The objective of this study was to validate reports on the bilaterality status of breast cancer in first-degree relatives of women with a strong family history of the disease; i.e., women with 1) two first-degree relatives who have, or have had, breast cancer; 2) one first- and one second-degree affected relative; or 3) one first-degree relative with diagnosis of breast cancer before the age of 50 years and/or bilateral breast cancer. We were able to obtain hospital records for 94 affected relatives of 83 patients who agreed to participate in the study. The accounts of these women were compared to the bilaterality status indicated in the hospital records of the affected relatives. Inconsistencies that might have been attributed to incomplete medical records were resolved through personal interviews with the participants, and when indicated, with other family members or the physician of the affected relative. Overall, 89.4% (84/94) of the reports validated in this manner were correct. Participants who reported unilateral breast cancer in a first-degree relative were correct 94.4% (68/72) of the time. Similarly, 94.0% (47/50) of the accounts concerning affected living relatives were accurate, regardless of whether the participant had indicated unilateral or bilateral disease. However, participants who reported bilateral breast cancer in a deceased relative were accurate only 61.5% (8/13) of the time. Incorrect reports were associated with misunderstanding of medical terminology, especially if the participant was young at the time of the diagnosis of her relative.

Key words: family history, risk assessment, breast carcinoma

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INTRODUCTION

Women who have a first-degree relative with breast cancer are at an increased risk for developing the disease [Gail et al., 1989; Ottman et al., 1983; Sattin et al., 1985; Schwartz et al., 1985; Brinton et al., 1982]. However, within this group, it is unclear whether women whose affected relatives had bilateral breast cancer are at a greater risk than those whose relatives had unilateral disease. Findings of several studies support such an increased risk [Anderson, 1971; Ottman et al., 1983, 1986; Breuer, 1990; Bernstein et al., 1992a]. Thus, the risk of breast cancer in women with relatives who had bilateral disease was found to be three to four times higher than in women with relatives who have had unilateral disease [Anderson, 1971]. Similarly, among women whose sisters were diagnosed at the age of 50 years or younger, relative risks were higher for those whose sisters had bilateral breast cancer than for those whose sisters had unilateral breast cancer [Ottman et al., 1983, 1986]. A recent prospective, population-based study that used direct interviews of patients [Bernstein et al., 1992a] found that the risk of developing a second primary cancer in the contralateral breast was significantly elevated in women who had a first-degree relative with a history of the disease. The risk was further increased if 1) the affected family member had an early age of onset, which is related to familial breast cancer [Claus et al., 1990], or 2) the affected relative was a mother who had bilateral breast cancer. Nevertheless, a number of studies have found no positive association between the risk of developing breast neoplasms and having a family history of bilateral breast cancer [Gail et al., 1989; Claus et al., 1990; Sattin et al., 1985]. Yet others indicate that the effect of bilaterality on risk may depend on the “type” of affected relative, i.e., mother or sister, and on the menopausal status [Byrne et al., 1991] or age [Mettlin et al., 1990] of the patient who is at risk. These equivocal findings confound risk counseling for breast cancer, a disease that will affect between one in nine [American Cancer Society, 1991] and one in eight women [Miller et al., 1992]. A possible contributing factor to the inconsistent findings is incorrect patient reports on laterality status of affected relatives. Although reports of breast cancer in first-degree relatives have been found to be valid [Love et al., 1985], the authors know of no study on the validity of reports of bilateral disease. The issue is addressed in this article.

MATERIALS AND METHODS

Patient Population

In this report, the word patients refers to the study participants. They attend the Strang program for women who are at increased risk for developing breast cancer because of their family history of the disease; i.e., they have 1) two first-degree relatives who have, or have had, breast cancer; 2) one first- and one second-degree affected relative; or 3) one first-degree relative with diagnosis of breast cancer before the age of 50 years and/or bilateral breast cancer. The above classifications are derived from a self-administered questionnaire completed by patients prior to their first Strang breast examination. In order to ensure that the patient understands all the questions, technical terminology is avoided. Thus the form includes a table that lists first- and second-degree relatives. For each relative who has had breast cancer, the Strang patient is instructed to indicate the laterality status by checking the box labeled “in one breast,” “in two breasts,” or “unknown,” respectively. For the purpose of this study, validation of reports was performed only in those cases where the patient had indicated unilateral or bilateral status.
Affected relatives refers to the relatives of the above patients who have, or who have had, breast cancer.

