The Association Between Cervical Abnormalities and Attitudes Toward Cervical Cancer Prevention

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Abstract

Background: We investigated whether a history of cervical abnormalities predicts responses to cervical cancer prevention for women and their daughters.

Methods: In 2007, we interviewed 832 mothers of adolescent daughters from North Carolina counties with elevated rates of cervical cancer. We measured the association of experiences with cervical abnormalities and emotions, beliefs, attitudes, and behaviors related to cervical cancer and its prevention.

Results: Anxiety about cervical cancer was higher among women who had cervical cancer, hysterectomies, and abnormal Pap test results (including false positives) than in women who had experienced none of these (each p < 0.05). Pap tests were perceived as being more effective at reducing the chance of developing cervical cancer by women with a history of cancer and women who reported hysterectomies relative to women with normal Pap results (each p < 0.05). Intentions to vaccinate their daughters against human papillomavirus (HPV) were highest among women who had cervical cancer, women who had hysterectomies, and women who were treated for precancerous lesions (each p < 0.05).

Conclusions: Women with histories of cervical health abnormalities reported more favorable views of Pap testing and HPV vaccination than women who had received only normal Pap testing results. They also reported higher levels of anxiety about cervical cancer.

Introduction

In 2004, 11,892 women in the United States received diagnoses of cervical cancer, and 3,850 women died of the disease.1 Prevention strategies have been developed to reduce the incidence and mortality of this disease, however. Screening with the Papanicolaou (Pap) test detects precursor lesions (cervical dysplasia) and cancer.2 The human papillomavirus (HPV) vaccine, newly available in 2006 for adolescent girls and young women, successfully prevents infection with HPV types that can cause cervical dysplasia and cancer.3 Both methods of cervical cancer prevention require active participation: women must decide to get screened regularly, and those with adolescent daughters may be responsible for their daughters’ HPV vaccination.

Previous studies have shown that individual factors, such as age,4 knowledge about prevention,5,6 social and cultural norms,7-9 fear and embarrassment,6,10-12 health beliefs,4,10,11 and receipt of an abnormal Pap test result,10,12,13 can affect attendance at cervical health screening. Similarly, studies have shown relationships between individual factors and attitudes toward the vaccination of adolescent daughters (see ref. 14 for review). Comparing the effect of women’s experiences with a range of cervical abnormalities has not been explored, however. Although the consequences of abnormal Pap tests have been studied, women who have received abnormal Pap test results may have had very different experiences with follow-up and treatment. To our knowledge, experiences with false positives (an abnormal Pap test resulting in no diagnosis of cancer or dysplasia) have not been investigated. Understanding the impact of experiences with cervical abnormalities, including false positives, can elucidate whether these experiences affect emotional well-being and can identify women who may be less likely to make an effort to prevent cervical cancer not only for themselves but also for their daughters. The intention to vaccinate adolescent daughters is especially important because mothers are in a unique role to provide this highly efficacious preventive measure.

This study examined whether experiences with cervical abnormalities, such as having had an abnormal Pap test,
having been treated for dysplasia, having a history of cervical cancer, or having had a hysterectomy, are related to emotions, beliefs, attitudes, and behaviors related to cervical cancer and its prevention for both women and their daughters. We conducted this study in areas with high cervical cancer incidence and mortality, where efforts to improve cervical cancer prevention are most needed.

Materials and Methods

Sample

The current study is part of the Carolina HPV Immunization Measurement and Evaluation (CHIME) Project, which is described elsewhere. Briefly, among 3259 households contacted, we screened 89% for eligibility. Of 1220 eligible households, a sample of 889 (73%) female and male caregivers of adolescent girls (aged 10–18) in five counties in North Carolina participated. We selected the five counties (Duplin, Harnett, Sampson, Wayne, and Cumberland) for their having a high incidence and mortality of invasive cervical cancer, at least 20% African American residents, and at least 1500 girls in the age range 10–18 years. Annual cervical cancer rates in these counties ranged from 10.2 to 13.9 incident cases during 1993–2003 and 4.2 to 6.5 deaths during 1994–2004, substantially higher than corresponding U.S. rates (8.6 incident cases and 2.9 deaths).

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Trained interviewers administered a telephone survey between July and October of 2007. The current study examines responses of female caregivers. As 97% of the female caregivers were mothers, we refer to the caregivers as mothers and the adolescent girls as daughters.

