

Table 2.63. Studies of smoking and breast cancer risk by genetic subtype

NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype		Controlled for
Cohort (Nested case-control)						
Hunter <i>et al.</i> (1997)	466/466	Never Former 1-14 c/day 15+ c/day	1.0 (ref) 1.3 (0.9-1.7) 1.3 (0.6-2.5) 1.6 (0.9-2.8)	Rapid 1.0 (ref) 1.2 (0.8-1.9) 1.1 (0.4-3.1) 1.2 (0.5-3.3)	Slow 0.8 (0.6-1.3) 1.1 (0.7-1.7) 1.1 (0.4-3.0) 1.5 (0.7-3.2)	Age at menarche, parity, age at first birth, BMI, family history of breast cancer, history of benign breast disease
Egan <i>et al.</i> (2002)	791/797	Ever vs. Never	1.37 (1.12-1.69)	Rapid: 1.24 (0.91-1.70) Slow: 1.50 (1.11-2.02)		State, age, education, age at menarche, parity, age at first birth, benign breast disease, BMI, family history of breast cancer, menopausal status, age at menopause, alcohol
Case-Control						
Ambrosone <i>et al.</i> (1996)	304/327	Pack-yrs Never ≤183 184-365 >365		Premenopausal <i>Rapid</i> 1.0 (ref) 1.8 (0.5-6.5) 2.5 (0.7-8.6) 2.1 (0.5-7.9) <i>Slow</i> 1.0 (ref) 1.7 (0.5-5.1) 0.8 (0.3-2.4) 1.2 (0.4-3.8)	Postmenopausal <i>Rapid</i> 1.0 (ref) 0.4 (0.1-1.6) 1.5 (0.5-4.2) 0.9 (0.4-2.1) <i>Slow</i> 1.0 (ref) 0.9 (0.3-3.0) 1.1 (0.4-2.7) 2.8 (1.4-5.5)	Age, education, age at menarche, age at first pregnancy, BMI, family history of breast cancer, age at menopause
Millikan <i>et al.</i> (1998)	498/473	Never Current Former	1.0 (ref) 1.0 (0.7-1.4) 1.3 (0.9-1.8)	Premenopausal <i>Rapid</i> 1.0 (ref) 1.1 (0.5-2.3) 1.1 (0.6-2.1) <i>Slow</i> 1.0 (ref) 0.8 (0.4-1.6) 1.0 (0.5-1.9)	Postmenopausal <i>Rapid</i> 1.0 (ref) 1.4 (0.7-2.8) 1.6 (0.9-2.9) <i>Slow</i> 1.0 (ref) 1.1 (0.6-2.2) 1.8 (1.0-3.3)	Age, race
Morabia <i>et al.</i> (2000)	177/170	Never Ever pass. Ever active Former Curr <20cpd Curr 20+cpd		Rapid 1.0 (ref) 1.9 (0.7-4.6) 2.7 (1.1-6.6) 2.8 (1.05-7.8) 3.7 (1.05-12.9) 1.6 (0.7-6.9)	Slow 1.0 (ref) 5.9 (2.0-17.4) 4.2 (1.5-12.0) 5.2 (1.5-18.0) 3.1 (0.7-12.7) 5.3 (1.4-20.5)	Age, education, family history of breast cancer
Delfino <i>et al.</i> (2000)	113/278	Never Passive Former Current	1.00 (ref) 1.32 (0.69-2.52) 0.94 (0.53-1.68) 0.55 (0.18-1.67)			Age, menopausal status, family history of breast cancer

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NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype		Controlled for
Krajcinovic <i>et al.</i> (2001)	149/207	Ever vs. Never		Rapid: 2.6 (0.8–8.2)		Age, age at menarche, BMI, family history of cancer, menopause, parity, breast feeding, HRT use, alcohol
