

Supplementary Table S1: Histologic and immunohistochemical profiling and molecular classification of the 59 male breast cancers included in the study. Germline BRCA status is available for the ten patients who consented to genetic testing.

Sample ID	Histologic type	Age	Histologic grade	Size (cm)	pN	ER status	PR status	HER2 status	Ki-67 labeling index	St. Gallen classification	Genetic testing (BRCA2)	Mean Sequencing Depth
MB-T01	IC-NST	77	3	1.1	NA	Positive	Positive	Negative	Low	Luminal A-like	Not tested	135
MB-T02	IC-NST	53	1	1.5	1mi	Positive	Positive	Negative	Low	Luminal A-like	Not tested	307
MB-T03	IC-NST	78	2	3.2	1mi	Positive	Positive	Negative	Low	Luminal A-like	Not tested	773
MB-T04	IC-NST	73	3	1	0	Positive	Positive	Negative	High	Luminal B-like	Not tested	251
MB-T05	IC-NST	65	3	1.9	3a	Positive	Positive	Negative	High	Luminal B-like	Not tested	196
MB-T06	IC-NST	35	2	3.5	2a	Positive	Positive	Negative	High	Luminal B-like	Not tested	925
MB-T08	IC-NST	58	3	2.7	1a	Positive	Positive	Negative	High	Luminal B-like	Not tested	188
MB-T09	IC-NST	84	1	2.2	1a	Positive	Positive	Negative	Low	Luminal A-like	Not tested	607
MB-T11	IC-NST	61	2	1.6	0(sn)	Positive	Positive	Negative	High	Luminal B-like	Not tested	240
MB-T12	IC-NST	77	2	1.6	1a	Positive	Positive	Negative	High	Luminal B-like	Not tested	966
MB-T13	IC-NST	49	2	2.2	3a	Positive	Positive	Negative	High	Luminal B-like	Not tested	1009
MB-T14	IC-NST	88	3	1.5	0	Positive	Positive	Negative	High	Luminal B-like	Not tested	857
MB-T15	IC-NST	63	2	1.5	0(sn)	Positive	Positive	Negative	High	Luminal B-like	Mutant	405
MB-T16	IC-NST	76	2	1.4	1a	Positive	Positive	Negative	High	Luminal B-like	Not tested	1101
MB-T18	IC-NST	68	3	3	0(sn)	Positive	Positive	Negative	High	Luminal B-like	Not tested	468
MB-T19	IC-NST	58	3	4	2a	Positive	Positive	Negative	High	Luminal B-like	Not tested	274
MB-T20	IC-NST	57	3	2.6	1a	Positive	Negative	Negative	High	Luminal B-like	Not tested	352
MB-T21	IC-NST	66	2	3	3a	Positive	Positive	Amplified	High	Luminal B-like	Not tested	745
MB-T22	IC-NST	66	3	3	1a	Positive	Positive	Negative	Low	Luminal A-like	Not tested	313
MB-T24	IC-NST	56	2	1.1	1mi(sn)	Positive	Positive	Negative	Low	Luminal A-like	Not tested	245
MB-T28	IC-NST	77	3	2.7	1a	Positive	Positive	Negative	High	Luminal B-like	Wild-type	285
MB-T29	IC-NST	83	2	1.9	0(sn)	Positive	Positive	Negative	Low	Luminal A-like	Not tested	299
MB-T31	IMC	49	2	2.6	2a	Positive	Positive	Negative	Low	Luminal A-like	Not tested	167
MB-T32	IC-NST	58	3	1.7	0	Positive	Positive	Negative	High	Luminal B-like	Not tested	245
MB-T33	IC-NST	33	2	1.4	1	Positive	Negative	Negative	Low	Luminal B-like	Mutant	661
MB-T36	IC-NST	66	3	1.6	1(sn)	Positive	Negative	Negative	High	Luminal B-like	Not tested	687
MB-T38	IMuC	62	2	2.5	2a	Positive	Negative	Negative	Low	Luminal B-like	Not tested	241
