**Supplementary Table 2.** Hazard ratios of breast cancer risk according to blood cholesterol levels in prospective studies

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Source** | **Cholesterol** **parameter** | **Compared cholesterol categories (mmol/L)** | **HR (95% Cl)** | **Number of years of follow-up excluded** | **Adjustment factors** |
| Hiatt et al (1986) [11] | T-C | ­[4.8-5.4[ vs <4.8 | 0.97 (0.82-1.14) | 0  | Ethnicity, education, smoking status, alcohol consumption, BMI, age at menarche, parity, menopausal status |
| [5.4-5.9[ vs <4.8 | 0.89 (0.76-1.05) |
| [5.9-6.6[ vs <4.8 | 0.98 (0.83-1.16) |
| ≥6.6 vs <4.8 | 0.97 (0.82-1.14) |
| [4.8-5.4[ vs <4.8 | 1.04 (0.97-1.12) | 2 |
| [5.4-5.9[ vs <4.8 | 0.64 (0.60-0.69) |
| [5.9-6.6[ vs <4.8 | 0.58(0.54-0.62) |
| ≥6.6 vs <4.8 | 0.69(0.65-0.75) |
| Törnberg et al (1987) [12] | T-C | 1 mmol/L | 0.96 (0.93-1.00) | 2 | Age, distric |
| [5.8-6.9[ vs <5.8 | 0.63 (0.35-1.13)\* | 2 |
| ≥6.9 vs <5.8 | 0.32 (0.08-1.33)\* |
| 1 mmol/L | 0.89 (0.76-1.04)\* | 2 |
| 1 mmol/L | 0.96 (0.91-1.02)† | 2 |
| Knekt et al (1988) [13]  | T-C | [5.9-6.9[ vs <5.9 | 0.97 (0.59-1.59) | 0 | Age, municipality |
| ≥6.9 vs <5.9 | 1.02 (0.62-1.67) |
| ≥5.9 vs <5.9 | 0.87(0.58-1.30) | 0 | Age, municipality, occupation, hematocrit, BMI, blood pressure, parity |
| ≥5.9 vs <5.9 | 1.04(0.46-2.38) | 4 | Age, municipality |
| Vatten et al (1990) [14]  | T-C | [5.9-6.6[ vs <5.9 | 0.93 (0.65-1.32) | 0 | Age, height, BMI |
| [6.6-7.5[ vs <5.9 | 1.08 (0.76-1.54) |
| ≥7.5 vs <5.9 | 0.70 (0.46-1.06) |
| [5.9-6.6[ vs <5.9 | 0.83 (0.54-1.28)\* | 0  |
| [6.6-7.5[ vs <5.9 | 0.99 (0.65-1.52)\* |
| ≥7.5 vs <5.9 | 0.56 (0.33-0.97)\* |
| [5.9-6.6[ vs <5.9 | 1.15 (0.61-2.15)† | 0 |
| [6.6-7.5[ vs <5.9 | 1.26 (0.67-2.34)† |
| ≥7.5 vs <5.9 | 0.92 (0.48-1.77)b |
| [5.9-6.6[ vs <5.9 | 0.70(0.40-1.40)\* | 3 | Age |
| [6.6-7.5[ vs <5.9 | 0.40(0.20-1.00)\* |
| ≥7.5 vs <5.9 | 0.20(0.10-0.50)\* |
| Hoyer et al (1992) [15]  | T-C | Q2+Q3 vs Q1 | 0.80 (0.40-1.80) | 0 | Menopausal status, age at menarche, number of full-term pregnancies, BMI, alcohol and coffee consumption |
| Q4 vs Q1 | 1.00 (0.40-2.20) |
| HDL-C | Q2+Q3 vs Q1 | 0.50 (0.20-1.10) | 0 |
| Q4 vs Q1 | 0.30 (0.10-0.80) |
| LDL-C | Q2+Q3 vs Q1 | 1.30 (0.40-4.50) | 0 |
| Q4 vs Q1 | 1.90 (0.50-6.60) |
| Gaard et al (1994) [16]  | T-C | [5.3-6.0[ vs <5.2 | 0.76 (0.54-1.06) | 1 | Height, BMI, age, age at diagnosis, menopausal status at screening, smoking status |
| [6.0-6.9[ vs <5.2 | 1.04 (0.76-1.43) |
| ≥6.9 vs <5.2 | 0.87 (0.61-1.23) |
