General Risk Factors and Gene-Environmental Interaction for Breast Cancer in Korea

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Trend in Major Cancer Mortality Rates

Age-standardized rate per 100,000

Male

Female

Date Source: Annual Report of Causes of Death, Korea National Statistical Office
Age-standardized rates on the 2000 Korea registration population
<table>
<thead>
<tr>
<th>Country</th>
<th>% Change 1985-87 to 1995-97</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republic of Korea</td>
<td>36.1</td>
</tr>
<tr>
<td>China: rural areas</td>
<td>25.8</td>
</tr>
<tr>
<td>Japan</td>
<td>15.0</td>
</tr>
<tr>
<td>Ukraine</td>
<td>12.4</td>
</tr>
<tr>
<td>Mauritius</td>
<td>9.4</td>
</tr>
<tr>
<td>Estonia</td>
<td>7.9</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>5.3</td>
</tr>
<tr>
<td>China: urban areas</td>
<td>4.3</td>
</tr>
<tr>
<td>Romania</td>
<td>3.7</td>
</tr>
<tr>
<td>Finland</td>
<td>3.7</td>
</tr>
<tr>
<td>Republic of Moldova</td>
<td>3.7</td>
</tr>
<tr>
<td>Latvia</td>
<td>3.7</td>
</tr>
<tr>
<td>Argentina</td>
<td>3.7</td>
</tr>
<tr>
<td>Norway</td>
<td>3.7</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>3.7</td>
</tr>
<tr>
<td>Belarus</td>
<td>3.7</td>
</tr>
<tr>
<td>France</td>
<td>3.7</td>
</tr>
<tr>
<td>Israel</td>
<td>3.7</td>
</tr>
<tr>
<td>Croatia</td>
<td>3.7</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3.7</td>
</tr>
<tr>
<td>Hungary</td>
<td>3.7</td>
</tr>
<tr>
<td>Spain</td>
<td>3.7</td>
</tr>
<tr>
<td>New Zealand</td>
<td>3.7</td>
</tr>
<tr>
<td>Germany</td>
<td>3.7</td>
</tr>
<tr>
<td>Lithuania</td>
<td>3.7</td>
</tr>
<tr>
<td>Australia</td>
<td>3.7</td>
</tr>
<tr>
<td>Portugal</td>
<td>3.7</td>
</tr>
<tr>
<td>Italy</td>
<td>3.7</td>
</tr>
<tr>
<td>Slovenia</td>
<td>3.7</td>
</tr>
<tr>
<td>United States of America</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Source: WHO Mortality database
http://www-depdb.iarc.fr/

Change in Breast Cancer Mortality
Ages 25-49, % Change during 1985-87 to 1995-97

Bray et al. Breast Cancer Res 2004
Trend of Age-standardized Incidence Rate by Site
Female, 1999-2005, Korea
Health and Welfare Statistics
Republic of Korea

population: 49 M (south) (18th rank in the world)
23 M (north) as of 2007

life expectancy: 75.7 yrs (M)
82.4 yrs (F)

aging (65+): 7.2% (2000)
14.4% (2019)
20.0% (2026)

health insurance: universal coverage

per capita GNI: USD 20,000 (2007)
Selected Food Intake in Korea (1969-2005)

Lifestyle Changes in Korea

- **mean age at first marriage**

- **total fertility rate**

- **age at menarche** *

- **total calorie supply (per capita per day)**

  * Cho et al. 1999
Stage Frequency of Breast Cancer

Source: Korea Central Cancer Registry, Korean Breast Cancer Society
## Screening rates, All Combined, Korea

<table>
<thead>
<tr>
<th>Cancers</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomach</td>
<td>39.2</td>
<td>39.4</td>
<td>43.3</td>
<td>45.6</td>
</tr>
<tr>
<td>Liver</td>
<td>20.0</td>
<td>16.3</td>
<td>16.5</td>
<td>22.7</td>
</tr>
<tr>
<td>Colon</td>
<td>19.9</td>
<td>25.4</td>
<td>29.4</td>
<td>34.1</td>
</tr>
<tr>
<td>Breast</td>
<td>33.2</td>
<td>38.4</td>
<td>40.6</td>
<td>45.8</td>
</tr>
<tr>
<td>U. cervix</td>
<td>58.3</td>
<td>38.4</td>
<td>54.9</td>
<td>57.0</td>
</tr>
</tbody>
</table>

