

Online Supplemental Material

Several different programs are available for calculating a woman's breast cancer risk.

We provide information about three risk models in Table 4 of "American Cancer Society Guidelines for Breast Screening with MRI as an Adjunct to Mammography" (CA Cancer J Clin 2007;57:75-89). Software for each model is available via the internet:

BRCAPRO Version 4.3, <http://www4.utsouthwestern.edu/breasthealth/cagene/default.asp>

Claus model (BreastCa for Palm, version 1.0, copyright 2001)

<http://www.palmgear.com/index.cfm?fuseaction=software.showsoftware&prodID=29820>

Tyrer-Cuzick (IBIS Breast Cancer Risk Evaluation Tool, RiskFileCalc version 1.0, copyright 2004) Available by contacting IBIS: ibis@cancer.org.uk

The three risk models utilize different combinations of risk factors, are derived from different data sets, and vary in the age to which they calculate cumulative breast cancer risk. As a result, they may generate different risk estimates for a given patient (Table 4). This variability is an indicator that the risk models provide approximate, rather than precise, estimates of breast cancer risk. Each of the risk models can be used for the purpose of identifying patients who would benefit from breast MRI screening.

All risk models incorporate family history data in the risk calculation, although there is variation in the specific family history factors included in each risk model. Other non-genetic risk factors such as age of menarche are included in the Tyrer-Cuzick program (see Table 4). Ashkenazi Jewish ancestry is also included in the BRCAPRO and Tyrer-Cuzick models. The BRCAPRO and Tyrer-Cuzick programs calculate the likelihood of a BRCA mutation being present (data not shown) in addition to breast cancer risk. The Claus model incorporates up to two relatives with breast cancer, taking into account their ages of onset, but does not include relatives with ovarian cancer. A separate paper allows for the calculation of breast cancer risk for women with a first-degree family history of ovarian cancer.^{1,2} The Claus model also does not incorporate Ashkenazi Jewish ancestry. None of the models used in Table 4 incorporate any other ethnicity or race in the risk calculations. None of the models incorporate cancer in third-degree relatives, such as cousins or great aunts.

Two other risk models are available for calculating breast cancer risk, the Gail³ and the BOADICEA⁴ models. They are not included in Table 4 because they are less useful than BRCAPRO, Claus, and Tyrer-Cuzick for identifying women who are candidates for breast MRI screening. The Gail model incorporates a woman's age, age at menarche, age at first livebirth or nulliparity, number of first-degree relatives with breast cancer, number of breast biopsies, whether a biopsy showed atypical hyperplasia, and race. This model is not adequate for evaluating family history because it does not incorporate second-degree relatives (including aunts, grandmothers, or any paternal relatives) or the age of onset of breast cancer in the family history. For example, Cases 1 and 4 in Table 4 would have

had the same risk according to the Gail model because the ages of onset of breast cancer in maternal relatives are not included in the model. Additionally, Cases 2 and 3 would not have an increased risk of breast cancer attributable to family history in the Gail model because paternal relatives are not included in the risk calculation. Therefore we do not recommend its use for evaluating patients for breast MRI screening. However, the Gail model is used clinically to determine whether a patient meets a minimum risk threshold to be offered tamoxifen for chemoprevention.⁵

The Breast and Ovarian Analysis of Disease Incidence and Carrier Estimation Algorithm (BOADICEA) model of risk calculation⁴ provides another method for estimation of breast cancer risk. This model incorporates family history of breast, ovarian, prostate, and pancreatic cancer. BOADICEA calculates BRCA mutation probabilities as well as cancer risk estimates. BOADICEA has been evaluated and compares favorably to other BRCA probability models,⁶ but software for using this model is not currently available. Because published tables for BOADICEA provide only a limited number of family configurations for risk calculations,⁴ we do not recommend its use for evaluating patients for breast MRI at this time. However, a Web-based version of this risk model is likely to be available in 2007 and will provide another method for identifying candidates for breast MRI screening. Updates on BOADICEA can be found at the BOADICEA Web site (http://www.srl.cam.ac.uk/genepi/boadicea/boadicea_home.html).

References

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