At the initiation of the study, the mean age of the women in the high-risk program was 45 years. Among these patients, 85.5% were white, 67.0% had at least some college education, and 62.6% held professional/technical or managerial/administrative positions.

Recruitment of Study Subjects and Retrieval of Medical Records

Three hundred sixty-one women attended the Strang high-risk program in 1990. A randomly ordered list of their medical numbers was generated, and letters requesting study participation were mailed to the first 166 patients on this list. Follow-up calls were made approximately 1 week after the packet mailing to encourage completion and return of the requested material. If a working woman could not be contacted at home, she was telephoned at her place of work; in fact, several women were contacted at their work numbers. Women who did not return the material after two telephone calls and the mailing of two packets were not further contacted.

Participants provided signed consent forms for release of medical records of their deceased first-degree relatives. In addition, they furnished written permission to contact their living affected relatives, who, in turn, were asked to provide authorization for release of their hospital records. Up to two letters were sent, and two successful telephone contacts were made to obtain each authorization.

The hospital records requested included all pathology reports, along with the history and physical report, and the discharge summary of the most recent hospital admission. Requests were followed until the records were received, or until the hospital reported that, upon further investigation, it did not have the records.

Definition of Laterality Status

In this article, the term laterality status refers to whether the affected relative had breast cancer in one or both breasts.

Assessing the Accuracy of the Medical and Patient Reports

If the patient’s account of the laterality status matched that of the hospital record, the patient was classified as correct. In cases where the patient reported that an affected relative had unilateral breast cancer, and the medical record stated that the relative had developed bilateral breast cancer, the medical record was classified as “correct” and the patient as “incorrect.” Whenever the patient reported bilateral breast cancer, but the medical record indicated unilateral disease, we considered the possibility that we had not obtained all the relevant medical records. In order to understand the reason for the discrepancy, the Strang patient was contacted and requested to explain how she had arrived at the laterality status she reported. In one case, an additional interview was held with a sister of the participant in order to resolve the inconsistency. In another instance, it was necessary to consult the physician of the affected relative.

Statistical Methods

The data were analyzed with the chi-square test, Fisher’s exact test, Student’s t-test, or the Wilcoxon rank sums test, as deemed appropriate.
RESULTS

Flow of the Study

Figure 1, a flow chart of the study, shows that 166 patients were asked to assist in getting the medical records of their 215 affected relatives. At the time of study completion, hospital records had been procured for 94 affected relatives of 83 Strang patients who had agreed to participate in the study. Thus, we obtained the medical records of 1 relative for each of 72 Strang patients and those of 2 relatives for 11 patients.

Reasons for Nonparticipation

Thirty-three percent of the 166 women we attempted to contact did not participate in this study. Approximately one-third of these did not respond to our mailings and telephone calls. The remaining two-thirds responded, but refused to participate for one or more reasons: they did not want to reexperience painful memories, they did not know at which hospital(s) their relatives had been treated, they felt they could not authorize retrieval of medical records of deceased relatives, or for a variety of personal reasons they did not wish to contact their mothers or sisters.
We had authorization to procure medical records of 132 affected relatives. Thirty-eight of those documents could not be retrieved. Many had been discarded because they were old; others could not be obtained because the patient had provided incorrect names and addresses for the hospitals where the affected relatives had been treated. Finally, records could not be obtained for some individuals who had been treated outside the United States.

**Comparison Between the High-Risk Strang Population and Those for Whom Medical Records of Relatives Were Obtained**

Compared to the total population of women in the high-risk program, the patients for whom medical records of relatives were obtained tended to be slightly younger (median ages: 42 vs. 40 years; \( P = 0.09 \)) and were somewhat more likely to be white (percentage white: 85.5 vs. 94.9; \( P = 0.01 \)). The two groups were nearly identical with respect to the distribution of their levels of education and occupational status. In each group, approximately 65% had at least some college education and 60% were in a professional/technical or administrative/managerial position.

**Validity of Patient Reports and of Laterality Status Classifications Based on Medical Record Information**

Overall, 84 of 94 patient reports were correct (89.4%; 95% confidence interval = 83.0–95.8%). Excluding one report that pertained to a relative who did not have breast cancer yields a kappa statistic of 0.72, which is considered to be substantial [Landis and Koch, 1977].