Unit: %

Source: National Cancer Center. Nationwide Survey for Health Screening Performance Rate, 2004~2007

Note: Cancer screening performance rate by any programs in a given year under the screening guideline recommended by the National Cancer Center and the Ministry of Health & Welfare.
Five Year Survival of Cancer Sites of National Screening Program

Stomach
- '93-'95: 43.0
- '96-'00: 46.9
- '01-'05: 57.0

Liver
- '93-'95: 9.9
- '96-'00: 12.9
- '01-'05: 18.8

Colorectum
- '93-'95: 55.3
- '96-'00: 59.0
- '01-'05: 66.7

Stomach
- '93-'95: 42.6
- '96-'00: 46.0
- '01-'05: 55.1

Liver
- '93-'95: 13.6
- '96-'00: 14.2
- '01-'05: 19.0

Colorectum
- '93-'95: 54.2
- '96-'00: 56.8
- '01-'05: 62.4

Breast
- '93-'95: 78.0
- '96-'00: 83.2
- '01-'05: 87.3

Cervix uteri
- '93-'95: 77.5
- '96-'00: 80.0
- '01-'05: 81.1
Projection of Breast Cancer Mortality
Korea, all ages, 2005-2020

FEMALE BREAST CANCER

Mortality rates, per a hundred thousand

Source: National Statistical Office 2002
--- based on Poisson regression model
Economic Burden of Cancer Korea, 2005

Total: 14 billion US$ (1.7% of GDP)

Are There Any Differences in Breast Cancer Risk Factors of Korean Women?
Cases: Histologically confirmed incident cases
Controls: No cancer nor systemic diseases

Direct interview with questionnaire
Blood samples

29% of total breast cancer patients of Korea

Large-scale, Multi-center Hospital Based Case-Control Study in Korea

<Seoul National University Hospital>  <Asan Medical Center>
Number of breast cancer cases and controls, 1993-2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-2003</td>
<td>2,076</td>
<td>726</td>
</tr>
<tr>
<td>2004-2006</td>
<td>1,728</td>
<td>665</td>
</tr>
<tr>
<td>Total</td>
<td>3,804</td>
<td>1,391</td>
</tr>
</tbody>
</table>
Age at Menarche and Menopause

Case-control study, Korea, 1997-2003

* Adjusted for age, hospital, family history of breast cancer, BMI
† Adjusted for age, hospital, family history of breast cancer, BMI, age at menarche

Reproductive Factors
Case-control study, Korea, 1997-2003

Adjusted for age, hospital, family history of breast cancer, BMI, menopausal status, age at menarche

Breast Feeding
Case-control study, Korea, 1997-2003

Odds Ratio

Adjusted for age, hospital, family history of breast cancer, BMI, menopausal status, age at menarche, number of live-birth, age at full-term pregnancy

Lifetime Exposure to Estrogen

*Korean*

(Kim et al. 2004)

\[ P \text{ trend}=0.05 \]
Height and Breast Cancer
Korea, 1997-2003

P for interaction between pre- and postmenopausal women = 0.02
adjusted for age, hospital, family history of breast cancer, age at menarche, age at first full-term pregnancy, number of full-term pregnancy, history of hormone replacement therapy

Kim et al. presented in Asian Pacific Cancer Conference. Sep 2005
Mean Weight at Late Teens and Breast Cancer
Korea, 1997-2003

Birth between 1950-1969

<table>
<thead>
<tr>
<th>Birth Weight (kg)</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;48</td>
<td>1</td>
</tr>
<tr>
<td>48-53</td>
<td>1.25</td>
</tr>
<tr>
<td>≥54</td>
<td>0.5</td>
</tr>
</tbody>
</table>

\[ p \text{ trend} = 0.12 \]

Birth after 1970

<table>
<thead>
<tr>
<th>Birth Weight (kg)</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;48</td>
<td>1</td>
</tr>
<tr>
<td>48-53</td>
<td>0.89</td>
</tr>
<tr>
<td>≥54</td>
<td>0.49</td>
</tr>
</tbody>
</table>

\[ p \text{ trend} = 0.02 \]

adjusted for age, hospital, family history of breast cancer, age at menarche, age at first full-term pregnancy, number of full-term pregnancy, history of hormone replacement therapy

Kim et al. presented in AACR 2006
Body Mass Index and Breast Cancer
Korea, 2004-2005

