Table S1. Characteristics of successful typing and unsuccessful typing specimens

Characteristics	F/f subtype, n (%)		P value[a]	C/D subtype, n (%)		P value[a]
	Yes	No		Yes	No	
Age						
≤ 40	38 (21.1)	33 (17.4)		24 (14.1)	47 (23.5)	
41– 60	96 (53.3)	118 (62.1)		101 (59.	113 (56.5)	
≥61	46 (25.6)	39 (20.5)	0.232	45 (26.5)	40 (20.0)	0.049
Education						
Junior middle school or below	92 (51.1)	88 (46.3)		83 (48.8)	97 (48.5)	
Senior middle school	47 (26.1)	62 (32.6)		48 (28.2)	61 (30.5)	
College or above	30 (16.7)	31 (16.3)	0.415	27 (15.9)	34 (17.0)	0.932
Unknown	11 (6.1)	9 (4.7)		12 (7.1)	8 (4.0)	
Marital status						
Never married	4 (2.2)	10 (5.3)		6 (3.5)	8 (4.0)	
Married/living as married	151 (83.9)	159 (83.7)		144 (84.	166 (83.0)	
Separated/widow	14 (7.8)	11 (5.8)	0.247	11 (6.5)	14 (7.0)	0.942
Unknown	11 (6.1)	10 (5.3)		9 (5.3)	12 (6.0)	
BMI (kg/m^2)						
< 22	64 (35.6)	72 (37.9)		57 (33.5)	79 (39.5)	
22~	57 (31.7)	57 (30.0)		49 (28.8)	65 (32.5)	
25~	46 (25.6)	50 (26.3)	0.895	52 (30.6)	44 (22.0)	0.142
Unknown	13 (7.2)	11 (5.8)		12 (7.1)	12 (6.0)	
Age at menarche (years)						
≤12	22 (12.2)	30 (15.8)		24 (14.1)	28 (14.0)	
>12	144 (80.0)	151 (79.5)	0.387	137 (80.	158 (79.0)	0.969
Unknown	14 (7.8)	9 (4.7)		9 (5.3)	14 (7.0)	
Menopausal status						
Premenopausal	73 (40.6)	81 (42.6)		60 (35.3)	94 (47.0)	
Postmenopausal	99 (55.0)	103 (54.2)	0.764	103 (60.6)	99 (49.5)	0.024 *
Unknown	8 (4.4)	6 (3.2)		7 (4.1)	7 (3.5)	
Age at menopausal (years)						
≤45	16 (16.2)	16 (15.5)		17 (16.5)	15 (15.2)	
46–50	41 (41.4)	48 (46.6)		45 (43.7)	44 (44.4)	
≥51	34 (34.3)	35 (34.0)	0.892	38 (36.9)	31 (31.3)	0.852
Unknown	8 (8.1)	4 (3.9)		3 (2.9)	9 (9.1)	
Parity						
0	9 (5.0)	15 (7.9)		10 (5.9)	14 (7.0)	
≥1	162 (90.0)	169 (88.9)	0.279	153 (90.	178 (89.0)	0.665
Unknown	9 (5.0)	6 (3.2)		7 (4.1)	8 (4.0)	
History of breastfeeding						
Never	24 (13.3)	29 (15.3)		24 (14.1)	29 (14.5)	
Ever	130 (72.2)	134 (70.5)	0.599	124 (72.	140 (70.0)	0.822
Unknown	26 (14.4)	27 (14.2)		22 (12.9)	31 (15.5)	
Family history of breast cancer						
Absent	164 (91.1)	176 (92.6)		157 (92.	183 (91.5)	
Present	5 (2.8)	6 (3.2)	0.856	2 (1.2)	9 (4.5)	0.066
Unknown	11 (6.1)	8 (4.2)		11 (6.5)	8 (4.0)	

[a] Student's *t*-test for continuous variables; χ^2 test for categorical variables; * Statistical significance

Table S2. Association between EBV F/f subtypes and breast cancer risk stratified by menopausal status, BMI, and clinical characteristics.

Variables	F/f subtype	Cases, n(%)	Controls, n(%)	OR[a] (95%CI)	P value
Menopausal status					
Premenopausal	F	27 (77.1)	31 (81.6)	1.00 (reference)	
	f	8 (22.9)	7 (18.4)	1.11 (0.34~3.56)	
Postmenopausal	F	29 (82.9)	47 (73.4)	1.00 (reference)	
	f	6 (17.1)	17 (26.6)	0.61 (0.21~1.74)	0.435[b]
BMI (kg/m^2)					
<23	F	29 (78.4)	38 (79.2)	1.00 (reference)	
	f	8 (21.6)	10 (20.8)	1.12 (0.39~3.23)	
≥23	F	24 (80.0)	37 (71.2)	1.00 (reference)	
	f	6 (20.0)	15 (28.8)	0.64 (0.22~1.90)	0.478[b]
ER					
Negative	F	18 (90.0)	83 (76.1)	1.00 (reference)	
	f	2 (10.0)	26 (23.9)	0.33 (0.07-1.53)	
Positive	F	33 (73.3)	83 (76.1)	1.00 (reference)	
	f	12 (26.7)	26 (23.9)	1.16 (0.52-2.57)	0.170[c]
PR					
Negative	F	26 (89.7)	83 (76.1)	1.00 (reference)	
	f	3 (10.3)	26 (23.9)	0.35 (0.10-1.26)	
Positive	F	25 (69.4)	83 (76.1)	1.00 (reference)	
	f	11 (30.6)	26 (23.9)	1.44 (0.62-3.33)	0.082[c]
HER2					
Negative	F	27 (71.1)	83 (76.1)	1.00 (reference)	
	f	11 (28.9)	26 (23.9)	1.30 (0.57-2.97)	
Positive	F	22 (88.0)	83 (76.1)	1.00 (reference)	
	f	3 (12.0)	26 (23.9)	0.42 (0.11-1.51)	0.110[c]
Clinical stage					
I/ II	F	37 (82.2)	83 (76.1)	1.00 (reference)	
	f	8 (17.8)	26 (23.9)	0.68 (0.28~1.64)	
Ⅲ/Ⅳ	F	7 (63.6)	83 (76.1)	1.00 (reference)	
	f	4 (36.4)	26 (23.9)	1.75 (0.47-6.50)	0.147[c]