MB-T41	IC-NST	59	2	1.4	1a	Positive	Positive	Negative	Low	Luminal A-like	Not tested	978
MB-T42	IPC	82	3	1.8	0(sn)	Positive	Positive	Negative	High	Luminal B-like	Not tested	1372
MB-T43	IC-NST	64	2	NA	1a	Positive	Negative	Negative	High	Luminal B-like	Not tested	447
MB-T45	IC-NST	52	3	3.3	3a	Positive	Positive	Negative	High	Luminal B-like	Not tested	203
MB-T46	IC-NST	71	2	0.8	0	Positive	Negative	Negative	High	Luminal B-like	Not tested	892
MB-T48	IC-NST	62	2	1.8	0(sn)	Positive	Positive	Negative	Low	Luminal A-like	Not tested	327
MB-T49	IC-NST	74	3	1.6	0	Positive	Positive	Negative	High	Luminal B-like	Not tested	308
MB-T50	IC-NST	51	2	2.1	0(sn)	Positive	Negative	Negative	Low	Luminal B-like	Not tested	221
MB-T51	IC-NST	55	3	1.9	1a	Positive	Positive	Negative	High	Luminal B-like	Not tested	474
MB-T53	IC-NST	77	1	0.8	NA	Positive	Positive	Negative	Low	Luminal A-like	Not tested	612
MB-T55	IC-NST	85	3	2.5	2a	Positive	Positive	Negative	High	Luminal B-like	Not tested	540
MB-T56	IC-NST	69	2	2.8	1a	Positive	Positive	Negative	High	Luminal B-like	Not tested	323
MB-T58	IC-NST	62	3	3.8	0	Positive	Positive	Negative	High	Luminal B-like	Wild-type	793
MB-T60	IC-NST	44	2	2.3	0	Positive	Positive	Negative	High	Luminal B-like	Not tested	504
MB-T62	IPC	66	3	3.2	0(+,sn)	Positive	Positive	Negative	High	Luminal B-like	Not tested	1012
MB-T63	IC-NST	62	2	2.5	0(+)	Positive	Positive	Negative	High	Luminal B-like	Not tested	759
MB-T64	IC-NST	53	3	2.5	3a	Positive	Positive	Amplified	High	Luminal B-like	Not tested	671
MB-T65	IC-NST	79	2	1.6	0(sn)	Positive	Positive	Negative	Low	Luminal A-like	Not tested	601
MB-T66	IC-NST	79	2	4.7	3a	Positive	Positive	Negative	High	Luminal B-like	Wild-type	1189
MB-T68	IC-NST	79	1	1.7	0(sn)	Positive	Positive	Negative	Low	Luminal A-like	Wild-type	626
MB-T69	IC-NST	68	3	2.2	1a	Positive	Positive	Negative	High	Luminal B-like	Wild-type	1039
MB-T82	IC-NST	53	3	2.6	0	Positive	Positive	Negative	Low	Luminal A-like	Wild-type	832
MB-T83	IC-NST	57	2	1.2	0(sn)	Positive	Positive	Negative	Low	Luminal A-like	Wild-type	1038
MB-T84	IC-NST	43	2	3.2	1mi	Positive	Positive	Negative	High	Luminal B-like	Not tested	700
MB-T85	IC-NST	63	3	2.2	1mi(sn)	Positive	Positive	Negative	High	Luminal B-like	Not tested	1063
MB-T86	IC-NST	54	3	4.5	3a	Positive	Positive	Negative	High	Luminal B-like	Not tested	999
MB-T88	Mixed ductal and lobular carcinoma	75	2	1.9	1a	Positive	Positive	Negative	Low	Luminal A-like	Mutant	897
MB-T89	IC-NST	72	3	3.2	3a	Positive	Positive	Negative	High	Luminal B-like	Not tested	785
MB-T90	IC-NST	66	2	1.9	1a	Positive	Positive	Negative	High	Luminal B-like	Not tested	888
MB-T91	IC-NST	71	2	0.8	0(sn)	Positive	Positive	Negative	High	Luminal B-like	Not tested	668
MB-T92	IC-NST	73	2	0.6	0(sn)	Positive	Positive	Negative	Low	Luminal A-like	Not tested	1887
MB-T93	IC-NST	80	3	1.3	1mi	Positive	Positive	Negative	High	Luminal B-like	Not tested	974