OR  Premenopausal

1
1
1.22
1.34

18.5-22.9
23.0-24.9
≥25.0
kg/m²

Postmenopausal

1
1
1.35
1.49

18.5-22.9
23.0-24.9
≥25.0
kg/m²

p trend = 0.06
p trend = 0.05

adjusted for age, hospital, family history of breast cancer, age at menarche, age at first full-term pregnancy, number of full-term pregnancy, history of hormone replacement therapy

Kim et al. Cancer Epidemiol Biomarkers Prev 2009
Risk and Protective Factors of Breast Cancer in Korean Women

- **established**
  - early menarche
  - late menopause
  - nulli-parity
  - later FFTP
  - family history
  - obesity (postmenopausal)
  - alcohol drinking
  - breast feeding
  - HRT

- **probable**
  - smoking
  - physical activity
  - NSAID use
  - oral contraceptives
  - ionizing radiation

References:
- Yoo et al. *CCC* 1993
- Choi et al. *BMC Cancer* 2005
Life-time Risk of Breast Cancer

Factors:
- Early menarche
- Late menopause
- Over-nutrition in childhood
- Nulli-parity
- Late marriage
- Late FTP
- No lactation
- HRT
- Genetic susceptibility
- Physical exercise
- Postmenopausal obesity
- Estrogen-augmented-by-Progesterone
Comparison of Established Risk Factors of Breast Cancer to western women

- Western women
  - early menarche
  - late menopause
  - nulli-parity
  - later FFTP
  - family history
  - obesity (postmenopausal)
  - alcohol drinking
  - breast feeding
  - HRT

- Korean women
  - early menarche (weak)
  - postmenopausal obesity (moderate)
  - breast feeding (strong)
  - HRT (weak)
Dietary Factors May Prevent Breast Cancer

How Strong Is The Evidence?

Dietary Factors May Cause Breast Cancer
Ecologic Correlation Study between Nutrients Intake and Breast Cancer Mortality in Korea

<table>
<thead>
<tr>
<th>Nutrients/capita/day</th>
<th>lag (yrs)</th>
<th>r</th>
<th>lag (yrs)</th>
<th>r</th>
<th>lag (yrs)</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein, animal source (%)</td>
<td>12</td>
<td>0.83</td>
<td>11</td>
<td>0.74</td>
<td>10</td>
<td>0.77</td>
</tr>
<tr>
<td>Total lipid (g)</td>
<td>12</td>
<td>0.58</td>
<td>11</td>
<td>0.63</td>
<td>10</td>
<td>0.64</td>
</tr>
<tr>
<td>Total carbohydrate (g)</td>
<td>12</td>
<td>-0.70</td>
<td>11</td>
<td>-0.63</td>
<td>10</td>
<td>-0.37</td>
</tr>
<tr>
<td>Energy from cereal (%)</td>
<td>12</td>
<td>-0.77</td>
<td>11</td>
<td>-0.53</td>
<td>10</td>
<td>-0.74</td>
</tr>
</tbody>
</table>

Yoo et al. Seoul J Med 1993
### Average Intake of Nutrients

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Breast Cancer</th>
<th>Control</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>2266 ± 553.5</td>
<td>2119 ± 581.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>100 ± 32.5</td>
<td>93 ± 32.4</td>
<td>0.002</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>66 ± 27.3</td>
<td>60 ± 25.9</td>
<td>0.001</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>316 ± 62.4</td>
<td>300 ± 74.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Ca (mg)</td>
<td>713 ± 227.4</td>
<td>744 ± 303.1</td>
<td>0.093</td>
</tr>
<tr>
<td>P (mg)</td>
<td>1504 ± 424.6</td>
<td>1427 ± 464.2</td>
<td>0.010</td>
</tr>
<tr>
<td>Fe (mg)</td>
<td>16 ± 4.6</td>
<td>16 ± 5.8</td>
<td>0.198</td>
</tr>
<tr>
<td>Na (mg)</td>
<td>9864 ± 3213</td>
<td>9107 ± 3752</td>
<td>0.001</td>
</tr>
<tr>
<td>K (mg)</td>
<td>4061 ± 1085</td>
<td>3788 ± 1322</td>
<td>0.001</td>
</tr>
<tr>
<td>Vitamin A (RE)</td>
<td>1096 ± 442.9</td>
<td>955 ± 483.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Vitamin B1 (mg)</td>
<td>1.76 ± 0.54</td>
<td>1.50 ± 0.58</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Vitamin B2 (mg)</td>
<td>1.74 ± 0.55</td>
<td>1.65 ± 0.58</td>
<td>0.038</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>1.26 ± 0.46</td>
<td>1.14 ± 0.49</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td>22 ± 7.2</td>
<td>20 ± 6.95</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>201 ± 72.6</td>
<td>168 ± 105.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Vitamin E (TE)</td>
<td>11.9 ± 5.3</td>
<td>9.9 ± 5.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Folate (ug)</td>
<td>108 ± 38.9</td>
<td>111 ± 62.0</td>
<td>0.430</td>
</tr>
<tr>
<td>Zn (mg)</td>
<td>6.59 ± 1.23</td>
<td>6.08 ± 1.38</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
HDL cholesterol and breast cancer
Case-control study, Korea, 2004-2005