| HDL-C | [1.2-1.4[ vs <1.2 | 1.23 (0.89-1.68) | 1 |
| [1.4-1.7[ vs <1.2 | 1.02 (0.73-1.42) |
| ≥1.7 vs <1.2 | 0.96 (0.68-1.34) |
| LDL-C | [3.2-3.9[ vs <3.2  | 0.78 (0.56-1.08) | 1 |
| [3.9-4.7[ vs <3.2 | 0.87 (0.63-1.20) |
| ≥4.7 vs <3.2 | 0.93 (0.67-1.29) |
| Steenland et al (1995) [17]  | T-C | [4.8-5.6[ vs <4.8 | 1.39 (0.72-2.70) | 0 | Age, BMI, smoking status, alcohol consumption, income, recreational physical activity, menopausal status |
| [5.6-6.5[ vs <4.8 | 0.88 (0.45-1.70) |
| ≥6.5 vs <4.8 | 1.52 (0.89-2.58) |
| Tulinius et al (1997) [18] | T-C | 1mmol/L increment | 0.91 (0.84-0.99) | 0 | Age, height, weight, body surface, lean body mass |
| Moorman et al (1998) [22] | HDL-C | 1mmol/L increment | 0.21 (0.05-0.84)\* | 2 | Number of pregnancies, BMI, history of breast cancer in mother or sister, education, smoking status, alcohol consumption, history of benignbreast disease, use of hormones, oral contraceptives, or diuretics,history of radiation treatment to the chest, and history ofchest X-rays as dichotomous variables |
| 1mmol/L increment | 2.15 (0.69-6.70)† | 2 |
| [0.7-0.8[ vs <0.7  | 0.83 (0.31-2.22)\* | 2 |
| [0.8-1.0[ vs <0.7 | 0.86 (0.39-1.90)\* |
| ≥1.0 vs <0.7 | 0.53 (0.20-1.39)\* |
| [0.7-0.8[ vs <0.7  | 0.91 (0.34-2.42)† | 2 |
| [0.8-1.0[ vs <0.7 | 1.68 (0.60-4.68)† |
| ≥1.0 vs <0.7 | 1.70 (0.67-4.33)† |
| Furberg et al (2004) [23]  | HDL-C | [1.2-1.4[ vs <1.2 | 1.13 (0.69-1.86)\* | 0 | Age, county of residence, parity, height, BMI, total serum cholesterol, recreational and occupation physical activity, blood pressure, serum triglycerides, age at first birth, time since last meal, smoking status, dietary energy and fat intakes |
| [1.4-1.6[ vs <1.2 | 1.24 (0.77-1.99)\* |
| ≥1.6 vs <1.2 | 1.44 (0.91-2.30)\* |
| [1.2-1.4[ vs <1.2 | 0.89 (0.69-1.15)b | 0 | Idem + menopausal status at blood draw |
| [1.4-1.6[ vs <1.2 | 0.82 (0.64-1.07)b |
| ≥1.6 vs <1.2 | 0.75 (0.58-0.97)b |
| Eliassen et al (2005) [19]  | T-C | [4.7-5.1[ vs <4.7 | 0.73 (0.48-1.09)\* | 2 | Age, age at menarche, parity, age at first birth, height, BMI, menopausal status, age at menopause, use of postmenopausal hormones, alcohol consumption, smoking status, physical activity |
| [5.1-5.7[ vs <4.7 | 0.82 (0.54-1.24)\* | 2 |
| [5.7-6.2[ vs <4.7 | 0.72 (0.43-1.19)\* |
| ≥6.2 vs <4.7 | 0.94 (0.54-1.64)\* |
| [4.7-5.1[ vs <4.7 | 1.05 (0.92-1.20)† | 2 |
| [5.1-5.7[ vs <4.7 | 1.01 (0.89-1.14)† |
| [5.7-6.2[ vs <4.7 | 0.90 (0.78-1.03)† |
| ≥6.2 vs <4.7 | 1.04 (0.91-1.17)† |
