCH_SIGNALING	27	-0.5	-1.4	0.084	0.083	0.648	1117
HALLMARK_PEROXISOME	86	-0.4	-1.4	0.049	0.088	0.692	1594
HALLMARK_MTORC1_SIGNALING	192	-0.3	-1.3	0.023	0.108	0.786	2514
HALLMARK_BILE_ACID_METABOLISM	67	-0.4	-1.3	0.069	0.104	0.794	2699
HALLMARK_UV_RESPONSE_DN	124	-0.3	-1.3	0.033	0.105	0.819	1977
HALLMARK_ESTROGEN_RESPONSE_LATE	193	-0.3	-1.2	0.096	0.206	0.972	1194
HALLMARK_COAGULATION	64	-0.3	-1.2	0.183	0.277	0.999	1080
HALLMARK_COMPLEMENT	119	-0.3	-1.2	0.175	0.271	0.999	1772
HALLMARK_MYOGENESIS	113	-0.3	-1.1	0.215	0.373	1	2170
HALLMARK_TNFA_SIGNALING_VIA_NFKB	156	-0.3	-1.1	0.247	0.404	1	1426
HALLMARK_UV_RESPONSE_UP	136	-0.3	-1.1	0.292	0.399	1	1890
HALLMARK_PI3K_AKT_MTOR_SIGNALING	88	-0.3	-1.0	0.362	0.488	1	2037
HALLMARK_SPERMATOGENESIS	62	-0.3	-1.0	0.490	0.639	1	2539
HALLMARK_WNT_BETA_CATENIN_SIGNALING	33	-0.3	-0.9	0.606	0.854	1	246
HALLMARK_MYC_TARGETS_V1	200	-0.2	-0.8	0.915	1.000	1	2772
HALLMARK_MITOTIC_SPINDLE	195	-0.2	-0.8	0.943	1.000	1	2105
HALLMARK_DNA_REPAIR	144	-0.2	-0.8	0.951	1.000	1	2800
HALLMARK_APICAL_SURFACE	26	-0.3	-0.7	0.845	1.000	1	1297
HALLMARK_REACTIVE_OXYGEN_SPECIES_PATHWAY	45	-0.2	-0.7	0.943	1.000	1	2778
HALLMARK_G2M_CHECKPOINT	198	-0.1	-0.5	1.000	1.000	1	2883
HALLMARK_E2F_TARGETS	199	-0.1	-0.4	1.000	1.000	1	2596

Supplementary Table S7
Differential genes common to all ESR1 mutations

Genes	Cluster	Genes	Cluster
RGAG4	UP	AP000439.3	DOWN
PRKAR2B	UP	MYZAP	DOWN
RAB31L1	UP	FSTL4	DOWN
DLC1	UP	MT1X	DOWN
TOX2	UP	RASD1	DOWN
B3GNT4	UP	KRT86	DOWN
ZNF385D	UP	CA2	DOWN
ZNF417	UP	ACSL4	DOWN
MUC3A	UP	NRP2	DOWN
PALM3	UP	RP11-466H18.1	DOWN
RP11-321G12.1	UP	ITPRIPL2	DOWN
CLIP4	UP	MUC1	DOWN
FOSL1	UP	ATP8A1	DOWN
MAG	UP	KRT81	DOWN
CD22	UP	SSPN	DOWN
OLFML3	UP	PLLP	DOWN
PROCR	UP	SEMA5A	DOWN
SMARCD3	UP	SCARA3	DOWN
KND1	UP	C9orf152	DOWN
ZNF416	UP	CEMIP	DOWN
SLC4A3	UP	PTPRN2	DOWN
FAM19A5	UP	VAT1L	DOWN
COL5A1	UP	CRAT	DOWN
C1orf95	UP	CEACAM6	DOWN
KCNMA1	UP	MDFIC	DOWN
PTGER3	UP	ERGIC1	DOWN
CDH2	UP	PTPRU	DOWN
PTGER2	UP	PP14571	DOWN
CRABP1	UP	PLXNA2	DOWN
RND2	UP	CYP2T2P	DOWN
GULP1	UP	MUC5AC	DOWN
PDZK1	UP	SLPI	DOWN
RERG	UP	CYP2S1	DOWN
SULT1A1	UP	PTGES	DOWN
NUAK2	UP	GDPD3	DOWN
C5AR2	UP	APCDD1	DOWN
APOL3	UP	C2orf54	DOWN
IFI35	UP	GALNT12	DOWN
UBE2L6	UP	FOXD2	DOWN
OAS2	UP	HSD17B11	DOWN
PARP10	UP	RAPGEF3	DOWN
PSMB8	UP	SLC9A2	DOWN
ACTG2	UP	WNT11	DOWN
PSMB9	UP	ABCG2	DOWN
TAP2	UP	EHD2	DOWN
KCNQ2	UP		
MAP1B	UP		
RP11-556I14.1	UP		
MGP	UP		
AL356737.1	UP		
LANCL3	UP		
FRAS1	UP		
PMP22	UP		
RP11-662G23.1	UP		
SOCS1	UP		
ANXA3	UP		
OSGIN1	UP		
CCDC85A	UP		
AC007743.1	UP		
CRABP2	UP		
GPRC5C	UP		
CA12	UP		
NPY1R	UP		
MAGEE1	UP		
HCN4	UP		
DLGAP3	UP		
SEMA3D	UP		
HMCN1	UP		
AC005256.1	UP		
PYCARD	UP		
MTMR7	UP		
GPC6	UP		
COL3A1	UP		
MTCL1	UP		
FHL1	UP		
GALNTL6	UP		
NRG3	UP		
PPP1R1C	UP		
EPHA6	UP		
NTSR1	UP		
AC011747.4	UP		
PSTPIP2	UP		
NPR3	UP		
LINC00052	UP		