IC-NST: Invasive carcinoma of no special type; IMC: invasive micropapillary carcinoma; IMuC: invasive mucinous carcinoma; IPC: invasive papillary carcinoma

Supplementary Table S2: Antibody clones and amplification primers used in this study.

Antibodies					
Marker	Vendor	Type	Clone	Ab concentration	Chromogen
HER2	DAKO	Rabbit anti-Human Her-2	n185 ^{Her-2}	RTU	DAB
Ki67	DAKO	Mouse Monoclonal	MIB	1:400	DAB
ER	DAKO	Mouse Monoclonal	1D5	1:500	DAB
PR	DAKO	Mouse Monoclonal	PGR636	1:100	DAB
E-cadherin	Ventana	Mouse Monoclonal	36	RTU	DAB
p120	Ventana	Mouse Monoclonal	98	RTU	DAB

Sanger Sequencing primers			
Gene	Mutation	Forward	Reverse
<i>FOXA1</i>	S234F	CTTGAAGCGCTTCTGGCG	ATGGACCTCTTCCCCTATTACC
<i>GATA3</i>	N332FS	TTTACCCTCTCCTCTCTCCC	CCATCAGGAAGCGAGCCCT
<i>GATA3</i>	G335FS	TTTACCCTCTCCTCTCTCCC	CCATCAGGAAGCGAGCCCT
<i>MAP3K1</i>	V569I	ATCAAAAATGATGCTAAACTCAAAATG	CTCTCCCCATTTGCCAAC
<i>PIK3CA</i>	H419_C420del	TATAGAGATGATTGTTGAATTTTCCTT	ATCCATGAGGTAAGGCGCCAA
<i>PTEN</i>	T319fs	AACCTCAGAAAAAGTAGAAAAATGGAA	ACCCCCACAAAATGTTTAATTTAA

Supplementary Table S3: List of 241 genes included in the targeted capture massively parallel sequencing platform.

Gene_name	Number of cases with mutation in the TCGA breast cancer study	% of cases with mutation in the TCGA breast cancer study	Number of cases with amplification or homozygous deletion in the TCGA breast cancer study	% of cases with amplification or homozygous deletion in the TCGA breast cancer study
ABCA13	14	2.8%	2	0.4%
ABCB1	3	0.6%	1	0.2%
ADAMTSL1	3	0.6%	4	0.8%
AGFG2	3	0.6%	4	0.8%
AHNAK2	9	1.8%	6	1.2%
AK9	9	1.8%	2	0.4%
AKAP9	4	0.8%	16	3.2%
AKT1	12	2.4%	6	1.2%
AKT2	1	0.2%	7	1.4%
AKT3	3	0.6%	24	4.7%
ANK3	10	2.0%	9	1.8%
AOAH	0	0.0%	1	0.2%
APC	3	0.6%	0	0.0%
APOBEC1	1	0.2%	7	1.4%
APOBEC2	1	0.2%	5	1.0%
APOBEC3A	1	0.2%	1	0.2%
APOBEC3C	0	0.0%	1	0.2%
APOBEC3D	0	0.0%	2	0.4%
APOBEC3F	0	0.0%	2	0.4%
APOBEC3G	1	0.2%	2	0.4%
APOBEC3H	0	0.0%	2	0.4%
APOBEC4	1	0.2%	20	3.9%
ARAF	1	0.2%	0	0.0%
ARID1A	11	2.2%	2	0.4%
ATM	16	3.2%	5	1.0%
ATN1	8	1.6%	8	1.6%
ATR	2	0.4%	4	0.8%
ATRX	9	1.8%	0	0.0%
AURKA	1	0.2%	20	3.9%
AURKB	0	0.0%	2	0.4%
AURKC	1	0.2%	12	2.4%
BIRC5	0	0.0%	21	4.1%
BRAF	3	0.6%	3	0.6%
BRCA1	15	3.0%	5	1.0%
BRCA2	22	4.3%	8	1.6%
BRIP1	8	1.6%	36	7.1%
CACNA1A	6	1.2%	6	1.2%
CACNA1C	6	1.2%	7	1.4%
CACNA1E	13	2.6%	19	3.7%
CBFB	8	1.6%	8	1.6%
CDC25A	1	0.2%	0	0.0%
CDC25B	3	0.6%	5	1.0%
CDC25C	1	0.2%	1	0.2%
CDH1	33	6.5%	10	2.0%
CDK1	0	0.0%	9	1.8%
CDK4	0	0.0%	10	2.0%
CDK6	1	0.2%	3	0.6%
CDKN1A	0	0.0%	3	0.6%
CDKN1B	5	1.0%	2	0.4%
CDKN2A	0	0.0%	23	4.5%
CDKN2B	0	0.0%	24	4.7%
CEP164	4	0.8%	0	0.0%
CHD4	7	1.4%	8	1.6%
CHD6	7	1.4%	6	1.2%
CHEK1	0	0.0%	2	0.4%
CHEK2	4	0.8%	3	0.6%
COL12A1	10	2.0%	3	0.6%
CTCF	13	2.6%	8	1.6%

