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Genetic Testing and Counseling for Women At-Risk for Familial Breast Cancer



The pink ribbon of breast cancer awareness graces everything from tennis shoes to cupcakes. The symbol's frequent appearance attests to the attention that many individuals are paying to the prevalence of breast cancer. Second only to skin cancer, it is the most common cancer to affect United States women and, second to lung cancer, it is the leading cause of cancer death in women as well.¹ The American Cancer Society estimates that 182,460 American women will be diagnosed with breast cancer in 2008 alone, and the disease will take the lives of over 40,000 women in the United States this year. Currently, a woman's chance of having breast cancer at some point in her life is approximately 1 in 8; her chance of dying from breast cancer is about 1 in 35. The pink ribbon's presence speaks to the increasing awareness of the risk that women especially, but men as well, face in the form of breast cancer. However, the ribbon does not always indicate individuals' awareness of the genetic testing and counseling that is available for familial forms of this cancer.

Approximately five to ten percent of breast cancers are linked to inherited genetic mutations. Most commonly these mutations involve genes known as the BRCA1 and BRCA2 genes. Women who have inherited these mutations have an 80% chance of getting breast cancer at some point in their lives. Having an immediate family member with breast cancer almost

¹ "Cancer Reference Information," American Cancer Society, <<http://www.cancer.org>>.

doubles a woman's risk for breast cancer. Though between 70 and 80 percent of women diagnosed with breast cancer do not have a family history of the disease, the implications of genetic knowledge regarding familial breast cancer are highly significant for the thousands of women who do have a mother, sister, or daughter affected by the disease. Since breast cancer is 100 times more common in women than in men, most studies to date have focused on women in particular who are at-risk for familial breast cancer.² Though specified in terms of women, however, these studies' findings have importance for men affected by breast cancer as well.

Since 1996, genetic testing for the presence of mutations in highly penetrable genes such as BRCA1 and BRCA2 (BRCA1/2), as well as TP53 and PTEN, has been clinically available for individuals through analysis of a blood sample.³ The genetic mutation signified by the BRCA1/2 gene indicates increased risk not only for breast cancer but also for ovarian cancer in women. In men, these mutations put their carriers at increased risk for prostate cancer, pancreatic cancer, and melanoma as well. When a woman has a family history of breast or ovarian cancer, her decision whether or not to undergo genetic testing for the presence of inherited risk factors can impact multiple aspects of her life. If a woman chooses to have genetic analysis and receives results that indicate the presence of BRCA1/2, preventive treatment may become a recommended option. Some women may choose to engage in chemoprevention, while others may undergo a bilateral prophylactic mastectomy. Women who specifically carry the BCRA1 mutation may choose to undergo a bilateral prophylactic oophorectomy, which can significantly decrease a woman's risk for ovarian cancer and also lowers the risk for breast cancer.

² "Cancer Reference Information," American Cancer Society, <<http://www.cancer.org>>.

³ Edlich RF, Winters KL, Lin KY, "Breast Cancer and Ovarian Cancer Genetics," J Long Term Eff Med Implants, 2005; 15(5):533-45, PubMed, <<http://www.pubmed.gov>>.

For most women, however, the decision to receive prophylactic treatment is by no means an easy one. While treatment may reduce the risk for breast cancer itself, such treatment for some women may entail other types of hardship. Anxiety regarding the psychological distress that could result from the removal of the breasts, for instance, can influence some women's decision for or against surgery.⁴ Indeed, some women who undergo genetic testing subsequently choose not to engage in chemoprevention or surgery and instead opt for frequent self-examination and/or clinical surveillance. In a one-year follow-up of women who had presymptomatic testing for BRCA1/2 and then chose either surveillance or surgery, the women who underwent prophylactic mastectomies reported more distress than the other women in the study.⁵ After about 6 months, however, their distress levels had dropped significantly; the women were satisfied with their decision to receive treatment, though the knowledge of reduced risk for cancer also entailed a negative impact on "body image, the intimate relationship, and physical well-being." Genetic counselors can help women navigate through this maze of potential outcomes. Regardless of the consequences though, making an informed choice between enhanced surveillance and preventive treatment ultimately relies on a woman's initial decision to seek genetic testing. However, many individuals are not aware that such testing is even an option.