GATA4	UP
PCDH17	UP
FBN2	UP
SLC30A3	UP
FAM131C	UP
UBASH3B	UP
PLXNA4	UP
SGPP2	UP
NFIA	UP
MYO10	UP
LIMK1	UP
ADA	UP
DMTN	UP
CLIP2	UP
RAB31	UP
NDRG4	UP
NXN	UP
FAM171A1	UP
SYT8	UP
THEMIS2	UP
FBXO6	UP
CDSN	UP
LRRC61	UP
ZBED6CL	UP
PGBD5	UP
NUPR1	UP
GABBR1	UP
CYP1A1	UP
ZNF268	UP
COL6A1	UP
DIRAS1	UP
COL6A2	UP
PIK3CD	UP
GPNMB	UP
S100A7	UP
ARMCX2	UP
LPAR1	UP
SLC22A31	UP
RIN3	UP
ATP8A2	UP
SMOC2	UP
SDK2	UP
SMTNL2	UP
ITGA2B	UP
FBXO2	UP
C15orf59	UP
TRPV3	UP
SLC47A1	UP
GRIK3	UP
PDLIM3	UP
LRG1	UP
IL24	UP
FAIM3	UP
RP11-564A8.4	UP
IL20	UP
C4A	UP
CFB	UP
SLC25A18	UP
GPR68	UP
ARTN	UP
CPPED1	UP
PREX1	UP
B4GALNT1	UP
ADORA1	UP
HSPB8	UP
RTN4RL1	UP
CISH	UP
APLP1	UP
CHST8	UP
FHL2	UP
SDC2	UP
RHOBTB1	UP
LCN2	UP
PXMP4	UP
RILP	UP
RP11-64B16.2	UP
BMP2	UP
ATP2B4	UP
SELM	UP
CPQ	UP
PTK6	UP
ARHGAP4	UP
UBE2QL1	UP
TCIRG1	UP
IFI30	UP
SLFN5	UP
CAMK1	UP
MESP2	UP

Supplementary Table S8 Gene Set Enrichment Analysis (GSEA)