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CTNNB1	0	0.0%	1	0.2%
CUBN	7	1.4%	6	1.2%
DCHS2	8	1.6%	3	0.6%
DEPTOR	0	0.0%	56	11.0%
DMC1	2	0.4%	2	0.4%
DOCK11	9	1.8%	0	0.0%
EGFR	4	0.8%	8	1.6%
EME1	0	0.0%	34	6.7%
EME2	0	0.0%	12	2.4%
EPPK1	1	0.2%	35	6.9%
ERBB2	7	1.4%	66	13.0%
ERBB3	8	1.6%	2	0.4%
ERBB4	6	1.2%	3	0.6%
ERCC1	1	0.2%	6	1.2%
ERCC2	0	0.0%	6	1.2%
ERCC3	2	0.4%	1	0.2%
ERCC5	4	0.8%	8	1.6%
ESR1	2	0.4%	10	2.0%
ESR2	2	0.4%	4	0.8%
FAM157B	1	0.2%	2	0.4%
FANCA	7	1.4%	13	2.6%
FANCB	0	0.0%	0	0.0%
FANCC	1	0.2%	2	0.4%
FANCD2	3	0.6%	7	1.4%
FANCE	1	0.2%	1	0.2%
FANCF	1	0.2%	6	1.2%
FANCG	1	0.2%	4	0.8%
FANCI	3	0.6%	10	2.0%
FANCL	1	0.2%	3	0.6%
FANCM	2	0.4%	3	0.6%
FBN1	7	1.4%	3	0.6%
FGFR1	0	0.0%	54	10.7%
FGFR2	4	0.8%	9	1.8%
FGFR3	1	0.2%	5	1.0%
FGFR4	3	0.6%	5	1.0%
FMN2	8	1.6%	24	4.7%
FOXA1	8	1.6%	8	1.6%
FOXC2	0	0.0%	12	2.4%
FRG1B	0	0.0%	2	0.4%
GATA3	54	10.7%	12	2.4%
GRB2	1	0.2%	20	3.9%
GRIN2A	10	2.0%	10	2.0%
GRIN2B	8	1.6%	3	0.6%
HECW1	8	1.6%	1	0.2%
HERC2	6	1.2%	5	1.0%
HIF1A	1	0.2%	4	0.8%
HRAS	0	0.0%	4	0.8%
HRNR	9	1.8%	34	6.7%
HSP90AA1	2	0.4%	4	0.8%
HSP90AB1	2	0.4%	6	1.2%
HUWE1	9	1.8%	0	0.0%
IGF1R	2	0.4%	21	4.1%
INPP4B	4	0.8%	6	1.2%
IRS1	1	0.2%	1	0.2%
JAK1	2	0.4%	6	1.2%
JAK2	5	1.0%	4	0.8%
KIT	5	1.0%	0	0.0%
KRAS	4	0.8%	7	1.4%
LAMA1	7	1.4%	5	1.0%
LAMA5	7	1.4%	20	3.9%
MACF1	11	2.2%	1	0.2%
MAP1A	10	2.0%	1	0.2%
MAP2K1	1	0.2%	4	0.8%
MAP2K2	1	0.2%	7	1.4%