Chang-Claude <i>et al.</i> (2002)	422/887	Never A/P Pass only Current Former		Rapid 1.0 (ref) 2.02 (0.99–4.10) 1.12 (0.56–2.22) 1.22 (0.59–2.54) 1.02 (0.49–2.13)	Slow 1.0 (ref) 1.19 (0.69–2.07) 1.40 (0.84–2.34) 1.67 (0.97–2.89) 1.16 (0.67–2.03)	Age, parity, breastfeeding, BMI, alcohol, menopausal status
van der Hel <i>et al.</i> (2003)	229/264	Never <15 yrs 15–30 yrs 30+ yrs	1.00 (ref) 1.22 (0.68–2.18) 1.37 (0.86–2.16) 1.55 (0.92–2.61)	Rapid 1.00 (ref) 1.22 (0.68–2.18) 1.37 (0.86–2.16) 1.55 (0.92–2.61)	Slow 0.97 (0.53–1.80) 1.01 (0.47–2.19) 1.61 (0.84–3.12) 1.66 (0.80–3.44)	Genotype study; didn't do current vs ever; just by duration and dose
Alberg <i>et al.</i> (2004)	110/113	Never Former Current	1.0 (ref) 1.1 (0.56–2.1) 0.66 (0.30–1.4)	Slow 1.0 (ref) 1.4 (0.59–3.6) 1.3 (0.42–3.7)	Int/Rapid 1.0 (ref) 0.77 (0.29–2.1) 0.36 (0.11–1.2)	Family history, passive smoking, age at first birth, age at menarche, BMI
Kocabaş <i>et al.</i> (2004)	84/103	Never Active Passive		Slow vs. Rapid: 0.66 (0.30–1.42) 0.77 (0.19–3.16) 0.99 (0.30–3.24)		Age at menarche, age at first term pregnancy, BMI
Sillanpää <i>et al.</i> (2005)	483/482	Never A/P Only Pass. Former Current	1.0 (ref) 0.85 (0.62–1.16) 0.87 (0.56–1.37) 1.34 (0.86–2.09)	Slow vs. Rapid: 1.39 (0.91–2.13) 1.22 (0.75–1.98) 1.18 (0.51–2.74) 2.14 (0.93–4.95)		Age, age at menarche, age at first term pregnancy, number of pregnancies, family history of breast cancer, history of benign breast disease, alcohol
Lilla <i>et al.</i> (2005)	419/884	Never A/P Pass only 1–10 p–y 11+ p–y		Rapid 1.0 (ref) 1.95 (0.97–3.91) 0.98 (0.48–1.98) 1.22 (0.59–2.54)	Slow 1.0 (ref) 1.25 (0.72–2.16) 1.24 (0.72–2.12) 1.85 (1.04–3.30)	Age, family history of breast cancer, breastfeeding, BMI, parity, alcohol, menopausal status, education

Table 2.63. Studies of smoking and breast cancer risk by genetic subtype

NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype				Controlled for	
van der Hel <i>et al.</i> (2005)	676/669	Never Former Curr <10cpd 10–20 cpd >20 cpd	1.00 (ref) 1.29 (0.81–2.03) 1.01 (0.74–1.36) 1.03 (0.77–1.38) 1.28 (0.83–1.96)	Rapid		Slow		Age, cohort	
				1.0 (ref) 1.25 (0.61–2.56) 0.66 (0.40–1.09) 0.92 (0.55–1.52) 1.31 (0.63–2.70)	1.0 (ref) 1.24 (0.66–2.33) 1.19 (0.78–1.83) 0.89 (0.60–1.33) 1.08 (0.59–1.97)				
Lissowska <i>et al.</i> (2006)	2386/ 2502	Never A/P Pass only Act only Act+Pass	1.00 (ref) 1.11 (0.85–1.46) 1.23 (0.83–1.83) 1.21 (0.93–1.59)	Rapid/intermediate		Slow		Age, site, education, age at menarche, full-term births, age at first term birth, age at menopause, BMI, family breast cancer history, benign biopsy, mammography, OC use, HRT use	