| Inoue et al (2008) [25]  | HDL-C | ≥1.03 vs <1.03 | 1.54 (0.98-2.44) | 0 | Age, study center, smoking status, alcohol consumption (weekly ethanol intake), total serum cholesterol |
| Kucharska-Newton et al (2008) [24] | HDL-C | [1.2-1.4[ vs <1.2 | 0.94 (0.75-1.18) | 0 | Age, ethnicity, age at menarche, BMI, smoking status, reproductive hormone use, age at menopause |
| [1.4-1.7[ vs <1.2 | 1.02 (0.83-1.24) |
| ≥1.7 vs <1.2 | 0.95 (0.66-1.37) |
| 1mmol/L | 1.05 (0.77-1.41) | 0 |
| [1.2-1.4[ vs <1.2 | 0.82 (0.62-1.08)\* | 0 |
| [1.4-1.7[ vs <1.2 | 0.69 (0.53-0.92)\* |
| ≥1.7 vs <1.2 | 0.83 (0.44-1.56)\* |
| [1.2-1.4[ vs <1.2 | 1.01 (0.71-1.44)† | 0 |
| [1.4-1.7[ vs <1.2 | 1.33 (0.99-1.80)† |
| ≥1.7 vs <1.2 | 1.04 (0.64-1.71)† |
| ≥1.3 vs <1.3 | 0.60 (0.38-0.94)\*  | 0 |
| ≥1.3 vs <1.3 | 1.08 (0.77-1.52)† | 0 |
| 1mmol/L | 1.05 (0.59-1.84)\* | 0 |
| 1mmol/L | 1.14 (0.78-1.68)† | 0 |
| ≥1.3 vs <1.3 | 0.75(0.55-1.02) | 5 |
| 1mmol/L | 0,93(0.79-1.11) | 5 |
| Iso et al (2009) [20]  | T-C | [4.1-4.6[ vs <4.1 | 0.66 (0.35-1.21) | 0 | Age, BMI, pack year of smoking, alcohol consumption, hypertension, diabetes, hyperlipidemia medication use, total vegetable intake, coffee intake, study center |
| [4.6-5.2[ vs <4.1 | 1.15 (0.66-2.01) |
| [5.2-5.7[ vs <4.1 | 0.92 (0.53-1.58) |
| [5.7-6.2[ vs <4.1 | 0.91 (0.51-1.62) |
| ≥6.2 vs <4.1 | 0.92 (0.51-1.65) |
| 1mmol/L | 1.00 (0.84-1.19) | 0 |
| Kabat et al (2009) [26]  | HDL-C | [1. 3-1.6[ vs <1.3 | 0.85 (0.58-1.25)† | 2 | Age, education, ethnicity, BMI, oral contraceptive use, hormone therapy, age at menarche, age at first birth, age at menopause, alcohol consumption, family history of breast cancer, history of breast biopsy, physical activity, energy intake, smoking status, randomization status (for women in the clinical trial) in the hormone therapy, all other components of the metabolic syndrome |
| ≥1.6 vs <1.3 | 0.80 (0.53-1.21)† |
| Agnoli et al (2010) [27]  | HDL-C | ≥1.3 vs <1.3 | 0.63 (0.43-0.91)† | 0 | Age at menarche, years from menopause, number of full-term pregnancies, age at first birth, oral contraceptive use, past hormone therapy use, education, family history of breast cancer, breastfeeding, smoking status, alcohol consumption. BMI was not related to breast cancer risk in this study |
| Bjorge et al (2010) [33] | T-C | [4.1-4.6[ vs <4.1 | 0.97 (0.84-1.13) | 1 | Year of birth, age at measurement, smoking, and quintile levels of BMI |
| [4.6-5.1[ vs <4.1 | 0.95 (0.82-1.09) |
| [5.1-6.2[ vs <4.1 | 0.87 (0.76-1.01) |
| ≥6.2 vs <4.1 | 0.74 (0.64-0.86) |
| [4.1-4.6[ vs <4.1 | 1.06 (0.85-1.32)§ | 1 |