One study published in late 2008 found that few women with ovarian cancer undergo genetic testing for the breast and ovarian cancer susceptibility genes, BRCA1/2.⁶ 55% of the 237

⁴ Edlich RF, Winters KL, Lin KY, "Breast Cancer and Ovarian Cancer Genetics," J Long Term Eff Med Implants, 2005; 15(5):533-45, PubMed, <<http://www.pubmed.gov>>.

⁵ Lodder LN, Frets PG, et. al., "One year follow-up of women opting for presymptomatic testing for BRCA1 and BRCA2," Breast Cancer Res Treat., 2002 May; 73(2):97-112, PubMed, <<http://www.pubmed.gov>>.

⁶ Lacour RA, Daniels MS, et. al., "What women with ovarian cancer think and know about genetic testing," Gynecol Oncol., 2008 Oct; 111(1):132-6, PubMed, <<http://www.pubmed.gov>>.

ovarian cancer patients in the investigation had not even heard of BRCA testing. Even though genetic testing has been available for twelve years, 51% of Caucasian respondents were unaware of BRCA testing; 70% of Hispanic and 88% of African American participants were unaware. Overall, awareness was correlated with education. 89% of the study's participants reported that they would opt for genetic testing if it were to directly influence their therapy, and 86.9% would undergo testing for the benefit of family members. With the prospect of BRCA-directed therapeutics, many women would choose to be genetically tested; at the same time, however, many women have not been informed that this testing is available. Though this study questioned the awareness of women already diagnosed with ovarian cancer, the women who did not know about genetic testing at the time of the study would of course also not have been aware of it prior to their diagnosis and the investigation. Preventive treatment would thus not have been a genetically backed option for these women; though they certainly could have chosen to undergo surgery without genetic testing, doing so would have been acting without the aid of a complete risk assessment. As this study concluded, the clinicians who care for these patients "should work to make appropriate genetic counseling referrals." With the assistance of a genetic counselor, at-risk women can stay informed about their options and the physical and psychological risks associated with each outcome. Another August 2008 study analyzed the experiences of men in BRCA1/2 families.⁷ The researchers noted that data, though limited, suggests that the majority of these men do not seek genetic counseling. As a result, they "may forgo the opportunity to improve health practices and to pass on valuable cancer risk information to offspring." Without knowledge of the existence of BRCA testing in the first place, men and women cannot make an informed decision as to whether or not they would like to undergo such testing.

⁷ Daly MB, "The Impact of Social Roles on the Experience of Men in BRCA1/2 Families," J Genet Couns, 2008 Aug. 8, PubMed, <<http://www.pubmed.gov>>.

In 2007 a review was published of studies that provided data on the impact of genetic risk assessment for individuals at risk for familial breast cancer.⁸ Analyzing results for 1251 participants indicated that genetic testing services help to improve the accuracy of an individual's perceived risk as well as help to reduce an individual's distress. A 2006 review assessed the psychological impact of genetic testing on patients already diagnosed with breast cancer and found that testing does not lead to increased psychological distress in these patients.⁹ However, a woman's recent diagnosis adds to the distress experienced before and after genetic counseling. Consequently, the review stresses that clinicians must be aware of the additional counseling that recently diagnosed women who are undergoing genetic testing may need. Once again, be it pre- or post-diagnosis, these reviews highlight the importance of making genetic counseling's availability known to women at-risk for familial breast cancer.

Beyond the need for initial awareness, other issues involving genetic counseling are at stake. For instance, cost is a critical factor for many women. In the previously cited 2008 study involving women with ovarian cancer, researchers found that 74% of the 237 patients would pay 20% of the cost of genetic testing but that only 25.1% would pay the cost in full.¹⁰ In their conclusions they noted that cost presents a barrier for many at risk women. As one way to alleviate some of this financial burden, other studies have suggested the possibility of using genetic nurse counselors rather than clinical geneticists for risk counseling. A 2006 study found

⁸ Sivell S, Iredale R, et. al., "Cancer genetic risk assessment for individuals at risk of familial breast cancer," Cochrane Database Syst Rev., 2007 Apr 18; 2:CD003721, PubMed, <<http://www.pubmed.gov>>.