Differential genes common to all ESR1 mutations

Pathways UP

NAME	# Genes in Gene Set (K)	# Genes in Overlap (k)	k/K	FDR q-val	Genes
HALLMARK_UV_RESPONSE_DN	144	11	0.0764	1.43E-10	DLC1 FHL2 ATP2B4 PRKAR2B COL3A1 PMP22 SDC2 LPAR1 KCNMA1 MAP1B PIK3CD
HALLMARK_ESTROGEN_RESPONSE_EARLY	200	11	0.055	1.68E-09	DLC1 FHL2 CISH PDLIM3 HSPB8 RAB31 CA12 NPY1R PDZK1 OLFML3 FAIM3
HALLMARK_ESTROGEN_RESPONSE_LATE	200	11	0.055	1.68E-09	ATP2B4 PRKAR2B CISH PDLIM3 HSPB8 RAB31 CA12 NPY1R PDZK1 PTGER3 CHST8
HALLMARK_EPITHELIAL_MESENCHYMAL_TRANSITION	200	9	0.045	3.80E-07	COL3A1 PMP22 APLP1 COL6A2 COL5A1 CDH2 FBN2 MGP MAGEE1
HALLMARK_INTERFERON_GAMMA_RESPONSE	200	8	0.04	4.45E-06	IFI30 PSMB8 UBE2L6 PSMB9 IFI35 SOCS1 CFB OAS2
HALLMARK_INTERFERON_ALPHA_RESPONSE	97	6	0.0619	8.54E-06	IFI30 PSMB8 UBE2L6 PSMB9 IFI35 PROCR
HALLMARK_P53_PATHWAY	200	7	0.035	4.10E-05	IFI30 SOCS1 PROCR BMP2 NUPR1 ADA OSGIN1
HALLMARK_IL2_STAT5_SIGNALING	200	6	0.03	4.02E-04	CISH APLP1 SOCS1 BMP2 PTGER2 COL6A1
HALLMARK_UV_RESPONSE_UP	158	4	0.0253	1.16E-02	PDLIM3 APLP1 SULT1A1 CYP1A1
HALLMARK_KRAS_SIGNALLING_UP	200	4	0.02	2.20E-02	PSMB8 CFB BMP2 GPNMB

Pathways DOWN

NAME	# Genes in Gene Set (K)	# Genes in Overlap (k)	k/K	FDR q-val	Genes
HALLMARK_FATTY_ACID_METABOLISM	158	4	0.0253	6.17E-04	CRAT HSD17B11 ACSL4 CA2
HALLMARK_PEROXISOME	104	3	0.0288	2.82E-03	CRAT HSD17B11 ACSL4
HALLMARK_XENOBIOTIC_METABOLISM	200	3	0.015	1.28E-02	CA2 PTGES CYP2S1

Supplementary Table S9 Gene Signatures: 136 UP and 42 DOWN genes

(In bold are the genes also present in the smaller gene set used in Signature 3)