| [4.6-5.1[ vs <4.1 | 0.86 (0.68-1.09)§ |
| [5.1-6.2[ vs <4.1 | 0.93 (0.73-1.19)§ |
| ≥6.2 vs <4.1 | 0.67 (0.50-0.89)§ |
| [4.1-4.6[ vs <4.1 | 0.99 (0.76-1.30)|| | 1 |
| [4.6-5.1[ vs <4.1 | 1.13 (0.87-1.48)|| |
| [5.1-6.2[ vs <4.1 | 0.84 (0.63-1.11)|| |
| ≥6.2 vs <4.1 | 0.93 (0.70-1.24)|| |
| [4.1-4.6[ vs <4.1 | 0.80 (0.61-1.05)¶ | 1 |
| [4.6-5.1[ vs <4.1 | 0.81 (0.63-1.04)¶ |
| [5.1-6.2[ vs <4.1 | 0.78 (0.61-1.00)¶ |
| ≥6.2 vs <4.1 | 0.64 (0.50-0.81)¶ |
| 1mmol/L | 0.92 (0.83-1.02)§ | 1 |
| 1mmol/L | 0.98 (0.88-1.08)|| | 1 |
| 1mmol/L | 0.87 (0.80-0.93)¶ | 1 |
| Fagherazzi et al (2010) [21]  | T-C | ≥6.6 vs <6.6 | 0.99 (0.85-1.15) | 1 | Alcohol consumption, total dietary fat and energy intake, ever use of oral contraceptive, age at menarche, age at menopause, number of children, age at first pregnancy, family history of breast cancer, diabetes, education, current use of hormone therapy for menopause, personal history of benign breast disease |
| ≥6.6 vs <6.6 | 0.92 (0.66-1.27)\* | 1 |
| ≥6.6 vs <6.6 | 1.00 (0.85-1.19)† | 1 |
| Kitahara et al (2011) [5] | T-C | [4.1-4.6[ vs <4.1 | 1.08 (0.98-1.20) | 0 | Smoking status, alcohol consumption, BMI, fasting glycaemia, hypertension, physical activity |
| [4.7-5.1[ vs <4.1 | 1.12 (1.01-1.24) |
| [5.2-6.2[ vs <4.1 | 1.11 (1.01-1.23) |
| ≥6.2 vs <4.1 | 1.17 (1.03-1.33) |
| 1mmol/L | 1.04 (1.00-1.08) | 0 |
| ≥6.2 vs <4.1 | 1.17 (0.94-1.46)\* | 0 |
| ≥6.2 vs <4.1 | 1.14 (0.96-1.35)† | 0 |
| ≥6.2 vs <4.1 | 1.21 (1.04-1.41) | 5 |
| Bosco et al (2012) [6]  | HDL-C | ≥1.3 vs <1.3 | 1.03 (0.90-1.17) | 0 | Reproductive history, female hormone use, oral contraceptive use, age, education, BMI at 18, physical activity, obesity, diabetes and hypertension |
| ≥1.3 vs <1.3 | 1.03 (0.84-1.27)\* | 0 |
| ≥1.3 vs <1.3 | 1.13 (0.92-1.38)† | 0 |
| Osaki et al (2012) [8] | HDL-C | ≥1.3 vs <1.3 | 0.79 (0.48-1.28) | 0 | Age, smoking status, alcohol consumption (heavy drinking), high blood pressure, high blood triglycerides, high glycaemia, BMI |
| Melvin et al (2012) [7]  | T-C | [4.8-5.5[ vs <4.8 | 1.13 (1.05-1.22) | 0 | Age, smoking status, alcohol consumption (heavy drinking), high blood pressure, high blood triglycerides, high glycaemia, BMI |
| [5.5-6.3[ vs <4.8 | 1.06 (0.98-1.14) |
| ≥6.3 vs <4.8 | 0.97 (0.89-1.05) |
| HDL-C | [1.5-1.7[ vs <1.5 | 0.95 (0.79-1.15) | 0 |
| [1.7-2.0[ vs <1.5 | 1.02 (0.84-1.25) |
| ≥2.0 vs <1.5 | 1.05 (0.86-1.29) |
| LDL-C  | [2.7-3.4[ vs <2.7 | 1.10 (0.91-1.32) | 0 |
| [3.4-4.1[ vs <2.7 | 1.00 (0.82-1.22) |
| ≥4.1 vs <2.7 | 0.92 (0.75-1.13) |