Kim et al. Cancer Epidemiol Biomarkers Prev 2009

Adjusted for age, family history of breast cancer, BMI, age at menarche, age at full-term pregnancy, and total cholesterol
HDL, TG and breast cancer by ERPR
Case-control study, Korea, 2004-2005

Odds Ratio

Adjusted for age, family history of breast cancer, menopausal status, BMI, age at menarche, age at full-term pregnancy and total cholesterol

Kim et al. Cancer Epidemiol Biomarkers Prev 2009
Age-specific Incidence Rates of Major Sites

Female, 2003~2005

(A) Incidence trends of female invasive breast cancer and CIS by year of diagnosis

(B) Age-specific incidence rates of female invasive breast cancer by time period of diagnosis

# ER/PR Status in US by ethnic group

Unit: %

<table>
<thead>
<tr>
<th>Ethnic Groups</th>
<th>ER+PR+</th>
<th>ER+PR-</th>
<th>ER-PR+</th>
<th>ER-PR-</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>63.9</td>
<td>12.8</td>
<td>3.6</td>
<td>19.8</td>
</tr>
<tr>
<td>Blacks</td>
<td>48.3</td>
<td>11.8</td>
<td>5.1</td>
<td>34.8</td>
</tr>
<tr>
<td>Hispanic</td>
<td>56.7</td>
<td>12.0</td>
<td>4.6</td>
<td>26.7</td>
</tr>
<tr>
<td>Japanese</td>
<td>65.6</td>
<td>12.5</td>
<td>4.8</td>
<td>17.1</td>
</tr>
<tr>
<td>Chinese</td>
<td>60.6</td>
<td>11.7</td>
<td>5.1</td>
<td>22.6</td>
</tr>
<tr>
<td>Korean*</td>
<td>46.5</td>
<td>12.8</td>
<td>4.7</td>
<td>36.1</td>
</tr>
<tr>
<td>Filipino</td>
<td>60.2</td>
<td>11.6</td>
<td>4.9</td>
<td>23.3</td>
</tr>
</tbody>
</table>

Fig. Age frequency density plot

Figure from Anderson et al. JCO 2001;19:18-27
## ER/PR Status

**28,210 Korea Breast Cancer Society, 1992-2006**

<table>
<thead>
<tr>
<th>ER/PR</th>
<th>ER+</th>
<th>ER-</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR+</td>
<td>46.2%</td>
<td>7.3%</td>
<td>53.5%</td>
</tr>
<tr>
<td>PR-</td>
<td>12.5%</td>
<td>34.0%</td>
<td>46.5%</td>
</tr>
<tr>
<td>Total</td>
<td>58.7%</td>
<td>41.3%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Fig. Age frequency density plot

Kim et al. presented in AACR 2009
Are There Any Differences in Genetic Polymorphisms of Breast Cancer in Korea?
SNP-SNP interaction in a gene

GSTT1-GSTM1 interaction in GST gene

N of the null genotypes

No null
One null
Two null

OR

Park et al. *Pharmacogenetics* 2001
Interaction of Parity and GSTM1/T1

Case-control Study, Premenopausal

**GSTM1**

- FFT P<30: 1.0
- FFT P>30: 6.8
- GSTM1 (+): 1.6
- GSTM1 (-): 3.1

P_{interaction} < 0.01

**GSTT1**

- FFT P<30: 1.0
- FFT P>30: 12.6
- GSTT1 (+): 1.4
- GSTT1 (-): 2.9

P_{interaction} < 0.01

*FFTP : age at first full-term pregnancy

Park et al. Breast Cancer Res Tr 2003
Gene-Gene interaction

GSTM1, GSTT1 & COMT interactions

Park et al. *Breast Cancer Res Tr* 2004
Interaction between CYP2E1 Genotypes and Alcohol Consumption for Breast Cancer