⁹ Schlich-Bakker KJ, ten Kroode HF, Ausems MG, "A literature review of the psychological impact of genetic testing on breast cancer patients," Patient Educ Coun., 2006 Jul; 62(1):13-20, PubMed, <<http://www.pubmed.gov>>.

¹⁰ Lacour RA, Daniels MS, et. al., "What women with ovarian cancer think and know about genetic testing," Gynecol Oncol., 2008 Oct; 111(1):132-6, PubMed, <<http://www.pubmed.gov>>.

this substitution to “be an acceptable and cost-effective alternative.”¹¹ In addition to financial concerns, researchers are currently trying to assess how best to communicate risk to individuals. In 2007, a review indicated that data was still too limited to make conclusions as to the optimal method for delivering genetic risk assessment services.¹² More recently, in October 2008, the design for a Breast Cancer Risk Communication study (BRISC) was published describing the study’s aims to evaluate “the effect of different formats of risk communication on the counsellee’s risk perception, psychological well-being, and decision-making regarding preventive options for breast cancer.”¹³ The various formats will include lifetime and age-related risk expressed in number, graph, and percentage forms. Ideally, results will help improve decision-making among women with a family history of breast cancer.

Communication of another type presents itself as important for such women who have children. When a genetic test result returns positive for BRCA1/2, the results have significant implications for a carrier’s offspring: each child has a 50% chance of inheriting the mutation. Consequently, a mother who has just learned of her genetic risk factors faces the decision of whether or not to share this information with her family, and, if she chooses to tell her children, she must decide when and how to do so. A study published in August 2008 investigated the “phases of disclosing BRCA1/2 genetic information to offspring.”¹⁴ Researchers described carriers’ approaches to sharing this knowledge as “a process involving several distinct phases

¹¹ Torrance N, Mollison J, et. al., “Genetic nurse counselors can be an acceptable and cost-effective alternative...,” *Br J Cancer*, 2006 Aug 21; 95(4):435-55, [PubMed](http://www.pubmed.gov), <<http://www.pubmed.gov>>.

¹² Sivell S, Iredale R, et. al., “Cancer genetic risk assessment for individuals at risk of familial breast cancer,” *Cochrane Database Syst Rev.*, 2007 Apr 18; 2:CD003721, [PubMed](http://www.pubmed.gov), <<http://www.pubmed.gov>>.

¹³ Ockhuysen-Vermey CF, Henneman L, et. al., “Design of the BRISC study,” *BMC Cancer*, 2008 Oct 3; 8:283, [PubMed](http://www.pubmed.gov), <<http://www.pubmed.gov>>.

¹⁴ Clarke S, Butler K, Esplen MJ, “The phases of disclosing BRCA1/2 genetic information to offspring,” *Psychooncology*, 2008 Aug; 17(8):797-803, [PubMed](http://www.pubmed.gov), <<http://www.pubmed.gov>>.

with specific challenges within each phase.”¹⁵ They identified many dilemmas that the mothers faced: deciding if and when to disclose the information to their children, reconciling the desire to protect with the desire to inform, and coping with concern that their offspring may receive a positive genetic test result. As this study concluded, these findings have significant implications for genetic counseling: the importance of counseling for women facing breast cancer extends beyond the initial decision of whether or not to receive genetic testing. This far-reaching impact underscores the need to make the popular pink ribbon a symbol for awareness not only of breast cancer itself but also of the genetic clues that can be used to help overcome forms of this cancer. When women are aware of the availability of genetic services, as the cost of receiving such care decreases, and as BRCA1/2 directed therapeutics become increasingly likely, genetic testing and counseling can play critical roles along every step of the way in an individual’s battle against breast cancer.

¹⁵ Clarke S, Butler K, Esplen MJ, “The phases of disclosing BRCA1/2 genetic information to offspring,” Psychooncology, 2008 Aug; 17(8):797-803, PubMed, <<http://www.pubmed.gov>>.