Correct patient reports came from women who tended to be older. The proportion of women with more education and higher occupational status was greater among those whose reports were incorrect compared to those whose reports were correct (Table I). However, as we did not have information on educational levels and occupations of husbands, these indices in the Strang patients may not be indicative of socioeconomic status, especially since the level of education was significantly related to age. The median age of those with some college education was 36 years compared to 50 years for women with less education (\( P = 0.0001 \)). The relationship of age to occupation was not statistically significant. (The median age of those holding professional/technical or managerial/administrative positions was 37 years compared to 42 years for those with other types of occupations; \( P = 0.14 \)).

<table>
<thead>
<tr>
<th>TABLE I. Comparison of Demographic Features Between Those Whose Reports Were Correct and Those Whose Reports Were Incorrect*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct (N = 84)*</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Median age (range)</td>
</tr>
<tr>
<td>Percent with at least some college</td>
</tr>
<tr>
<td>Percent professional/technical or administrative/managerial</td>
</tr>
</tbody>
</table>

*Women are counted once for each report they provided because a woman may have provided correct information on one relative and incorrect information on another.

*In some cases, because of missing data, calculations are based on sample sizes that are smaller than indicated.
Validity did not differ according to the number of affected relatives. Of the 59 reports from women with 1 affected first-degree relative, 52, or 88.1%, were correct. The corresponding validity for reports by women with 2 or more affected relatives was 91.4% (32/35; \( P = 0.6 \)).

Table IIa indicates that validity rates regarding reports on affected mothers and sisters were 88.6% and 91.7%, respectively. The percentage of accurate reports on living relatives (94.0%) was higher than that regarding deceased relatives (84.1%). Patients indicating unilateral breast cancer in their relatives were correct more often than those indicating bilateral disease (\( P < 0.005; \) Table IIb). The statistical significance of this latter finding was attributable to the difference between the validity of patient reports of unilateral breast cancer and that of patient reports of bilateral disease in deceased relatives, of which only 61.5% were correct (95% confidence interval = 34.5–88.5%).

There were 11 instances in which the patient’s report on the laterality status of her relative did not match the medical report (Fig. 1). In one case, the patient reported unilateral breast cancer in her deceased mother and the hospital records did not mention breast cancer at all. However, the mother’s physician confirmed the diagnosis of unilateral breast cancer. This was the only instance in which the medical record we received was apparently incomplete. Of the remaining 10 cases in which there was disagreement between the hospital and patient reports, 3 involved patients who reported unilateral disease because they were unaware of the cancer in the contralateral breast for which we had pathology reports. One of these patients was ignorant of a second breast cancer detected at the time of her mother’s autopsy. A fourth patient reported unilateral breast cancer in her mother, who, in fact, had not had breast cancer at all.

### TABLE IIa. Validity Rate of Patient Reports on the Laterality Status of Affected Relatives

<table>
<thead>
<tr>
<th>Patient report on</th>
<th>Sample size</th>
<th>No. of correct reports</th>
<th>Percentage correct</th>
<th>( P )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All mothers and sisters</td>
<td>94</td>
<td>84</td>
<td>89.4</td>
<td></td>
</tr>
<tr>
<td>Mothers</td>
<td>70</td>
<td>62</td>
<td>88.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Sisters</td>
<td>24</td>
<td>22</td>
<td>91.7</td>
<td></td>
</tr>
<tr>
<td>Live relatives</td>
<td>50</td>
<td>47</td>
<td>94.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Deceased relatives</td>
<td>44</td>
<td>37</td>
<td>84.1</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE IIb. Validity Rate of Patient Reports According to Their Accounts on the Laterality Status of Affected Relatives and the Vital Status of Those Relatives*