<table>
<thead>
<tr>
<th>Alcohol consumption</th>
<th>CYP2E1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>c1/c1</td>
</tr>
<tr>
<td>&lt; 1/month</td>
<td>1.0</td>
</tr>
<tr>
<td>≥ 1/month</td>
<td>1.1 (0.70-1.80)</td>
</tr>
</tbody>
</table>

†p for interaction=0.043

Choi et al. Pharmacogenetics, 2003
Interaction between CYP19 Genotypes and Alcohol Consumption for Breast Cancer

<table>
<thead>
<tr>
<th>Alcohol consumption</th>
<th>CYP19</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arg/Arg</td>
<td>Arg/Cys or Cys/Cys</td>
</tr>
<tr>
<td></td>
<td>[No. cases/controls]</td>
<td>[No. cases/controls]</td>
</tr>
<tr>
<td>&lt; 1/month</td>
<td>1.0 (reference)(^a)</td>
<td>1.2 (0.8-1.9)</td>
</tr>
<tr>
<td></td>
<td>[111/134]</td>
<td>[97/95]</td>
</tr>
<tr>
<td>≥ 1/month</td>
<td>1.1 (0.7-1.9)</td>
<td>3.3 (1.7-6.5) (^b)</td>
</tr>
<tr>
<td></td>
<td>[39/42]</td>
<td>[41/17]</td>
</tr>
</tbody>
</table>

\(^a\) Odds ratios were adjusted for age, education, body-mass index, family history of breast cancer, age at first full-term pregnancy, and duration of breast feeding.

\(^b\) \(P\) for interaction=0.044.

Lee et al. Brit J Cancer 2003
## DNA Repair Genes

<table>
<thead>
<tr>
<th>category</th>
<th>genes</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct repair</td>
<td>AGT (<em>MGMT</em>)</td>
</tr>
<tr>
<td>BER (base excision repair)</td>
<td>XRCC1, hOGG1, LIG4, APE, TDG, UDG</td>
</tr>
<tr>
<td>NER (nucleotide excision repair)</td>
<td>ERCC2/4, ERCC1, ERCC5, XPC</td>
</tr>
<tr>
<td>DSBR (double-strand break repair)</td>
<td>XRCC3, ATM, XRCC2, XRCC4, XRCC6, LIG4, RAD51/52</td>
</tr>
<tr>
<td>mismatch repair</td>
<td>hPMS1/2, hMLH1, hMSH2/3, hMSH6</td>
</tr>
</tbody>
</table>
### Interaction between ATM Diplootype and Folate Intake in Breast Cancer Risk

<table>
<thead>
<tr>
<th>Folate intake</th>
<th>ATM diplotype (^a,b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[ATTGT:ATTGT]</td>
</tr>
<tr>
<td>≥111 µg/day</td>
<td>1.0 (ref.)</td>
</tr>
<tr>
<td>&lt;111 µg/day</td>
<td>0.8 (0.3-1.9)</td>
</tr>
</tbody>
</table>

\(^a\)Composed of five polymorphic sites: -5144A>T, IVS21+1049T>C, IVS3355T>C, IVS34+60G>A, and 3393T>G

\(^b\)Odds ratios adjusted for age, education, body-mass index, family history of breast cancer, age at first full-term pregnancy, and duration of breast feeding

Lee et al. Cancer Epidemiol Biomarkers Prev 2005
Disease Free Survival of Breast Cancer by SULT1E1 genotypes IVS4-1653 T>C

**ER (+)**

- TC/CC vs. TT, HR=3.3 (95% CI=1.21-9.07)
- p=0.026 by Log-Rank test

**ER (-)**

- TC/CC vs. TT, HR=1.8 (95% CI=0.21-15.69)
- p=0.687 by Log-Rank test

Choi et al. Cancer Epidemiol Biomarkers Prev 2005
CASP8 polymorphisms, estrogen and progesterone receptor status, and breast cancer risk

- **Study size**
  - Enrolled from 2001-2005
  - 1,599 cases and 1,536 controls

- **Role of CASP8**
  - Location (band 2q33-34) has been known to be involved in tumorigenesis with loss of heterogeneity (LOH) in a number of human cancers

- **Results**
  - 5’-UTR T allele and breast cancer risk was prominent in ER(+) and PR(+) pre-menopausal women, whereas the association was found prominent in ER(−) or PR(−) cases among post-menopausal women.