				Never: 1.0 (ref) Ever: 1.04 (0.85–1.29)	Never: 0.89 (0.73–1.09) Ever: 1.12 (0.92–1.36)				
NAT1									
Millikan <i>et al.</i> (1998)	498/473		See above	<i>Premenopausal</i>		<i>Postmenopausal</i>		Age, race	
		Never Current Former		NAT1*10 1.0 (ref) 1.0 (0.5–2.1) 1.0 (0.5–1.9)	NAT1non*10 1.0 (ref) 0.9 (0.5–1.8) 1.2 (0.6–2.3)	NAT1*10 1.0 (ref) 1.1 (0.6–2.2) 1.8 (1.0–3.1)	NAT1non*10 1.0 (ref) 1.2 (0.6–2.4) 1.4 (0.8–2.6)		
Zheng <i>et al.</i> (1999)	154/330	Never Ever Quit >10yrs ≤14cpd <25 yr 15+cpd >25 yr	1.0 (ref) 1.14 (0.84–1.54) 1.40 (0.92–2.13) 0.88 (0.47–1.66) 1.07 (0.70–1.63)	NAT1*3/4 combo		NAT1*10/any		Age, family history of breast cancer	
				1.0 (ref) 1.1 (0.7–2.0) 1.3 (0.6–2.8) 1.1 (0.4–3.1) 0.8 (0.3–1.6)	1.2 (0.7–2.0) 1.4 (0.7–2.9) 2.2 (0.7–6.6) 5.0 (0.4–56.2) 0.6 (0.2–1.8)	2.1 (0.6–6.7) 13.2 (1.5–116.0) N/A N/A N/A			
Millikan <i>et al.</i> (2000)	AA: 290/273 White: 199/192	Never Ever		<i>African–American</i>			<i>White</i>		Age, family history of breast cancer
				NAT1*3/4 1.0 (ref) 1.3 (0.6–3.0)	NAT1*10 0.7 (0.4–1.4) 1.0 (0.6–2.0)	NAT1*11 N/A N/A	NAT1*3/4 1.0 (ref) 1.1 (0.7–1.8)	NAT1*10 1.0 (0.6–1.6) 1.1 (0.6–1.7)	NAT1*11 0.7 (0.2–2.7) 0.3 (0.1–1.7)
Krajinovic <i>et al.</i> (2001)	149/207	Ever vs Never	See above	NAT1*10: 0.4 (0.1–1.6)				Age, age at menarche, BMI, family history of cancer, menopause, parity, breast feeding, HRT use, alcohol	

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NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype				Controlled for
van der Hel <i>et al.</i> (2005)	676/669	Never Former Curr <10cpd 10–20 cpd >20 cpd	See above	NAT1*10		Non–NAT1*10		Age, cohort
				1.0 (ref)		1.12 (0.85–1.48)		
				1.48 (0.58–3.75)		1.40 (0.76–2.56)		
				0.73 (0.41–1.33)		1.14 (0.73–1.77)		
				0.94 (0.53–1.69)		1.10 (0.72–1.70)		
				1.24 (0.50–3.06)		1.54 (0.83–2.86)		
CYP1A1								
Ambrosone <i>et al.</i> (1995)	216/282	Nonsmokers <29 pack–yrs 29+ pack–yrs		CYP1A1 W/M vs. W/W (ref):				Age, age at menarche, age at first pregnancy, age at menopause, BMI, family history of breast cancer
				1.30 (0.62–2.70)				
				5.22 (1.16–23.56)				
				0.86 (0.24–3.09)				
Ishibe <i>et al.</i> (1998)	466/466	Never Former Current	1.0 (ref) 1.25 (0.93–1.67) 1.44 (0.90–2.32)	MspI WT 1.0 (ref) 1.21 (0.87–1.69) 1.24 (0.75–2.03)	MspI Variants 0.89 (0.54–1.46) 1.28 (0.75–2.20) 7.36 (1.39–39.0)	Exon 7 WT 1.0 (ref) 1.19 (0.86–1.59) 1.32 (0.78–2.22)	Exon 7 Variants 0.66 (0.35–1.26) 1.17 (0.64–2.11) 1.51 (0.55–4.13)	age, menopausal status, HRT use, month of blood return, time and fasting status of DNA collection, BMI, benign breast disease, age at menarche, parity, age at first birth, family history of breast cancer