Cervical health measures

The survey appears online at www.unc.edu/~ntbrewer/2007_caregiver1.pdf. Mothers reported their history of cervical cancer screening, results of screening, and follow-up of abnormal results. Using these responses, we created six mutually exclusive categories of participants by (1) identifying women who reported a history of cervical cancer and then (2) women who had had hysterectomies but did not have cancer. Following the same process of successive exclusion, we divided the remaining women into four additional groups: (3) ever had an abnormal Pap test result followed by colposcopy and treatment for precancerous lesions, (4) ever had an abnormal Pap test result followed by colposcopy but no further treatment, (5) ever had an abnormal Pap test but never had colposcopy, or (6) had only normal Pap test results. We distinguished abnormal Pap test results that were followed by colposcopy (group 4) and those that were not followed up with colposcopy (group 5) because women may feel more anxiety related to the additional procedure, which may, in turn, foster different preventive behaviors. We refer to group 4 as women who received false positive screening test results because this group of women reported having an initial abnormal test result, follow-up with colposcopy, and no subsequent treatment, suggesting that neither precancerous lesions that required treatment nor cancer was present. We acknowledge that this characterization of false positives is imperfect in that some women may not get a recommended colposcopy after an abnormal Pap test and physicians differ in whether and how they treat some cervical abnormalities found during colposcopy (e.g., low-grade lesions). However, the elicitation of information to determine a false positive was based on recall of treatment rather than the result of the colposcopy because we believed that treatment may be more salient and easier for respondents to remember and understand than the result of each Pap test and colposcopy.

Outcome measures

The survey assessed anxiety about developing cervical cancer, the perceived likelihood of the daughter developing cervical cancer if she were not vaccinated, the perceived likelihood of a girl the daughter’s age developing cervical cancer, and the perceived severity of cervical cancer if the daughter developed cervical cancer. Intended adherence to cervical cancer screening was measured as the women’s intention to undergo Pap testing in the next 3 years. We also assessed recent Pap testing and vaccination behaviors. Beliefs about cervical cancer screening were measured as trust in the Pap test to provide accurate information and belief that routine Pap testing reduces women’s chances of developing cervical cancer. We measured the intention to vaccinate one’s daughter against HPV using four items that captured different vaccination scenarios: the likelihood of vaccinating one’s daughter (1) in the next year, (2) if the vaccine were free, (3) if the vaccine were only effective against cervical cancer, and (4) if the vaccine were only one shot. These were highly correlated and were, therefore, combined into a single scale (alpha = 0.96).

Because validated measures do not exist for these cervical cancer-specific constructs, we created ad hoc measures of emotions, beliefs, attitudes, and behaviors. All emotion, belief, and attitude measures were assessed on 4-option response scales, with 4 representing the strongest endorsement of the statement. The response scales ranged from “not at all” to “very” for the anxiety scale, from “very unlikely” to “very likely” for the perceived likelihood of cervical cancer items, from “slightly” to “extremely” for the perceived severity item, from “not at all” to “a lot” for the trust and belief in effectiveness of Pap test items, and from “definitely won’t” to “definitely will” for the intention to have Pap test and intention to vaccinate daughter items. For the last Pap test being on time, the options were that the last test was “3 years ago or less”, “more than 3 years ago”, and “never had one.” Women who had hysterectomies were not asked about their emotions, beliefs, and attitudes toward cervical cancer, screening behaviors, or screening because most are no longer susceptible to cervical cancer. These women were asked only about past screening behavior, perceived likelihood and severity of their daughter getting cervical cancer, and intended HPV vaccination for their daughters.

Covariates

We assessed women’s age, race, and education as potential covariates in analyses. We coded age as a continuous variable, race as a categorical variable (white, black, and other), and education as a dichotomous variable (high school education or less vs. more than high school education).

Data analyses

Multivariable logistic and linear regression techniques modeled the association of cervical health with each of the outcome measures, controlling for the covariates described.
We dummy coded the levels of cervical health history, with having only normal Pap tests as the reference group for all comparisons. We note significant associations within each model using a critical alpha of 0.05. To simplify comparisons between each category of cervical health history, rather than present regression coefficients, we present mean levels of continuous outcomes and percentages for dichotomous outcomes for each cervical health category in the tables. In the text, we also present dichotomized descriptive data to aid interpreting means for some continuous outcomes. Analyses were conducted unweighted in Stata (Stata Corp., College Station, TX) using two-tailed tests.

### Results

Of 835 mothers who completed the survey, analyses excluded 1 participant who reported never having had a Pap test, cervical cancer, or a hysterectomy and 2 who could not remember if they had ever had abnormal Pap test results. Of the resulting analytic sample of 832 mothers, 70% were non-Hispanic white, and the mean age was 43 years (Table 1).

Forty-three percent of women had received only normal Pap test results in their lifetimes (356 of 832). Thirty-seven percent had either had abnormal Pap test results without subsequent follow-up with colposcopy (129 of 832), abnormal Pap test results followed by colposcopy with no further treatment (which we defined as a false positive) (97 of 832), or presumed precancerous lesions that were treated after colposcopy (84 of 832). In these counties with high cervical cancer rates, 20% reported either having been diagnosed with cervical cancer (37 of 832) or having had hysterectomies (129 of 832).