GeneID	Gene	baseMean	Log2 FC rel MCF7	padj
ENSG00000106683	LIMK1	2127.612527	1.278340889	7.0386E-112
ENSG00000162599	NFIA	532.4713641	3.658106963	4.68938E-93
ENSG00000168461	RAB31	285.805016	1.56473732	4.37688E-43
ENSG00000103490	PYCARD	1522.982631	1.378965893	6.42362E-42
ENSG00000196839	ADA	389.3664252	1.858394217	1.53942E-41
ENSG00000164128	NFIP1R	1490.1741	3.898461046	4.22897E-41
ENSG00000162894	FAM83B	758.083015	5.78203515	5.78203E-41
ENSG00000158856	DMTN	521.1526385	1.931654325	4.84692E-39
ENSG00000167994	RAB31L1	330.440047	1.25144047	2.03624E-37
ENSG00000074410	CA12	6398.835475	1.970130223	8.69857E-37
ENSG00000140961	OSGIN1	1501.526598	1.582380057	1.95331E-34
ENSG00000152137	HSPB8	2929.518789	4.382370696	2.98887E-33
ENSG00000135454	BAGALNT1	692.1763225	1.85626422	7.9385E-33
ENSG00000198832	SELM	330.6520524	1.609825832	1.41596E-31
ENSG00000170412	GPRC5C	1155.720125	1.530014104	5.5236E-31
ENSG00000164741	DLR1	1066.688345	3.258643697	1.05865E-27
ENSG00000003987	MTMR7	106.2107024	1.847110872	4.14666E-27
ENSG00000142173	COL16A2	332.8011362	2.831375691	3.70402E-25
ENSG00000124126	PREK1	28229.23249	2.022130021	8.16861E-25
ENSG00000163891	HLI	268.9236445	5.82590076	1.20344E-24
ENSG00000138622	HCN4	90.918415	2.092038918	2.08178E-24
ENSG00000138772	ANKA3	1080.585241	1.767148766	4.09661E-24
ENSG00000185338	SOC31	175.2183319	2.353513377	4.54724E-24
ENSG00000136574	GATA4	89.24544754	6.003473563	1.41931E-23
ENSG00000103881	CPPE1	401.9548423	1.297277143	2.18522E-23
ENSG00000195902	SULT1A1	337.2904752	1.7321892	1.28644E-22
ENSG00000162892	IL2L2	130.655232	5.89785182	1.51481E-22
ENSG00000185924	RITRNL1	1417.530617	1.287766197	2.29215E-22
ENSG00000083817	ZNF416	80.63248634	1.688059444	2.95122E-22
ENSG00000109099	PMP22	2050.349813	2.911951934	4.93698E-22
ENSG00000163545	NUAK2	181.8794595	2.6403374	4.99507E-22
ENSG00000198934	MAGE1E	111.4340339	1.707286537	6.02696E-22
ENSG00000058668	ATP2B4	6275.4465682	1.625352329	6.2532E-22
ENSG00000216490	IFI30	1255.787544	2.014343109	9.24181E-22
ENSG00000134830	CSAR2	702.6625059	2.13013705	3.16534E-21
ENSG00000104324	CPQ	88.71818893	2.075572726	5.19603E-21
ENSG00000108830	RND2	111.0205214	2.602415963	8.45056E-21
ENSG00000187867	PALM3	286.9622974	1.634158849	1.32394E-20
ENSG0000016774	QSOX3	912.6784431	1.76765443	1.26644E-20
ENSG00000176046	NUPL1	560.116359	5.079101048	2.20025E-20
ENSG00000183098	GPRC	974.0952546	1.587925807	2.27593E-20
ENSG00000008204	SMARCD3	321.1977448	1.595353793	9.54073E-20
ENSG00000130635	COL5A1	726.0561861	3.757664793	1.35954E-19
ENSG00000168502	MTCL1	668.8199598	1.769698819	1.40855E-19
ENSG00000168542	COL3A1	1779.243591	5.603891967	1.58289E-19
ENSG00000171236	UNC51	229.828961	1.63475959	2.72085E-19
ENSG00000114923	SILCA4	158.8096075	1.931646607	5.36758E-19
ENSG00000114737	CISH	568.1336586	1.437284441	1.05999E-18
ENSG00000105290	APLP1	425.1315479	1.237448742	1.16243E-18
ENSG00000145555	MYO10	1014.086034	2.113906792	1.61797E-18
ENSG00000105995	MAG	85.60297137	4.054905057	2.75924E-18
ENSG0000012773	RGA4	77.2364491	1.743952363	5.2777E-18
ENSG00000176383	B3GNT4	142.2799003	1.411628827	6.9724E-18
ENSG00000005249	PKAR2B	969.0399055	2.257031466	8.79545E-18
ENSG00000127399	LRC6L	308.3826763	2.196115977	1.17238E-17
ENSG00000176490	DIRAS1	168.0146684	2.604508851	1.29202E-17
ENSG00000134533	RERG	773.5594958	2.714208168	1.84794E-17
ENSG00000107119	TORG1	306.8046034	4.066503214	1.88848E-17
ENSG00000215218	UBR2	171.4403778	3.533923422	3.39196E-17
ENSG00000188707	ZBEDCL	157.8029195	2.412826858	4.14866E-17
ENSG00000116544	DLAGP3	93.47815442	1.609862886	4.47317E-17
ENSG00000163082	SGPP2	72.88461661	1.972186389	5.23506E-17
ENSG00000124191	TOX2	259.9010283	1.619229529	6.6481E-17
ENSG00000103034	NDRG4	416.8783589	1.133800587	6.75731E-17
ENSG00000113941	MGP	376.126017	3.842897078	6.88807E-17
ENSG00000143320	CRABP2	7465.121489	1.70595361	1.01817E-15
ENSG00000156587	UBE2L6	591.9008996	2.795879926	1.45422E-16
ENSG00000163485	ADORA1	653.980531	2.56347304	2.45284E-16