Li <i>et al.</i> (2004)	688/702	Never Former Current		M1/heterozygote 1.0 (ref) 1.7 (1.1–2.8) 1.1 (0.6–1.8)		WT 1.0 (ref) 1.2 (0.9–1.6) 0.8 (0.6–1.2)		Age, race, sampling fractions
GST								
Ambrosone <i>et al.</i> (1995)	See above	Nonsmokers <29 pack–yrs 29+ pack–yrs		M1–Present 1.0 (ref) 1.0 (ref) 1.0 (ref)		M1–Null 1.09 (0.61–1.98) 0.82 (0.31–2.16) 1.08 (0.43–2.72)		See above
Garcia-Closas <i>et al.</i> (1999)	466/466	Never <20 pack–yrs 20+ pack–yrs		T1–present 1.0 (ref) 1.07 (0.75–1.51) 1.18 (0.84–1.66)		T1–deleted 0.61 (0.35–1.06) 0.81 (0.40–1.64) 1.47 (0.83–2.63)		Age, HRT use, time of blood collection, month of blood return

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NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype					Controlled for	
				M1 Null	M1 Present	T1-Null	T1-Present	P1-Ile/Val or Val/Val		P1-Ile/Ile
Millikan (2000)	688/633	Never Current Former		1.0 (ref) 1.2 (0.7–1.9) 1.2 (0.7–1.8)	1.0 (ref) 0.7 (0.4–1.0) 1.4 (0.9–2.0)	1.0 (ref) 0.3 (0.1–0.9) 1.5 (0.7–3.0)	1.0 (ref) 0.9 (0.6–1.3) 1.2 (0.9–1.7)	1.0 (ref) 0.8 (0.6–1.3) 1.1 (0.8–1.5)	1.0 (ref) 0.7 (0.4–1.2) 1.7 (1.0–2.7)	Age, race, menopausal status, age at first term pregnancy/parity, breastfeeding, family history of breast cancer, biopsy, alcohol
Mitrunen <i>et al.</i> (2001a)	483/482	Never Ever		<i>Premenopausal</i>					Age, age at menarche, age at first term pregnancy, parity, family history of breast cancer, history of benign breast disease	
				M1 Null	M3 A/B B/B	P1 Ile/Val	P1 Val/Val	T1 null		
				1.05 (0.59–1.85)	1.74 (0.90–3.36)	0.74 (0.39–1.39)	0.58 (0.17–1.98)	2.04 (0.90–4.59)		
				0.85 (0.41–1.77)	1.12 (0.43–2.93)	1.01 (0.48–2.16)	1.98 (0.37–10.6)	0.78 (0.24–2.56)		
				<i>Postmenopausal</i>						
		Never Ever		1.72 (1.14–2.58)	0.69 (0.43–1.10)	0.96 (0.64–1.45)	0.52 (0.20–1.37)	1.05 (0.59–1.88)		
				0.65 (0.24–1.82)	1.31 (0.49–3.45)	0.37 (0.13–1.09)	0.12 (0.01–1.58)	1.54 (0.41–5.82)		
Zheng <i>et al.</i> (2002)	338/345	Never Current Former	1.0 (ref) 1.0 (0.6–1.6) 1.1 (0.8–1.6)	M1-A 1.0 (ref) 0.5 (0.2–1.3) 1.2 (0.7–2.3)	M1-B 1.0 (ref) 1.4 (0.3–6.2) 1.0 (0.4–2.7)	M1-null 1.0 (ref) 1.5 (0.8–2.9) 1.1 (0.7–1.8)	T1-positive 1.0 (ref) 1.1 (0.6–1.9) 1.0 (0.7–1.5)	T1-null 1.0 (ref) 1.1 (0.4–2.7) 1.3 (0.6–2.6)	Age, BMI, age at first term pregnancy, breastfeeding, family history, menopausal status	
