Supplementary Material

Supplementary Table 1. Summary characteristics of the participating BCAC case-control studies

Supplementary Table 2. Availability of information on tumor morphology and receptor status for Europeans, by each included BCAC study

Supplementary Table 3. Genotyping characteristics of each BCAC participating study

Supplementary Table 1. Summary characteristics of the 37 participating BCAC studies

Study (ref. no.)	Study acronym	Country	Study design	Specifically selected "genetically-enriched" cases	No. Cases Europeans/ Asians	No. Controls Europeans/ Asians	Age at diagnosis for European cases: range
Australian Breast Cancer Family Study (1)	ABCFS	Australia	Population-based case-control study	No	1183 / 58	608 / 16	23 - 69
Amsterdam Breast Cancer Study (2)	ABCS	Netherlands	Hospital-based; population-based controls	No	1112 / 0	986 / 0	22 - 79
Asia Cancer Program	ACP	Thailand	Hospital-based cases; hospital-based controls	No	0 / 325	0 / 565	-- - --
Bavarian Breast Cancer Cases and Controls (3-4)	BBCC	Germany	Hospital-based cases; population-based controls	No	1282 / 0	622 / 0	22 - 96
British Breast Cancer Study (5-6)	BBCS	UK	Cancer registry and National Cancer Research network (NCRN) based cases; population based controls	Yes	1150 / 0	828 / 0	26 - 77
Breast Cancer in Galway Genetic Study (7-8)	BIGGS	Ireland	Hospital based-cases; population-based controls	No	937 / 0	840 / 0	24 - 90
Breast Cancer Study of the University of Heidelberg (9-10)	BSUCH	Germany	Hospital-based cases; healthy blood donor controls	No	1086 / 0	1315 / 0	25 - 89
CECILE Breast Cancer Study (11)	CECILE	France	Population-based case-control	No	1059 / 0	1025 / 0	25 - 74
Copenhagen General Population Study (12)	CGPS	Denmark	Population-based	No	2467 / 0	6679 / 0	24 - 95
Spanish National Cancer Centre Breast Cancer Study (13)	CNIO-BCS	Spain	Case-control study	Yes	711 / 0	785 / 0	23 - 86
California Teachers Study (14)	CTS	USA	Prospective cohort study: nested case-control	No	1246 / 42	1217 / 31	32 - 83
ESTHER Breast Cancer Study (15)	ESTHER	Germany	Population-based case-control study	No	498 / 0	510 / 0	30 - 79
German Consortium for Hereditary Breast & Ovarian Cancer (16)	GC-HBOC	Germany	Population-based familial case-control study	Yes	850 / 0	1125 / 0	19 - 87
Gene Environment Interaction and Breast Cancer in Germany (17-18)	GENICA	Germany	Population-based case-control study	No	961 / 0	983 / 0	23 - 80
Genetic Epidemiology Study of Breast Cancer by Age 50 (19)	GESBC	Germany	Population-based study of women ≤50 years	No	471 / 0	554 / 0	24 - 50
Hannover Breast Cancer Study (20)	HABCS	Germany	Hospital-based case-control study	No	1005 / 0	995 / 0	25 - 91
Helsinki Breast Cancer Study (21-22)	HEBCS	Finland	Hospital-based case-control study plus additional familial cases	Yes	2372 / 0	1265 / 0	22 - 95
Hannover-Minsk Breast Cancer Study (23)	HMBCS	Belarus *	Hospital-based cases; population-based controls	No	1764 / 0	1018 / 0	16 - 82
Hannover-Ufa Breast Cancer Study (23)	HUBCS	Russia *	Hospital-based cases; population-based controls	No	862 / 60	1458 / 53	25 - 85