<table>
<thead>
<tr>
<th>Strang patient report</th>
<th>Vital status of affected relative</th>
<th>Sample size</th>
<th>No. of correct reports</th>
<th>Percentage correct</th>
<th>95% confidence interval (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Unilateral</td>
<td>Living and deceased</td>
<td>72</td>
<td>68</td>
<td>94.4</td>
<td>89.0–99.8</td>
</tr>
<tr>
<td>B. Bilateral</td>
<td>Living and deceased</td>
<td>22</td>
<td>16</td>
<td>72.7</td>
<td>53.7–91.7</td>
</tr>
<tr>
<td>C. Unilateral</td>
<td>Living</td>
<td>41</td>
<td>39</td>
<td>95.1</td>
<td>88.4–100</td>
</tr>
<tr>
<td>D. Unilateral</td>
<td>Deceased</td>
<td>31</td>
<td>29</td>
<td>93.5</td>
<td>84.7–100</td>
</tr>
<tr>
<td>E. Bilateral</td>
<td>Living</td>
<td>9</td>
<td>8</td>
<td>88.9</td>
<td>67.9–100</td>
</tr>
<tr>
<td>F. Bilateral</td>
<td>Deceased</td>
<td>13</td>
<td>8</td>
<td>61.5</td>
<td>34.6–88.5</td>
</tr>
</tbody>
</table>

* A vs. B and A vs. F: \( P < 0.005 \); C vs. D, E vs. F, and A vs. E: \( P \geq 0.2 \).
The six patients who reported bilateral disease in a relative who had had cancer in only one breast misunderstood their relatives’ diagnoses. Some thought that their relatives had been bilaterally affected because they were told such things as: “They removed everything,” “It spread to all parts of her body,” and “It was everywhere.” In fact, each of the hospital records of these six affected relatives indicated metastases to other parts of the body (lung, brain, bone, etc.). Two patients were unaware that their relatives’ second mastectomies had been performed prophylactically. Others were confused because the relative had experienced ipsilateral recurrence. Four of the six Strang patients were very young (ages 10–15) years at the time of their relatives’ illness or death. They indicated that members of their family were reluctant to discuss breast cancer with them or the meaning of the disease. One very interesting report on why a woman believed that her mother had had bilateral breast cancer came from a patient who was 12 years old when her mother died of the disease. This woman stated that at the time of her mother’s death she did not think of breasts as separate entities. Since her mother had always referred to breasts as “bosoms,” she thought that “breast” referred to the whole “chest,” as it does in “robin red breast.”

It should be noted that of the five cases where hospital records did not support the patient’s report of bilateral breast cancer in a deceased, affected relative, four records included history and physical reports and discharge summaries of the hospitalization during which the affected relative died. In the fifth case, the most recent records available were from a hospitalization that occurred only 13 months prior to the death of the affected relative. Furthermore, in that instance, the participant was thought to be an unreliable historian, because the details of her accounts often contradicted those of the hospital record.

We considered the possibility that hospital record information that indicated unilateral disease in a deceased mother or sister may have been incomplete. This could have occurred if the Strang patient was unaware of a cancer in the relative’s contralateral breast that had been treated in a second hospital. It seems unlikely that hospital records for living relatives were incomplete, as information regarding hospitals of treatment was received directly from the relative. There were 33 dead relatives whose hospital records indicated unilateral breast cancer, accounting for a total of 95.01 person-years from the date of the most recent hospital record obtained to the date of the relative’s death. This represents the time during which a cancer in the second breast could have developed. Robbins and Berg [1964] reported that the overall annual rate of developing breast cancer in the contralateral breast is constant over time and equals 0.7%, a value which is consistent with the rates that have been reported in more recent studies [Chaudary et al., 1984; Bernstein et al., 1992b; Fisher et al., 1984]. Applying this rate, and adjusting for age and family history of the affected relative (see Appendix), we estimate that there may have been one additional bilateral breast cancer in the above group subsequent to the date of the most recent record obtained. This means that, in all likelihood, no more than one woman was classified as having had unilateral breast cancer when, in fact, she had bilateral disease.

Although this project is a validity study, and as such focuses on the accuracy of patient reports, it is of interest to note that of the 19 relatives whose medical records indicated bilateral breast cancer, 16, or 84.2%, were correctly classified by the Strang patients. In 68 of the 74, or 91.9%, of the cases in which affected relatives had unilateral breast cancer, the patient reported unilaterality. The denominator, i.e., 74, repre-
sents the 73 affected relatives whose hospital records indicated unilateral breast cancer and the 1 case in which the Strang patient reported unilateral disease, and although the hospital report did not mention breast cancer, the relative’s physician confirmed that she did, indeed, have unilateral breast cancer. These data can be viewed as the sensitivity of patient reports.