van der Hel <i>et al.</i> (2003)	See above	Never <15 yrs 15–30 yrs 30+ yrs	See above	M1-Present 1.0 (ref) 1.58 (0.67–3.72) 1.57 (0.82–3.01) 1.51 (0.67–3.40)		M1-Null 1.65 (0.90–3.05) 1.70 (0.76–3.82) 2.40 (1.17–4.92) 2.53 (1.24–5.16)			See above	
van der Hel <i>et al.</i> (2005)	676/669	Never Former Curr <10cpd 10–20 cpd >20 cpd	See above	M1-Present 1.0 (ref) 0.92 (0.42–2.01) 0.94 (0.43–2.05) 1.08 (0.68–1.72) 0.96 (0.60–1.54)		M1-Null 1.17 (0.90–1.52) 1.99 (0.99–3.97) 0.87 (0.52–1.46) 1.13 (0.68–1.86) 1.30 (0.60–2.80)		T1-Present 1.0 (ref) 1.10 (0.57–2.11) 1.03 (0.68–1.55) 0.95 (0.61–1.46) 1.97 (0.99–3.94)	T1-Null 1.43 (1.07–1.89) 2.55 (1.10–5.90) 1.02 (0.57–1.82) 1.29 (0.76–2.20) 1.06 (0.51–2.18)	Age, cohort
NOS3										
Yang <i>et al.</i> (2007)	502/505	Never Ever		GG 1.0 (ref) 1.0 (ref)	GT 0.65 (0.43–0.97) 1.49 (0.96–2.31)	TT 0.78 (0.37–1.63) 2.06 (1.01–4.18)	GT and TT 0.67 (0.45–0.99) 1.59 (1.05–2.41)		Age, race, BMI, family history of breast cancer, age at menarche, parity, age at menopause, HRT use, fruit and vegetable consumption	

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NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype				Controlled for
MPO								
Yang <i>et al.</i> (2007)	See above	Never		GG 1.0 (ref)	GA 0.98 (0.65–1.49)	AA 1.65 (0.62–4.37)	GG and AA 1.04 (0.70–1.55)	See above
		Ever		1.0 (ref)	1.35 (0.85–2.14)	2.84 (0.73–11.1)	1.44 (0.92–2.24)	
MnSOD2								
Mitrunen <i>et al.</i> (2001b)	483/482	Never		Val/Val 1.0 (ref)	Val/Ala 1.6 (1.0–2.5)	Ala/Ala 1.2 (0.7–2.1)	Val/Ala or Ala/Ala 1.5 (1.0–2.3)	Age
		Ever		1.0 (ref)	4.0 (1.4–11.2)	3.2 (0.9–11.0)	3.7 (1.4–9.9)	
Millikan <i>et al.</i> (2004)	2025/ 1812	Never A/P Passive only ≤10 years >10 to 20 >20 years		Val/Val or Val/Ala 1.0 (ref) 1.0 (0.8–1.3) 0.9 (0.7–1.3) 1.0 (0.8–1.4) 1.2 (0.9–1.5)		Ala/Ala 0.8 (0.6–1.2) 1.0 (0.7–1.3) 0.9 (0.6–1.3) 0.8 (0.6–1.4) 1.5 (1.0–2.2)		Age, race, family history, age at menarche, age at first term pregnancy/parity, alcohol
Tamimi <i>et al.</i> (2004)	968/1205	Never Former Current		Val/Val 1.0 (ref) 1.06 (0.74–1.53) 0.41 (0.21–0.81)	Val/Ala 0.79 (0.58–1.09) 0.94 (0.68–1.29) 0.83 (0.52–1.35)	Ala/Ala 0.84 (0.58–1.20) 0.95 (0.65–1.39) 1.41 (0.77–2.60)		Age, menopausal status, postmenopausal hormone use, date of blood draw, time of blood draw, fasting status, BMI weight gain, age at menarche, benign breast disease, family history of breast cancer, age at first birth/parity, age at menopause, alcohol
Gaudet <i>et al.</i> (2005)	1034/ 1084	Never Former Current		Val/Val 1.0 (ref) 1.02 (0.69–1.51) 1.30 (0.81–2.07)		Ala carrier 1.09 (1.10–1.28) 0.97 (0.72–1.31) 1.11 (0.79–1.56)		Age