ENSG00000166426	CRABP1	789.2664028	2.108065333	7.43267E-16
ENSG00000101213	PTK6	205.8291632	2.703074023	1.70079E-15
ENSG00000148468	FAM171A1	144.2191229	1.819957316	1.87388E-15
ENSG00000188176	GNTM12	96.65591498	3.258438885	2.1114E-15
ENSG00000177514	PGRD5	184.0215077	2.580558807	2.60351E-15
ENSG00000101000	PROCR	79.01550583	1.848144105	5.23178E-15
ENSG00000134072	CAMK1	140.780296	1.75114949	6.2774E-15
ENSG00000125384	PTGER2	73.82703141	2.183319454	6.2774E-15
ENSG00000101417	PXMP4	139.7733747	1.247391588	6.82117E-15
ENSG00000022667	FH1	943.3549777	1.55474262	1.02849E-14
ENSG00000144866	GILP1	510.011758	2.43667722	1.301307E-14
ENSG00000169439	SDC2	1677.528906	2.344697157	1.36711E-14
ENSG00000163873	GRIK3	207.2086256	3.123154214	1.45957E-14
ENSG00000116661	FBXO2	134.3644036	3.645195213	2.07196E-14
ENSG00000167705	RILP	101.4715931	1.22280897	2.46073E-14
ENSG00000174827	PDXK1	1293.272299	2.548306462	4.74794E-14
ENSG00000091880	SDX2	146.2501159	2.74414378	5.74979E-14
ENSG00000090612	ZNF268	267.5240098	1.28373857	6.04489E-14
ENSG00000115641	FHL2	1463.655594	1.481971195	6.04489E-14
ENSG00000138829	FBN2	68.8985955	2.818892001	6.83622E-14
ENSG00000116663	FBXO6	125.3877431	2.999597636	7.96597E-14
ENSG00000124302	CHST8	181.2170044	1.816280265	8.08999E-14
ENSG00000159993	SEMA3D	129.4650703	3.820805821	1.50399E-13
ENSG0000015813	LOC65A	147.2632625	3.208070664	4.28128E-13
ENSG00000152229	PSIPIP2	288.5702754	2.546407252	5.52944E-13
ENSG00000115194	SIL30A3	218.2079403	1.468297801	6.72839E-13
ENSG00000178685	PARP10	478.2799923	3.81722585	8.57239E-13
ENSG00000106665	CLIP2	277.7625572	1.281467167	9.90843E-13
ENSG00000171798	KNDCL1	318.5109586	1.876953843	1.19262E-12
ENSG00000068079	IFI35	271.013463	2.070528791	1.32033E-12
ENSG00000072422	RHOC1B1	561.242415	1.66705928	1.61649E-12
ENSG00000171608	PKICD	75.3489588	2.52587589	2.01359E-12
ENSG00000185519	FAM131C	112.3420027	1.357906961	2.94511E-12
ENSG00000205363	C15orf59	153.1068128	4.35663503	1.63787E-12
ENSG00000101188	NTSR1	48.46696606	2.09214754	1.00318E-11
ENSG00000142494	SIL47A1	59.39261327	1.84522202	1.4176E-11
ENSG00000204681	GABRB1	60.2029797	1.79354812	1.61448E-11
ENSG00000154553	PDLIM3	89.10035413	2.846355798	1.70515E-11
ENSG00000167693	NXN	261.2182148	1.353450891	2.23566E-11
ENSG00000219438	FAM19A5	94.4973651	2.781628191	2.85808E-11
ENSG00000154127	UBASH3B	125.2288801	1.539939321	3.16078E-11
ENSG00000166750	SIFN5	231.5447269	2.261349734	4.37142E-11
ENSG00000113389	NPR3	272.162725	2.287148716	5.89564E-11
ENSG00000142156	COL4A1	247.3638466	1.85498367	1.36195E-10
ENSG00000143341	HMCN1	2268.205073	3.067057548	1.57326E-10
ENSG00000089820	ARHGAP4	150.6553979	1.68254551	2.46667E-10
ENSG00000156113	KCNMA1	67.60957989	1.80442893	5.07462E-10
ENSG00000115295	CLIP4	66.7188783	2.755791402	1.16313E-10
ENSG00000163017	ACTG2	168.2034337	3.077171887	6.6373E-10
ENSG00000117111	NOP58	106.9508211	1.69695728	3.91455E-09
ENSG00000140465	CYP11A1	164.2657206	2.567604864	3.91455E-09
ENSG0000012124	CD22	83.84841342	2.282878998	4.51663E-09
ENSG00000117407	ARTN	84.97991786	2.10280288	4.89938E-09
ENSG00000240065	PSMB9	166.091829	2.208824405	1.04405E-08
ENSG00000100599	RIN3	160.6190064	1.883993245	1.21404E-08
ENSG00000198994	MUC3A	118.5985382	1.824113799	1.4169E-08
ENSG00000138759	RHCA1	492.623518	1.760597192	2.15431E-08
ENSG00000175592	FOSL1	155.6831647	1.427930143	3.74359E-08
ENSG00000149043	SVT8	60.79391952	1.741382027	3.78992E-08
ENSG00000119714	GPR68	476.8409916	1.358442955	7.30374E-08
ENSG00000173480	ZNF417	87.37136504	1.271537304	2.23793E-07
ENSG00000050628	PTGER3	148.1614257	2.103630641	8.76815E-07
ENSG00000243649	CFB	60.7896275	1.368039775	1.31121E-06
ENSG00000242457	TAP2	1208.300467	1.145960288	2.27214E-06
ENSG00000118946	RCDH17	329.7931541	2.78646295	3.35729E-06
ENSG00000080224	EPHA6	92.46287047	1.583919245	7.62135E-06
ENSG00000185737	NR3	54.42340341	1.87323256	9.07331E-06
ENSG00000221866	PLXNA4	171.5474725	1.402242552	0.000128205

