Risk factors for breast cancer: Model fitting and application of polytomous logistic regression to evaluate risk factors for estrogen receptor-positive and estrogen receptor-negative breast cancer

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Support by CA89767 and US Army Center of Excellence in ER-negative Breast Cancer.

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Background Evaluations of epidemiologic risk factors in relation to estrogen receptor (ER)-positive and negative breast cancer have been inconsistent both in methods used to compare the risk factors and in the findings obtained. Greater insight into etiology of these different outcomes may provide a rationale for differences between premenopausal and postmenopausal breast cancer and suggest avenues for prevention.

Methods. We classified incident cases of breast cancer as either estrogen receptor-positive (both ER- and PR-positive) or ER-negative (both ER- and PR-negative). During 945,319 p-y of follow-up of 58,520 women in the Nurses' Health Study cohort from 1980 to 1998, we identified 1,058 cases of ER+/PR+ and 357 cases of ER-/PR- breast cancer. An additional 269 cases were ER+/PR-, and 77 cases were ER-/PR+. We fitted the log-incidence model of breast cancer and used polychotomous logistic regression to compare coefficients for ER+/PR+ and ER-/PR- tumors.

Results. Incidence of ER+/PR+ tumors increases at 10.8% per year during premenopausal years and at 4.3% per year after natural menopause. In contrast, the incidence of ER-/PR- tumors increases at 5.0% per year during premenopausal years and 1.0% after menopause. The adverse effect of first pregnancy is present for ER-/PR- breast cancer (b=0.021, se 0.012, p=0.08) but not ER+/PR+ tumors (b=-0.004, se=0.006, p=0.50). Parity shows a strong inverse association with ER+/PR+ tumors ($p<0.001$) but not ER-/PR- tumors (p=0.84). Duration of use of postmenopausal hormones show similar effects for ER+/PR+ and ER-/PR- tumors, but current use is somewhat stronger for ER+/PR+ tumors, and past use has a strong and significant inverse association with ER-/PR- tumors (p=0.01) but no association with ER+/PR+ tumors (p=0.47). Other risk factors show consistent relations[hips] with both ER+/PR+ and ER-/PR- breast cancer.

Conclusions. Incidence rates for ER+/PR+ and ER-PR- breast cancer differ by age and menopausal status. The influence of parity and past use of postmenopausal hormones differ between the two tumor types.

JNCI 2004