[a] Adjusted for age.

[b] P for multiplicative interaction.

[c] P for heterogeneity.

Table S3. Association between EBV C/D subtypes and breast cancer risk stratified by menopausal status, BMI, and clinical characteristics.

Variables	C/D subtype	Cases, n(%)	Controls, n(%)	OR[a] (95%CI)	P value
Menopausal status					
Premenopausal	C	13 (52.0)	26 (74.3)	1.00 (reference)	
	D	12 (48.0)	9 (25.7)	2.86 (0.94~8.72)	
Postmenopausal	C	19 (61.3)	59 (81.9)	1.00 (reference)	
	D	12 (38.7)	13 (18.1)	3.39 (1.27~9.08)*	0.863[b]
BMI (kg/m^2)					
<23	C	17 (63.0)	40 (78.4)	1.00 (reference)	
	D	10 (37.0)	11 (21.6)	2.13 (0.76~5.99)	
≥23	C	15 (57.7)	43 (79.6)	1.00 (reference)	
	D	11 (42.3)	11 (20.4)	3.17 (1.09~9.24)*	0.672[b]
ER					
Negative	C	9 (50.0)	88 (78.6)	1.00 (reference)	
	D	9 (50.0)	24 (21.4)	3.55 (1.24-10.18)*	
Positive	C	19 (59.4)	88 (78.6)	1.00 (reference)	
	D	13 (40.6)	24 (21.4)	2.57 (1.10-6.00)*	0.552[c]
PR					
Negative	C	10 (45.5)	88 (78.6)	1.00 (reference)	
	D	12 (54.5)	24 (21.4)	4.20 (1.59-11.08)*	
Positive	C	18 (64.3)	88 (78.6)	1.00 (reference)	
	D	10 (35.7)	24 (21.4)	2.15 (0.87-5.33)	0.205[c]
HER2					
Negative	C	15 (55.6)	88 (78.6)	1.00 (reference)	
	D	12 (44.4)	24 (21.4)	3.01 (1.22-7.41)*	
Positive	C	12 (54.5)	88 (78.6)	1.00 (reference)	
	D	10 (45.5)	24 (21.4)	2.99 (1.14-7.83)*	0.857[c]
Clinical stage					
I/ II	C	19 (55.9)	88 (78.6)	1.00 (reference)	
	D	15 (44.1)	24 (21.4)	3.02 (1.32~6.93)*	
Ⅲ/IV	C	7 (77.8)	88 (78.6)	1.00 (reference)	
	D	2 (22.2)	24 (21.4)	0.83 (0.16~4.48)	0.233[c]

[a] Adjusted for age.

[b] *P* for multiplicative interaction.

[c] *P* for heterogeneity.

* Statistical significance

Table S4. Correlation between EBV F/f subtype and EBV IgA.

EBV IgA	F/f subtype		r_s	P value
	F, n (%)	f, n (%)		
VCA IgA				
Negative	64 (83.1)	18 (75.0)		
Positive	13 (16.9)	6 (25.0)	0.088	0.379[a]
Median (25th-75th)	0.10 (0.02~0.23)	0.12 (0.06~0.52)		0.030[b] *
EBNA-1 IgA				
Negative	74 (96.1)	21 (87.5)		
Positive	3 (3.9)	3 (12.5)	0.155	0.122[a]
Median (25th-75th)	0.06 (0.03~0.11)	0.09 (0.03~0.25)		0.145[b]
Combined EBV IgA				
Negative	61 (79.2)	16 (66.7)		
Positive	16 (20.8)	8 (33.3)	0.126	0.211[a]

[a] P for spearman rank correlation.

[b] P for rank test.

* Statistical significance

Table S5. Correlation between EBV C/D subtype and EBV IgA.

EBV IgA	C/D subtype		r_s	P value
	C, n (%)	D, n (%)		
VCA IgA				
Negative	54 (78.3)	23 (88.5)		
Positive	15 (21.7)	3 (11.5)	-0.116	0.263[a]
Median (25th-75th)	0.09 (0.02~0.26)	0.08 (0.04~0.19)		0.255[b]
EBNA-1 IgA				
Negative	65 (94.2)	25 (96.2)		
Positive	4 (5.8)	1 (3.8)	-0.039	0.708[a]
Median (25th-75th)	0.06 (0.02~0.10)	0.07 (0.02~0.16)		0.633[b]
Combined EBV IgA				
Negative	52 (75.4)	22 (84.6)		
Positive	17 (24.6)	4 (15.4)	-0.099	0.338[a]

[a] P for spearman rank correlation.

[b] P for rank test.