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NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype			Controlled for	
DNA repair Genes								
Nucleotide Excision Repair Genes								
Mechanic <i>et al.</i> (2006)	2311/ 2022	Never A/P Passive only Former Current	African Americans				Offsets, age, age at menarche, age at first full-term pregnancy/parity composite, family history and alcohol	
			<i>0-1at risk genotype</i>	<i>2-3 at risk genotypes</i>	<i>≥4 at risk genotypes</i>			
			1.0 (ref)	1.0 (ref)	1.0 (ref)			
			0.5 (0.2-1.4)	1.5 (1.0-2.2)	1.6 (0.9-2.9)			
			0.5 (0.2-1.5)	1.8 (1.1-2.9)	2.4 (1.2-4.6)			
			1.2 (0.3-3.9)	0.9 (0.6-1.5)	2.1 (1.0-2.4)			
		Never A/P Passive only Former Current	White					
			<i>0-1at risk genotype</i>	<i>2-3 at risk genotypes</i>	<i>≥4 at risk genotypes</i>			
			1.0 (ref)	1.0 (ref)	1.0 (ref)			
			0.7 (0.4-1.3)	0.9 (0.6-1.3)	1.2 (0.7-2.1)			
			1.0 (0.6-1.7)	1.0 (0.7-1.5)	1.2 (0.7-2.0)			
			0.9 (0.5-1.7)	0.7 (0.4-1.0)	0.9 (0.5-1.5)			
MGMT								
Shen <i>et al.</i> (2005b)	1067/ 1110	Never Ever	Codon 84		Codon 143		Age	
			<i>CC</i>	<i>CT/TT</i>	<i>AA</i>	<i>AG/GG</i>		
			1.0 (ref)	1.1 (0.8-1.4)	1.0 (ref)	1.1 (0.8-1.5)		
			1.0 (0.8-1.2)	1.0 (0.8-1.4)	1.1 (0.9-1.3)	0.9 (0.7-1.1)		
XRCC1								
Duell <i>et al.</i> (2001)	AA: 253/266 White: 386/381	Never Former Current	Codon 399, African Americans		Codon 399, Whites		Age	
			<i>Arg/Gln or Gln/Gln</i>	<i>Arg/Arg</i>	<i>Arg/Gln or Gln/Gln</i>	<i>Arg/Arg</i>		
			1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)		
			1.4 (0.6-3.2)	2.2 (1.3-3.6)	1.0 (0.7-1.6)	1.1 (0.7-1.9)		
			0.4 (0.2-0.9)	1.4 (0.8-2.4)	0.9 (0.5-1.4)	0.9 (0.5-1.6)		
Patel <i>et al.</i> (2005)	502/502	Never Ever	Codon 194		Codon 399		BMI, age at menopause, age at menarche, alcohol, education, parity, age at first live birth, physical activity, history of breast cysts, family history of breast cancer, HRT use	
			<i>Arg/Arg</i>	<i>Arg/Trp or Trp/Trp</i>	<i>Arg/Arg</i>	<i>Arg/Gln</i>		<i>Gln/Gln</i>
			1.0 (ref)	0.78 (0.43-1.40)	1.0 (ref)	0.91 (0.57-1.43)		0.64 (0.33-1.26)
			1.0 (ref)	0.47 (0.24-0.94)	1.0 (ref)	1.06 (0.66-1.72)	2.76 (1.36-5.63)	
Shen <i>et al.</i> (2005a)	1067/ 1110	Never Ever	Did not understand results					

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NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype						Controlled for