Gene-Pathological marker interaction

[CASP8 - estrogen and progesterone receptor] for breast cancer risk

## Genome Epidemiologic Studies on Breast Cancer at Seoul National University (since 2000)

<table>
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<tr>
<th>Genes/Factors</th>
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<td>GST M1/T1 &amp; alcohol</td>
<td>Pharmacogenetics (2000)</td>
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<td>COMT</td>
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<td>hOgg1</td>
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<td>TGF-β1 &amp; TNF-β</td>
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<td>SULT1A1 &amp; SULT1E1</td>
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<td>IL-1β &amp; IL-1RN</td>
<td>Breast Cancer Res Tr (2006)</td>
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<td>eNOS, hormone receptor</td>
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<td>Innate immunity genes</td>
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<td>CASP8</td>
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<td>XRCC3 Thr241Met</td>
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<tr>
<td>Five SNiPs</td>
<td>CEBP (2008)</td>
</tr>
</tbody>
</table>

Breast Cancer Association Consortium
How much is explained about breast cancer?

- Environmental: 45-50%
- Inherited: 5~10% (?)
- Unknown
KOJACH: KOrea / JApAn / CHina

Workshop of KOJACH-I, II Cooperative Studies on Cancer
Risk and Protective Factors for Breast and Colorectal Cancer

Beijing Guangxi Hotel, Beijing, China October 10th, 2008

Supported by Grant-in-Aid for Scientific Research on Special Priority Area, MEXT, Japan, 2000-2009

General information of KOJACH-I, II cooperative studies
Chairperson: Yoon-OK Ahn (Korea)
K Tajima

Progress report of KOJACH Study

KOJACH-I Study
Chairperson: K-Y Yoo (Korea), C-M Gao (China)
T Kawase & K Matsuo
D-H Kim & Y-O Ahn
Z-Y Zhou & J Cao

KOJACH-II Study
Chairperson: H Tanaka (Japan), J Cao (China)
K Matsuo & H Tanaka
S-K Park, Y-J Kim & K-Y Yoo
J-H Ding & C-M Gao

Business Meeting
Chairperson: K Tajima (Japan)
Achievement in Breast Cancer Research
SNUMC Group, 2006-2009

[ Breast Cancer Statistics ]


Achievement in Breast Cancer Research
SNUMC Group, 2006-2009

[Sero-Epidemiological C-C Study]


Achievement in Breast Cancer Research
SNUMC Group, 2006-2009

[Molecular Epidemiology]

Lee et al. Genetic polymorphisms of interleukin-1 beta (IL-1B) and IL-1 receptor antagonist (IL-1RN) and breast cancer risk in Korean women. Breast Cancer Res Tr 2006;96(2):197-202 【IF=4.671】


Choi et al. Genetic polymorphisms of eNOS, hormone receptor status, and survival of breast cancer. Breast Cancer Res Tr 2006;100:213-8 【IF=4.671】


Lee et al. Genetic polymorphisms of NOS3 are associated with the risk of invasive breast cancer with lymph node involvement. Breast Cancer Res Tr 2007;106:433-8 【IF=4.671】


Achievement in Breast Cancer Research
SNUMC Group, 2006-2009

[ Breast Cancer Association Consortium (BCAC) ]


Ahmed et al. Newly discovered breast cancer susceptibility loci on 3p24 and 17q23.2. Nature Genet 2009; (published online XX XX 2009; doi:10.1038/ngXXXX) 【IF=25.556】

Udler et al. FGFR2 variants and breast cancer risk: fine-scale mapping using African American studies and analysis of chromatin conformation. Hum Mol Genet 2009 (accepted) 【IF=7.806】

Milne et al. Risk of estrogen receptor positive and negative breast cancer and SNP rs13387042 on 2q35. J Natl Cancer Inst 2009; (accepted 13/05/2009). 【IF=15.271】
Collaborative Research Works on Breast Cancer Epidemiology since 1991

- Descriptive epidemiologic studies [0 / 10]
- Risk factor analysis of breast cancer [3 / 14]
- Risk factors of BC according to ER and PR status [3 / 6]
- Molecular genetic study on breast cancer [3 / 41]
- Differences in risk factors of colon cancer by subsite [1 / 2]
- Cancer control strategy and cancer prevention [2 / 9]
The breast that has never lactated is more liable to become cancerous (JE Lane-Claypon, 1926).
Thank You for Your Attention!