Researchers validate new model for breast cancer risk assessment in multiple ethnic groups

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Researchers at the University of California, San Francisco have developed a way to quickly estimate a woman's risk for invasive breast cancer. The new model, based on a measure of breast density that is already reported with the majority of mammograms today, is the first to be validated across multiple ethnic groups living in the United States.

The model could one day be used to help calculate a woman's risk for breast cancer each time she has a mammogram, providing her with a realistic sense of her likelihood to develop breast cancer in the future.

"Breast density is the strongest risk factor after age for developing breast cancer," said lead author Jeffrey Tice, MD, assistant professor in the Department of General Internal Medicine at UCSF. "Unfortunately, there is no model currently available to clinicians for assessing breast cancer risk that includes this important risk factor. The model we have created could be a useful tool to improve breast cancer screening and prevention efforts and to help women better understand the magnitude of risk."

The findings are reported in the March 4, 2008 issue of *The Annals of Internal Medicine*.

The standard and most commonly used risk assessment model available to clinicians today is the Gail model, a previously validated breast cancer risk assessment tool that is primarily based on non-modifiable breast cancer risk factors. The Gail model was developed and validated in Caucasian women only. Tice and colleagues from UCSF and the University of Washington designed a new model that estimates predicted incidence of invasive breast cancer by using breast density, age and ethnicity. The estimates are then adjusted for family history of breast cancer and history of breast biopsy (whether or not a woman had undergone a previous biopsy for a suspect lump or lesion).

"Physicians are used to calculating their patients' risk for heart disease, but we don't routinely do it for breast cancer," said Tice. "Breast density classification in women, assessed during screening mammography, is already part of a routine clinical practice. Our goal was to develop a simple and useful model incorporating this data which estimated a woman's risk for invasive breast cancer in multiple ethnic groups."

The research team used data from more than one million women who visited screening mammography sites across the United States between 1996 and 2003. Model calibration was assessed by calculating the ratio of expected cases of breast cancer to observed cases of breast cancer. Calibration, according to the study, assesses how closely the number of women in whom the model predicts that breast cancer will develop matches with the actual number of women in whom breast cancer is diagnosed. An observed ratio of 1.0 would indicate perfect calibration.

Study results showed the model they developed was well calibrated and reasonably accurate across risk factor subgroups. After five years of follow-up, the observed rate of invasive breast cancer was 1.40 percent (8,784 cases of cancer among 629,229 women) compared to the expected rate created by the model of 1.41 percent. However, the model slightly underestimated breast cancer rates in younger women (age 40-44) and underestimated cancer rates among Asian and Hispanic women.

"We found that a model that incorporates mammographic breast density can estimate a woman's risk for invasive breast cancer and is

convenient enough that it could be incorporated into routine breast cancer screening," said Tice. "Primary care physicians could use it to calculate a woman's five year risk of developing breast cancer."

Tice warns, however, this is not the definitive model for breast cancer risk assessment and that it is unlikely a single model would be able to address all needs in breast cancer risk assessment. Some women will benefit from genetic counseling and screening, other women will require more detailed risk factor assessment, he adds, and this new model, like the Gail model, had only modest ability to discriminate between women overall who will develop breast cancer and those who will not.

One of the more surprising and unexpected findings in this study, according to Tice, was how poorly the Gail model performed in this population of ethnically diverse women. When the researchers compared their model to the Gail model, they found the Gail model was poorly calibrated and underestimated the number of breast cancers by 12 percent. This was particularly true for African American women in whom the Gail model under-predicted the number of breast cancers by 45 percent. The researchers hypothesize this may be because the Gail model was developed and validated in Caucasian women only.

"The most important finding of this study is the accuracy of the model across multiple ethnic groups," added Tice. "This is strong evidence that supports the inclusion of race and ethnicity in any risk assessment tool created in the future."

Source: University of California - San Francisco