Since there was medical record confirmation on only six relatives of nonwhite patients, no analyses are reported for the validity of reports according to ethnicity. Similarly, this study does not address reports on affected daughters, as there was only one patient who had an affected daughter.

DISCUSSION

It is highly unlikely that inaccuracies of patient reports on laterality status are attributable to misinterpretations of the questionnaire completed prior to the first Strang examination, as the questions were phrased in simple, nontechnical language. However, in the course of our interviews with women whose reports differed from the medical records we had obtained, it became clear that a variety of situations could understandably result in a woman’s mistaken assumption that a deceased first-degree relative had bilateral breast cancer. Women who were children when their mothers developed breast cancer may have received only vague information from their family members, who wanted to protect them from knowing about breast cancer. The immature reasoning they used to “fill in the gaps” may have led to incorrect conclusions regarding laterality status. Individuals who were told that an affected first-degree relative had “widespread metastasis” may assume that the disease had spread to the contralateral breast, which is in such close proximity to the site of the first cancer. A woman may deduce that her first-degree relative had bilateral disease if her mother or sister was hospitalized twice with breast cancer; the woman may not consider the possibility of recurrence in the same breast. Finally, in cases where an affected relative had bilateral mastectomies, the patient may assume that since the mother or sister had breast cancer and “lost both breasts,” she had bilateral breast cancer; the patient may not realize that mastectomy is sometimes a prophylactic procedure, or she may simply not consider the possibility of prophylactic mastectomy. For a lay population, these assumptions “make sense.” Hence, although our finding of poor accuracy of bilaterality reports in deceased relatives is based on small numbers, our interviews confirm that one may reasonably expect poor validity for these particular accounts. Therefore, researchers and medical counselors should not rely solely on responses given on close-ended, self-administered questionnaires regarding the laterality status of an affected first-degree relative, especially when patients report bilaterality in a deceased relative. Patients should be asked how they arrived at their responses. Some points that should be clarified are whether the patients are aware that mastectomies may be performed prophylactically, and whether they know that breast cancer seldom metastasizes to the contralateral breast [Fisher et al., 1984]. Finally, if a prophylactic mastectomy is being considered for a high-risk patient, and the patient’s report of bilaterality in a deceased, affected relative is a factor in the decision, then the relative’s medical records should be procured.

The significantly higher proportion of incorrect laterality reports from patients who had at least some college education may be related to the younger age of these
women (however, the reason for the relationship between age and accuracy is unclear). Nevertheless, the association does suggest that one should not attribute a higher degree of credibility to reports of women who have achieved a higher level of education. Furthermore, it is unrealistic to expect all patient reports on laterality status of affected relatives to be correct, even when the patient seems to be completely reliable. This was demonstrated in the case where a carcinoma in the contralateral breast of an affected relative was detected at the time of autopsy.

Retrieval of Medical Records and Generalizability of Findings

There were three points at which completeness of record retrieval was jeopardized:

1. Incomplete recruitment from the random list of patients.
2. Refusal of living relatives to authorize release of their medical records.
3. Inability to procure hospital records for which we had appropriate authorizations. In a large proportion of these cases, records had been disposed by the hospital because they were old.

Because of the incompleteness in study participation and of retrieval of medical records, the study group is not a random sample. The reasons for incomplete retrieval of records that are listed in the Results section, as well as the motivation of this unique study population, should likely result in a validity rate that is higher than one would find in the general population. Nevertheless, the demographic similarity between the total high-risk Strang group and the study patients for whose relatives medical reports were obtained suggests that nonparticipation may not have seriously compromised the generalizability of the investigation to the entire Strang population. Furthermore, the demographic characteristics of the study group, i.e., women who are primarily white and "upper, middle class," are similar to those of other facilities that provide medical counseling for women who have similar family histories of breast cancer [Vogel et al., 1990] (Stefanek, personal communication, 1991; Daly, personal communication, 1991); this resemblance supports the generalizability of the findings of this study to precisely the patients seeking the medical services that would utilize the results of this project. Since it is not uncommon for these women to seek advice regarding prophylactic mastectomies, the validity of their reports regarding bilaterality in affected relatives is especially critical.