Pachkowski <i>et al.</i> (2006)	2077/ 1818	Never A/P Passive only Former Current		Codon 194		Codon 280		Codon 399		Age, race, age at menarche, age at first term pregnancy/parity, family history, alcohol
				<i>Arg/Arg</i>	<i>Any Trp</i>	<i>Arg/Arg</i>	<i>Any His</i>	<i>Arg/Arg</i>	<i>Any Gln</i>	
				1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)	1.0 (ref)	
				1.1 (0.9–1.3)	1.2 (0.7–2.0)	1.0 (0.8–1.2)	2.8 (1.4–5.7)	1.2 (0.9–1.5)	1.2 (0.9–1.3)	
Metsola <i>et al.</i> (2005)	483/482	Never A/P Passive only Ever active	1.0 (ref) 0.78 (0.58–1.06) 0.91 (0.65–1.28)	Codon 280		Codon 399				Age, age at menarche, age at first term pregnancy, parity, history of benign breast disease, family history of breast cancer, waist–hip ratio, alcohol
				<i>Arg/Arg</i>	<i>Arg/His+2His</i>	<i>Arg/Arg</i>	<i>Arg/Gln</i>	<i>Gln/Gln</i>	<i>Arg/Gln+Gln/Gln</i>	
				1.0 (ref)	1.09 (0.6–2.0)	1.0 (ref)	0.8 (0.5–1.3)	0.7 (0.3–1.6)	0.8 (0.5–1.3)	
				1.0 (ref)	1.11 (0.6–2.1)	1.0 (ref)	1.4 (0.8–2.3)	1.6 (0.6–4.2)	1.4 (0.9–2.3)	
XPD										
Terry <i>et al.</i> (2004)	1053/ 1102	Never Former Current		AA		AC		CC		See above
				1.0 (ref)	1.0 (ref)	0.89 (0.67–1.19)	1.56 (1.12–2.16)	0.87 (0.57–1.32)	1.16 (0.75–1.81)	
				1.0 (ref)	1.0 (ref)	1.25 (0.80–1.97)	1.0 (ref)	1.97 (1.02–3.81)	1.0 (ref)	
Metsola <i>et al.</i> (2005)	See above	Never Passive only Active	See above	Lys/Lys	Lys/Gln	Gln/Gln	Lys/Lys+ Lys/Gln	Gln/Gln	See above	
				1.0 (ref)	1.03 (0.63–1.66)	0.78 (0.40–1.49)	1.0 (ref)	0.77 (0.43–1.39)		
				1.0 (ref)	1.35 (0.78–2.34)	0.84 (0.41–1.69)	1.0 (ref)	0.70 (0.38–1.29)		
XPC										
Shore <i>et al.</i> (2008)	612/612	Never Ever		XPC–PAT Wild Type/Heterozygote			XPC–PAT Homozygous variant			Race, age at menarche, ln(BMI), ln(height), family history of breast cancer, parity/age at first birth, history of bilateral oophorectomy
				1.0 (ref)	0.85 (0.62–1.16)	1.02 (0.62–1.67)	1.56 (0.95–2.58)			
IGHMBP2										
Shen <i>et al.</i> (2006)	1067/ 1110	Never Current Former		AA genotype			AG+GG genotypes			Age
				1.0 (ref)	0.2 (0.9–1.7)	0.9 (0.7–1.2)	1.1 (0.9–1.4)	1.1 (0.8–1.5)	1.1 (0.8–1.4)	
				1.0 (ref)	0.2 (0.9–1.7)	0.9 (0.7–1.2)	1.1 (0.9–1.4)	1.1 (0.8–1.5)	1.1 (0.8–1.4)	

Table 2.63. Studies of smoking and breast cancer risk by genetic subtype

NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype				Controlled for
BRCA Carriers								
Brunet <i>et al.</i> (1998)	186/186	Never Ever	1.00(ref) 1.54 (0.34–0.84)					Parity, age at first birth, age at last birth, residence
Ghadirian <i>et al.</i> (2004)	1097/ 1097	Never Ever	1.0 (ref) 1.05 (0.88–1.25)					none