| ApoA1 | [1.4-1.5[ vs <1.4 | 0.99 (0.82-1.19) | 0 | Age, glycaemia, blood triglycerides, parity, fasting status, socio-economic status, T-C |
| [1.5-1.7[ vs <1.4 | 0.96 (0.80-1.19) |
| ≥1.7 vs <1.4 | 1.08 (0.90-1.29) |
| ApoB | [0.9-1.1[ vs <0.9 | 1.09 (0.91-1.32) | 0 |
| [1.1-1.4[ vs <0.9 | 1.03 (0.95-1.25) |
| ≥1.4 vs <0.9  | 0.95 (0.76-1.17) |
| Strohmaier et al (2013) [10]  | T-C | [4.1-4.6[ vs <4.1 | 0.93 (0.81-1.07) | 0 | Age at blood draw, BMI, smoking status |
| [4.6-5.1[ vs <4.1 | 0.91 (0.79-1.04) |
| [5.1-6.2[ vs <4.1 | 0.84 (0.73-0.96) |
| ≥6.2 vs <4.1  | 0.70 (0.61-0.81) |
| 1mmol/L | 0.90 (0.86-0.93) | 0 |
| ≥6.2 vs <4.1  | 0.72(0.62-0.83) | 5 |
| His et al (2014) [9] | T-C | [5.2-5.8[ vs <5.2 | 0.84 (0.52-1.35) | 2 | Age, intervention group of the SU.VI.MAX antioxidant trial, number of dietary records, alcohol consumption, physical activity, smoking status, education, height, BMI, family history of breast cancer, baseline menopausal status, use of hormonal treatment for menopause at baseline, number of biological children, use of blood-glucose lowering drug, lipid-lowering drugs, triglyceride-lowering drugs and antihypertensive drugs, energy intake, glycaemia, blood triglycerides |
| [5.8-6.5[ vs <5.2 | 0.99 (0.63-1.58) |
| ≥6.5 vs <5.2 | 0.65 (0.39-1.10) |
| 1mmol/L | 0.83 (0.69-0.99) | 2 |
| HDL-C  | [1.7-1.9[ vs <1.7 | 1.10 (0.70-1.71) | 2 |
| [1.9-2.1[ vs <1.7 | 0.81 (0.50-1.30) |
| ≥2.1 vs <1.7 | 0.60 (0.36-1.01) |
| 1mmol/L | 0.48 (0.28-0.83) | 2 |
| ≥2.1 vs <1.7 | 0.44 (0.14-1.36)\* | 2 |
| ≥2.1 vs <1.7 | 0.66 (0.36-1.18)† | 2 |
| 1mmol/L  | 0.31 (0.10-1.00)\* | 2 |
| 1mmol/L | 0.53 (0.28-1.01)† | 2 |
| LDL-C  | [3.1-3.6[ vs <3.1 | 0.75 (0.46-1.22) | 2 |
| [3.6-4.1[ vs <3.1 | 1.11 (0.71-1.74) |
| ≥4.1 vs <3.1 | 0.65 (0.39-1.09) |
| 1mmol/L | 0.83 (0.66-1.05) | 2 |
| ApoA1 | [3.9-4.3[ vs <3.9 | 0.85 (0.54-1.34) | 2 |
| [4.3-4.8[ vs <3.9 | 1.01 (0.65-1.58) |
| ≥4.8 vs <3.9 | 0.55 (0.33-0.92) |
| 1mmol/L | 0.36 (0.18-0.73) | 2 |
| 1mmol/L  | 0.56 (0.13-2.34)\* | 2 |
| 1mmol/L | 0.31 (0.14-0.68)† | 2 |
| ApoB | [2.3-2.6[ vs <2.3 | 0.87 (0.54-1.41) | 2 |
| [2.6-3.1[ vs <2.3 | 1.02 (0.64-1.63) |
| ≥3.1 vs <2.3 | 0.73 (0.44-1.23) |
| 1mmol/L | 0.71 (0.33-1.54) | 2 |

Studies are chronologically ordered.

CI: confidence interval, HDL-C: High density lipoprotein cholesterol, HR: hazard ratio, LDL-C: Low density lipoprotein cholesterol, T-C: Total Cholesterol

\*In pre-menopausal women

†In post-menopausal women

§ In women of <50 years, || in women of 50-60 years, ¶ in women of ≥60 years