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MAP2K3	1	0.2%	7	1.4%
MAP2K4	21	4.1%	11	2.2%
MAP2K6	0	0.0%	23	4.5%
MAP3K1	39	7.7%	4	0.8%
MAP3K10	4	0.8%	7	1.4%
MAP3K4	4	0.8%	4	0.8%
MAP4K4	1	0.2%	3	0.6%
MAPK1	1	0.2%	3	0.6%
MAPK8	2	0.4%	1	0.2%
MAPK9	0	0.0%	3	0.6%
MDM2	2	0.4%	19	3.7%
MDN1	11	2.2%	4	0.8%
MED12	8	1.6%	0	0.0%
MET	3	0.6%	0	0.0%
MGAM	6	1.2%	3	0.6%
MGMT	2	0.4%	6	1.2%
MLH1	1	0.2%	0	0.0%
MLH3	3	0.6%	3	0.6%
MLL2	8	1.6%	2	0.4%
MLL3	37	7.3%	1	0.2%
MRE11A	1	0.2%	9	1.8%
MSH2	2	0.4%	2	0.4%
MSH3	2	0.4%	1	0.2%
MSH5	1	0.2%	1	0.2%
MSH6	4	0.8%	2	0.4%
MST1L	5	1.0%	0	0.0%
MTOR	8	1.6%	2	0.4%
MUTYH	2	0.4%	2	0.4%
MXRA5	7	1.4%	0	0.0%
NBEAL2	6	1.2%	2	0.4%
NBN	2	0.4%	37	7.3%
NBPF1	1	0.2%	0	0.0%
NCOA3	6	1.2%	12	2.4%
NCOR1	17	3.4%	4	0.8%
NCOR2	3	0.6%	5	1.0%
NEB	19	3.7%	0	0.0%
NF1	14	2.8%	12	2.4%
NF2	2	0.4%	3	0.6%
NR1H2	3	0.6%	10	2.0%
NRAS	0	0.0%	2	0.4%
PALB2	0	0.0%	9	1.8%
PARP1	1	0.2%	22	4.3%
PARP2	1	0.2%	1	0.2%
PARP3	2	0.4%	1	0.2%
PCNXL2	9	1.8%	24	4.7%
PDGFRA	3	0.6%	1	0.2%
PDGFRB	2	0.4%	2	0.4%
PGR	2	0.4%	7	1.4%
PIK3CA	178	35.1%	22	4.3%
PIK3CB	4	0.8%	5	1.0%
PIK3R1	13	2.6%	2	0.4%
PLEC	7	1.4%	35	6.9%
PLK1	2	0.4%	9	1.8%
PLXNA4	8	1.6%	1	0.2%
PMS1	5	1.0%	3	0.6%
PMS2	1	0.2%	3	0.6%
POLB	1	0.2%	37	7.3%
POLD1	0	0.0%	11	2.2%
POLE	5	1.0%	1	0.2%
POLH	2	0.4%	5	1.0%
POLQ	6	1.2%	2	0.4%
PRKCA	0	0.0%	36	7.1%
PRKCB	3	0.6%	9	1.8%
PRKCD	0	0.0%	1	0.2%

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PRKCG	2	0.4%	11	2.2%
PTCH1	6	1.2%	2	0.4%
PTEN	18	3.6%	9	1.8%
PTK2	3	0.6%	37	7.3%
RAD50	2	0.4%	0	0.0%
RAD51	1	0.2%	3	0.6%
RAD51B	0	0.0%	1	0.2%
RAD51C	2	0.4%	33	6.5%
RAD51D	1	0.2%	10	2.0%
RAD52	0	0.0%	13	2.6%
RAD54B	4	0.8%	38	7.5%
RAD54L	2	0.4%	3	0.6%
RAF1	1	0.2%	4	0.8%
RB1	9	1.8%	7	1.4%
RBBP8	0	0.0%	3	0.6%
RELN	13	2.6%	1	0.2%
RICTOR	3	0.6%	6	1.2%
RPS6KB1	0	0.0%	47	9.3%
RPTOR	2	0.4%	14	2.8%
RUNX1	17	3.4%	3	0.6%
SHC1	1	0.2%	32	6.3%
SHROOM4	5	1.0%	0	0.0%
SMO	2	0.4%	3	0.6%
SOS1	4	0.8%	2	0.4%
SPEN	13	2.6%	0	0.0%
SPRY1	0	0.0%	4	0.8%
SPTA1	14	2.8%	24	4.7%
SRCAP	9	1.8%	15	3.0%
STAT1	1	0.2%	4	0.8%
STAT3	1	0.2%	10	2.0%
SVEP1	11	2.2%	3	0.6%
TBX3	13	2.6%	1	0.2%
TENM1	10	2.0%	0	0.0%
TGFBR1	2	0.4%	3	0.6%
TGFBR2	3	0.6%	0	0.0%
TGFBR3	2	0.4%	2	0.4%
TOP2A	1	0.2%	24	4.7%
TP53	187	36.9%	3	0.6%
TP53BP1	3	0.6%	1	0.2%
TSC1	3	0.6%	2	0.4%
TSC2	2	0.4%	12	2.4%
TYK2	4	0.8%	6	1.2%
UBR4	12	2.4%	0	0.0%
USP36	3	0.6%	19	3.7%
WDFY3	9	1.8%	3	0.6%
XBP1	2	0.4%	3	0.6%
XPA	0	0.0%	1	0.2%
XPC	0	0.0%	5	1.0%
XRCC1	1	0.2%	4	0.8%
XRCC2	0	0.0%	1	0.2%
XRCC3	0	0.0%	6	1.2%
ZFHX3	10	2.0%	9	1.8%
ZFHX4	16	3.2%	28	5.5%
ZNF384	0	0.0%	8	1.6%
ZNF703	0	0.0%	61	12.0%