Study (ref. no.)	Study acronym	Country	Study design	Specifically selected "genetically-enriched" cases	No. Cases Europeans/ Asians	No. Controls Europeans/ Asians	Age at diagnosis for European cases: range
Karolinska Breast Cancer Study (24-25)	KARBAC	Sweden	Population and hospital-based cases; geographically matched controls	Yes	817 / 0	869 / 0	24 - 88
Kuopio Breast Cancer Project (26-27)	KBCP	Finland	Hospital-based prospective clinical cohort	No	484 / 0	356 / 0	23 - 92
Kathleen Cuningham Foundation Consortium for research into Familial Breast Cancer/ Australian Ovarian Cancer Study (28-29)	KConFab/ AOCS	Australia and New Zealand	Clinic-based recruitment of familial breast cancer patients (cases); population-based case-control study of ovarian cancer (controls only)	Yes	622 / 0	932 / 0	17 - 77
Leuven Multidisciplinary Breast Centre (30-31)	LMBC	Belgium	Hospital-based case-control study	No	2930 / 0	1613 / 0	21 - 95
Mammary Carcinoma Risk Factor Investigation (32)	MARIE	Germany	Population-based case-control study	No	2523 / 0	4867 / 0	50 - 75
Milan Breast Cancer Study Group (33-34)	MBCSG	Italy	Clinic-based recruitment of familial/early onset breast cancer patients (cases); population-based controls	Yes	752 / 0	1356 / 0	21 - 80
Mayo Clinic Breast Cancer Study (35)	MCBCS	USA	Hospital-based case-control study	No	2077 / 0	2120 / 0	22 - 93
Melbourne Collaborative Cohort Study (36)	MCCS	Australia	Prospective cohort study	No	450 / 0	617 / 0	37 - 80
Northern California Breast Cancer Family Registry (37)	NC-BCFR	USA	Population-based familial case-control study	Yes	389 / 460	154 / 61	26 - 65
Oulu Breast Cancer Study (38)	OBCS	Finland	Hospital-based case-control study	No	537 / 0	496 / 0	28 - 92
Ontario Familial Breast Cancer Registry (37)	OFBCR	Canada *	Population-based familial case-control study	Yes	1093 / 120	320 / 15	24 - 81
Leiden University Medical Centre Breast Cancer Study (39-40)	ORIGO	Netherlands	Hospital-based prospective cohort study	No	1221 / 0	899 / 0	22 - 88
Rotterdam Breast Cancer Study (41)	RBCS	Netherlands	Hospital based case-control study, Rotterdam area	Yes	792 / 0	799 / 0	18 - 24
Singapore and Sweden Breast Cancer Study (42)	SASBAC	Sweden	Population-based case-control study	No	1226 / 0	1466 / 0	50 - 75
Sheffield Breast Cancer Study (43)	SBCS	UK	Hospital-based case-control study	No	979 / 0	948 / 0	28 - 92
Study of Epidemiology and Risk factors in Cancer Heredity (44)	SEARCH	UK	Population-based case-control study	No	6271 / 36	6696 / 10	23 - 69
UCI Breast Cancer Study (45-46)	UCIBCS	USA	Population-based case-control study	No	742 / 46	440 / 14	24 - 90
UK Breakthrough Generations Study (47)	UKBGS	UK	Prospective cohort study: nested case-control study of women who had had breast cancer prior to entry into the cohort	No	2326 / 0	2310 / 0	24 - 84
TOTAL					**47247 / 1147**	**50071 / 765**	

*All participants from HMBCS and HUBCS and those in OFBCR who self-reported themselves as being Eastern European were taken as being "Eastern Europeans" in sub-ethnic analyses

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Supplementary Table 2. Availability of information on morphology and receptor status for Europeans, by each included BCAC study

		Morphology				Receptor Status					
Study Acronym	**Total no. of BC cases**	**No. invasive**	***(%)****	**No. *in situ***	***(%)***	**No. with ER status**	***(+ve) (%)***	**No. with PR status**	***(+ve) (%)***	**No. with HER2 status**	***(+ve) (%)***
ABCFS	1183	1183	*100*	0	*0*	1028	*66*	1024	*69*	0	*0*
ABCS	1112	697	*63*	63	*6*	374	*74*	0	*0*	0	*0*
BBCC	1282	1226	*96*	56	*4*	1178	*72*	1174	*65*	901	*17*
BBCS	1150	1150	*100*	0	*0*	0	*0*	0	*0*	0	*0*
BIGGS	937	886	*95*	51	*5*	698	*75*	535	*77*	0	*0*
BSUCH	1086	1067	*98*	19	*2*	812	*71*	812	*61*	761	*19*
CECILE	1059	936	*88*	123	*12*	981	*84*	970	*71*	718	*13*
CGPS	2467	2383	*97*	84	*3*	2184	*84*	1616	*62*	536	*76*
CNIO-BCS	711	678	*95*	33	*5*	237	*75*	255	*56*	123	*53*
CTS	1246	1246	*100*	0	*0*	0	*0*	0	*0*	0	*0*
ESTHER	498	435	*87*	5	*1*	428	*76*	422	*67*	195	*27*
GC-HBOC	850	850	*100*	0	*0*	0	*0*	0	*0*	0	*0*
GENICA	961	961	*100*	0	*0*	914	*78*	911	*70*	646	*28*
GESBC	471	432	*92*	32	*7*	348	*62*	342	*58*	0	*0*
HABCS	1005	993	*99*	12	*1*	676	*90*	609	*88*	0	*0*
HEBCS	2372	2220	*94*	152	*6*	2225	*81*	2224	*65*	1356	*15*
HMBCS	1764	1764	*100*	0	*0*	0	*0*	0	*0*	0	*0*
HUBCS	862	862	*100*	0	*0*	206	*55*	206	*56*	195	*50*
KARBAC	817	817	*100*	0	*0*	444	*83*	388	*76*	0	*0*
KBCP	484	462	*95*	22	*5*	434	*76*	432	*62*	393	*13*
kConFab/AOCS	622	433	*70*	106	*17*	226	*69*	200	*70*	0	*0*
LMBC	2930	2732	*93*	198	*7*	2710	*85*	2699	*77*	2509	*13*
MARIE	2523	2362	*94*	161	*6*	2420	*78*	2418	*66*	1400	*20*
MBCSG	752	308	*41*	29	*4*	304	*77*	304	*67*	198	*52*