DOWN Genes

EnsemblID	Gene	baseMean	Log2 FC rel MCF7	padj
ENSG00000170442	KRT86	1685.903155	-3.860351308	2.3152E-86
ENSG00000113719	ERGL1	8005.763442	-1.574623721	1.7433E-85
ENSG00000187193	MTIX	1071.208428	-2.002054989	7.6214E-36
ENSG00000119514	GALENT1	145.8370111	-2.145887408	1.6691E-30
ENSG00000060656	PTPRU	1682.318215	-1.364388829	1.5052E-29
ENSG0000018416	PP14571	165.6171265	-4.044577827	3.715E-25
ENSG00000186564	FMO2	132.9391961	-1.221627532	6.3885E-25
ENSG00000108551	RASD1	236.519776	-2.784130081	3.151E-24
ENSG00000115616	SILCB2A	391.4984557	-1.513619045	1.4684E-23
ENSG00000103888	CEMP	653.5399667	-2.253017277	3.22E-20
ENSG00000148344	PTGES	646.6722936	-2.401177282	5.4482E-19
ENSG00000079337	PAPGFE3	79.41071911	-1.792884055	1.015E-18
ENSG00000167600	CYP251	112.4477159	-2.068139873	5.2351E-17
ENSG00000051008	FSTL4	87.8505209	-2.02832105	5.7084E-17
ENSG00000102934	PLP	260.4319289	-2.296944539	1.8982E-16
ENSG00000168077	SCARA3	329.8696968	-2.07386431	5.2521E-16
ENSG00000076356	PLXNA2	175.1479982	-2.560026651	3.5354E-15
ENSG00000263155	MYZAP</			

Supplementary Table S10 Gene Signature 3

UP Genes

EnsembleID	Gene	baseMean	Log2 FC rel MCF7	padj
ENSG00000162599	NFIA	532.4713641	3.658160963	4.68938E-93
ENSG00000164128	NPY1R	1490.41942	3.898461046	4.22397E-41
ENSG00000162894	FAIM3	253.0833015	4.268865966	5.7856E-40
ENSG00000158856	DMTN	521.1526385	1.931654325	4.84692E-39
ENSG00000167994	RAB3IL1	330.4408154	2.15144047	2.03624E-37
ENSG00000074410	CA12	6398.835475	1.970130223	8.69857E-37
ENSG00000003987	MTMR7	106.2107024	1.847210872	4.14666E-27
ENSG00000162891	IL20	268.9226145	5.82590076	1.20244E-24
ENSG00000136574	GATA4	89.24544754	6.003473563	1.41931E-23
ENSG00000188176	SMTNL2	96.65591498	3.258438859	2.11013E-15
ENSG00000137628	DDX60	274.1966187	4.677465386	3.97364E-12