Inconsistency in Reports on the Relationship Between the Risk of Developing Breast Cancer and the Laterality Status of Affected First-Degree Relatives

This study sample is apparently a highly motivated group that is characterized by a concern of having affected first-degree relatives. One may, therefore, assume that the accuracy of their reports regarding the laterality status of their relatives is better than what would be found in most groups. Thus, the finding regarding the poor accuracy of bilateral reports in deceased relatives is especially worrisome, as our "motivated" group was correct only 61.5% of the time. Therefore, the inconsistency regarding the reported contribution to the risk of developing breast cancer by the laterality status of affected relatives may partly be attributable to the inaccuracy of reports of bilateral disease in deceased relatives. Nevertheless, the authors are not aware of any other published study on the validity of laterality reports, and one would have greater confidence in these findings if they were confirmed by another independent investigation.
The following are additional possible sources for the equivocal findings regarding the relationship between the risk of developing breast cancer and the laterality status of first-degree relatives:

1. Prophylactic mastectomy in the contralateral breast precludes bilateral breast cancer. This procedure, although relatively rare, is sometimes performed for women who are at an increased risk because of family history of the disease.

2. Women who have had primary breast cancer, and have been treated with tamoxifen, have reduced their risk of developing a second primary malignancy in the contralateral breast [CRC Adjuvant Breast Trial Working Party, 1988; Fisher et al., 1989]. Thus, for an unknown number of women who developed breast cancer since the early 1980s, tamoxifen treatment may have masked an innate predisposition for bilateral disease.

3. Since bilateral breast cancer is relatively rare, the lack of findings of associations may be attributed to insufficient statistical power.

CONCLUSION

This study demonstrates that researchers, psychologists, and medical counselors should exercise caution when their risk assessment and surveillance recommendations are based on a patient report of bilateral breast cancer in a relative, especially when the relative is deceased. The importance of the validity of such information is especially critical when dealing with a woman who is considering prophylactic mastectomy because of her perceived risk of developing breast cancer.

Furthermore, when designing a study, one should consider the potential biases associated with including women who, subsequent to the development of a primary breast cancer, have had prophylactic mastectomies or have been treated with tamoxifen.

REFERENCES

Validity of Bilateral Breast Cancer Reports


APPENDIX

Method of Estimating Number of Affected Relatives Who Were Misclassified as Having Had Unilateral Breast Cancer

Using the following equation, we estimated how many of the 33 deceased relatives whose hospital records had indicated unilateral status may have, in fact, developed a cancer in the contralateral breast subsequent to the date of the most recent medical record we had obtained:

\[
N = \sum_{i=1}^{33} \text{interval} \times R.R.f.h. \times R.R.age
\]

where \(N\) = the total number of expected contralateral breast cancers for this group. \(\text{Interval}\) = the period from the most recent hospital record we had obtained to the date of death; i.e., the period during which the relative was at risk for developing a contralateral breast cancer that the study might have missed. \(I\) = the annual incidence rate for developing a contralateral breast cancer. Robbins and Berg [1964] reported that this rate is constant over time and equals 0.7%, a figure that is consistent with more recent studies [Chaudary et al., 1984; Bernstein et al., 1992b; Fisher et al., 1984]. \(R.R.f.h.\) = the relative risk associated with the woman’s family history, as reported by Bernstein et al. [1992a]. Thus, \(R.R.f.h.\) equals 1 for women with no affected relatives (\(n = 8\); recall that the affected relatives did not necessarily have a family history of breast cancer; the Strang participants had the family history of the disease). \(R.R.f.h.\) is 1.4 for those having only an affected mother (\(n = 14\)) and 2.9 for those having...
only an affected sister (n = 3). Finally, since Bernstein et al. did not report a relative risk value for women with affected daughters, because their study included very few women in that category (Bernstein, personal communication, 1993), we assumed the relative risk in that group (n = 8) to be 1.9, i.e., the risk associated with having any affected first-degree relative [Bernstein et al., 1992a]. R.R.age = the relative risk associated with the age of onset of the affected relative, as reported by Chaudary et al. [1984]. Thus, R.R.age is 1 for women whose first breast cancer was diagnosed at the age of 40 years or older (n = 27) and 3 for those with such a diagnosis at an earlier age (n = 6).

Substituting the appropriate values into Eq. (1) yields a result of 1.12. Therefore, it seems likely that no more than one person with bilateral breast cancer was misclassified as having had unilateral disease.