MCBCS	2077	1730	*83*	347	*17*	1978	*84*	1977	*74*	1347	*15*
MCCS	450	450	*0*	0	*0*	375	*74*	375	*65*	156	*28*
NC-BCFR	389	268	*69*	121	*31*	272	*85*	271	*73*	0	*0*
OBCS	537	530	*99*	7	*1*	537	*80*	536	*70*	537	*14*
OFBCR	1093	1076	*98*	17	*2*	866	*71*	848	*61*	0	*0*
ORIGO	1221	1096	*90*	98	*8*	878	*73*	727	*60*	0	*0*
RBCS	792	739	*93*	51	*6*	610	*73*	519	*64*	113	*11*
SASBAC	1226	1226	*100*	0	*0*	856	*82*	833	*72*	0	*0*
SBCS	979	878	*90*	70	*7*	560	*79*	241	*59*	256	*7*
SEARCH	6271	6271	*100*	0	*0*	2949	*81*	2008	*70*	1356	*11*
UCIBCS	742	643	*87*	99	*13*	567	*79*	560	*70*	0	*0*
UKBGS	2326	2244	*96*	78	*3*	0	*0*	0	*0*	0	*0*
Total	**47247**	**44234**	***94***	**2034**	***4***	**29275**	***79***	**26539**	***69***	**13696**	***20***

Supplementary Table 3. Genotyping characteristics of each participating BCAC study

Study Acronym	No. of Cases	No. of Controls	Sample size Total	Genotyping platform	Call Rate Overall (%)	HWE (Controls) * P-value
ABCFS	1241	624	1865	TaqMan	99.2	0.39
ABCS	1112	986	2098	iPLEX	99.6	0.73
ACP	325	565	890	iPLEX	99.9	0.74
BBCC	1282	622	1904	iPLEX	99.6	0.65
BBCS	1150	828	1978	iPLEX	99.7	0.71
BIGGS	937	840	1777	iPLEX	98.6	0.20
BSUCH	1086	1315	2401	MALDI-TOF MS	99.7	0.19
CECILE	1059	1025	2084	TaqMan	99.5	0.07
CGPS	2467	6679	9146	TaqMan	99.2	0.08
CNIO-BCS	711	785	1496	iPLEX	99.7	0.28
CTS	1288	1248	2536	iPLEX	100.0	0.04
ESTHER	498	510	1008	MALDI-TOF MS	100.0	0.46
GC-HBOC	850	1125	1975	MALDI-TOF MS	99.7	0.37
GENICA	961	983	1944	iPLEX	99.8	0.49
GESBC	471	554	1025	iPLEX	99.3	0.86
HABCS	1005	995	2000	TaqMan	99.9	0.41
HEBCS	2372	1265	3637	iPLEX	99.8	0.31
HMBCS	1764	1018	2782	TaqMan	99.0	0.60
HUBCS	922	1511	2433	TaqMan	100.0	0.75
KARBAC	817	869	1686	TaqMan	97.5	0.77
KBCP	484	356	840	iPLEX	99.4	0.55
kConFab/AOCS	622	932	1554	iPLEX	99.6	0.41
LMBC	2930	1613	4543	iPLEX	99.9	0.02
MARIE	2523	4867	7390	iPLEX	99.7	0.03
MBCSG	752	1356	2108	MALDI-TOF MS	100.0	0.56
MCBCS	2077	2120	4197	TaqMan	100.0	0.78
MCCS	450	617	1067	TaqMan	99.2	0.49
NC-BCFR	849	215	1064	TaqMan	99.9	1.00
OBCS	537	496	1033	iPLEX	99.3	0.62
OFBCR	1213	335	1548	iPLEX	99.4	0.91
ORIGO	1221	899	2120	TaqMan	99.4	0.67
RBCS	792	799	1591	TaqMan	98.1	0.94
SASBAC	1226	1466	2692	iPLEX	98.8	0.12
SBCS	979	948	1927	iPLEX	99.0	0.50
SEARCH	6307	6706	13013	TaqMan	100.0	0.29
UCIBCS	788	454	1242	iPLEX	99.8	0.22
UKBGS	2326	2310	4636	TaqMan	100.0	0.83
Total	**48394**	**50836**	**99230**			

* Departure from Hardy-Weinberg Equilibrium (HWE) tested among controls using $\chi 2$ (1df) and a threshold of P=0.01