Polymorphisms in the DNA repair gene XRCC1 and Breast Cancer

*Kim, SU, Yoo, KY; Park, SK; Choi, JY; Noh, DY; Choe, KJ,Kang, D**

서울대학교 의과대학

To evaluate the potential association between XRCC1 polymorphisms (codon194 and codon399), a DNA repair enzyme involved in the base excision pathway, and development of breast cancer, a hospital based case-control study was conducted in Korea. The XRCC1 codon 194 Arg Õ Trp polymorphism was assessed in 151 histologically confirmed incident breast cancer cases and their 151 age-matched controls with no present or previous history of cancer. The XRCC1 codon399 Arg Õ Gln polymorphism was assessed in breast cancer cases and their 96 age-matched controls. A PCR-RFLP method was used for the genotyping and statistical evaluations were performed by unconditional logistic regression model. The frequency of XRCC1 codon194 polymorphism of Arg/Arg, Arg/Trp, and Trp/Trp were 33.1%, 56.3%, and 10.6 % in cases and 41.2%, 47.1%, and 11.8% in controls. Women with XRCC1 194Trp genotype increased the risk of breast cancer with an OR of 1.4 (95% CI=0.9-2.3) and the risk was higher in postmenopausal cases (OR=1.8, 95% CI=0.9-3.9), however this association was not statistical significant. There was a significant multiplicative interaction between the XRCC1 194Trp genotype and alcohol consumption (p for interaction=0.03); alcohol-consuming women with XRCC1 194Trp genotype have 2.9-fold increased risk (95% CI=1.3-6.2) compared to women with other genotype. The frequency of XRCC1 codon399 polymorphism of Arg/Arg, Arg/Gln, and Gln/Gln were 59.3%, 37.4%, and 3.3% in cases and 59.4%, 31.3%, and 9.4% in controls. There was no association between XRCC1 399Gln genotype and the risk of breast cancer(OR=1.0, 95% CI=0.5-1.8). However, there was a significant multiplicative interaction between the XRCC1 399Gln genotype and alcohol consumption (p for interaction=0.05); alcohol-consuming women with XRCC1 399Gln genotype have 2.9-fold increased risk (95% CI=0.9-9.2) compared to women with other genotype. Our findings thus suggest a novel gene-environment interaction between XRCC1 and alcohol consumption in the individual susceptibility to breast cancer.

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