Gronwald <i>et al.</i> (2006)	591/743	Never Ever	1.0 (ref) 1.1 (0.8–1.5)					
Colilla <i>et al.</i> (2006)	176/140	Never Ever	1.0 (ref) 0.63 (0.47–0.87)					
BCFR (2008)	195/302 128/179	Never Current Former	1.0 (ref) 1.67 (1.26–2.22) 2.08 (1.41–3.06)	BRCA1 carriers		BRCA2 carriers		Age, site, parity, alcohol, family history of breast or ovarian cancer
				1.0 (ref) 1.44 (0.96–2.17) 2.02 (1.31–3.10)	1.0 (ref) 2.02 (1.37–2.96) 2.35 (1.25–4.43)			
Ginsburg <i>et al.</i> (2009)	2538/ 2538	Never Ever	1.0 (ref) 1.02 (0.61–1.15)	BRCA1 carriers		BRCA2 carriers		OC use, parity
				1.0 (ref) 1.09 (0.95–1.24)	1.0 (ref) 1.09 (0.95–1.24)			
A–T								
Swift & Lukin (2008)				No RR's; not a case–control				
p53								
Gammon <i>et al.</i> (1999)	378/462	Never Former Current		p53+		p53-		Age, race, education, alcohol, BMI, age at first birth, parity, age at menarche, family history, prior breast biopsy, caloric intake, electric blanket/pad use
				1.00 (ref) 1.66 (1.02–2.70) 1.29 (0.79–2.11)	1.00 (ref) 1.18 (0.77–1.84) 0.66 (0.41–1.06)			
mEH								
de Assis <i>et al.</i> (2002)	267/293	Never Ever		Premenopausal (compared to wild–type)		Postmenopausal		Age, education, age at menarche, age at first pregnancy, BMI, family history of breast cancer, age at menopause
				<i>Exon 3</i> YY: 1.0 (ref) YH/HH: 1.1 (0.5–2.7) YH/HH: 1.5 (0.7–3.3)	<i>Exon 4</i> HH: 1.0 (ref) HA/AA: 0.8 (0.3–2.0) HA/AA: 1.6 (0.7–3.7)	<i>Exon 3</i> YY: 1.0 (ref) YH/HH: 1.1 (0.6–2.2) YH/HH: 0.8 (0.4–1.5)	<i>Exon 4</i> HH: 1.0 (ref) HA/AA: 1.0 (0.5–1.9) HA/AA: 1.0 (0.6–2.0)	

Table 2.63. Studies of smoking and breast cancer risk by genetic subtype

NAT2	Cases/ Controls	Smoking	Study RR	RR by Genotype				Controlled for
AIB1								
Colilla <i>et al.</i> (2006)	176/140	Never Ever	See Above	No 28 allele 1.0 (ref) 0.57 (0.35–0.92)		At least one 28 allele 0.63 (0.40–1.00) 0.31 (0.25–0.58)		Year of birth, parity, height, menopausal status, OC use, Jewish ancestry
Case-only								
Basham <i>et al.</i> (2001)	3821/ 2067	Never <10 p-yrs 10–19 p-yrs 20+ p-yrs		Ile462Val 1.0 (ref) 1.1 (0.7–1.8) 1.6 (1.0–2.7) 0.7 (0.4–1.2)		Thr461Asp 1.0 (ref) 1.5 (1.0–2.2) 1.2 (0.8–2.0) 1.0 (0.6–1.6)		
ER/PR								
Yoo <i>et al.</i> (1997)	1154/ 21714	Never Ever	1.00 (ref) 1.25 (1.06–1.47)	ER+ 1.00 (ref) 1.42 (1.04–1.94)	ER- 1.00 (ref) 1.33 (0.87–2.02)	PR+ (ref) 1.73 (1.22–2.45)	PR- 1.00 (ref) 1.06 (0.73–1.54)	Age, occupation, family history, age at menarche, menstrual regularity, age at menopause, age at first term pregnancy, number of term pregnancies, average months of breast feeding, alcohol