### Cervical cancer emotions, attitudes, and beliefs

Emotions, attitudes, and beliefs related to cervical cancer varied by cervical health history (Table 2). Women who had a history of cervical cancer reported the most anxiety about developing cervical cancer in the future, substantially higher than women who experienced only normal Pap testing results ($p < 0.05$). Of women with a history of cervical cancer, 63% reported being moderately or very anxious compared with 23% of women with normal Pap tests. However, even women who had some history of abnormal Pap results (without colposcopy follow-up, with normal colposcopy results, or with ensuing treatment for precancerous lesions) reported greater anxiety than women who experienced only normal Pap testing results (each $p < 0.05$).

Women who had a history of cervical cancer reported the highest perceived likelihood that their daughters or girls her age would develop cervical cancer ($p < 0.05$). Of women who had a history of cervical cancer, 70% reported that their daughters had a moderate or high chance of getting cervical cancer, compared with 31% of women with normal Pap tests.

### Table 1. Demographic Characteristics of Survey Sample (n = 832)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
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<tr>
<td>Mother</td>
<td>43.4</td>
<td>6.49</td>
</tr>
<tr>
<td>Daughter</td>
<td>14.8</td>
<td>2.50</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity of mother</td>
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<td></td>
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<tr>
<td>Non-Hispanic white</td>
<td>583</td>
<td>70</td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>196</td>
<td>24</td>
</tr>
<tr>
<td>Hispanic</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>27</td>
<td>3</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Education of mother</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate or less</td>
<td>174</td>
<td>21</td>
</tr>
<tr>
<td>Some college</td>
<td>313</td>
<td>38</td>
</tr>
<tr>
<td>College graduate</td>
<td>240</td>
<td>29</td>
</tr>
<tr>
<td>Any postcollege</td>
<td>105</td>
<td>13</td>
</tr>
<tr>
<td>Annual household income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$50,000</td>
<td>274</td>
<td>33</td>
</tr>
<tr>
<td>≥$50,000</td>
<td>526</td>
<td>63</td>
</tr>
<tr>
<td>Missing</td>
<td>32</td>
<td>4</td>
</tr>
<tr>
<td>Rural/urban</td>
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<td></td>
</tr>
<tr>
<td>Rural</td>
<td>411</td>
<td>49</td>
</tr>
<tr>
<td>Urban</td>
<td>421</td>
<td>51</td>
</tr>
</tbody>
</table>

SD, standard deviation.

We dummy coded the levels of cervical health history, with having only normal Pap tests as the reference group for all comparisons. We note significant associations within each model using a critical alpha of 0.05. To simplify comparisons between each category of cervical health history, rather than present regression coefficients, we present mean levels of continuous outcomes and percentages for dichotomous outcomes for each cervical health category in the tables. In the text, we also present dichotomized descriptive data to aid interpreting means for some continuous outcomes. Analyses were conducted unweighted in Stata (Stata Corp., College Station, TX) using two-tailed tests.

### Table 2. Attitudes About Cervical Cancer

<table>
<thead>
<tr>
<th></th>
<th>Have anxiety about cervical cancer</th>
<th>Perceived likelihood of daughter developing cervical cancer</th>
<th>Perceived likelihood of girl daughter’s age developing cervical cancer</th>
<th>Perceived severity of daughter developing cervical cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical cancer</td>
<td>n = 37</td>
<td>2.77*</td>
<td>3.05*</td>
<td>3.13*</td>
</tr>
<tr>
<td>Hysterectomy, no cancer</td>
<td>129</td>
<td></td>
<td>2.47*</td>
<td>2.93</td>
</tr>
<tr>
<td>Abnormal Pap test</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treated for cervical dysplasia</td>
<td>84</td>
<td>2.24*</td>
<td>2.49*</td>
<td>3.10*</td>
</tr>
<tr>
<td>Received colposcopy but not treated (false positive)</td>
<td>97</td>
<td>2.11*</td>
<td>2.40</td>
<td>2.78</td>
</tr>
<tr>
<td>Did not receive colposcopy</td>
<td>129</td>
<td>2.15*</td>
<td>2.42</td>
<td>2.93</td>
</tr>
<tr>
<td>Normal (Ref)</td>
<td>356</td>
<td>1.85</td>
<td>2.30</td>
<td>2.87</td>
</tr>
<tr>
<td>All</td>
<td>832</td>
<td>2.02</td>
<td>2.41</td>
<td>2.92</td>
</tr>
</tbody>
</table>

*a Item was not asked of women with hysterectomies; n = 703 for this item.

*b All emotion, attitude, and belief measures were assessed on 4-option response scales, with 4 representing the strongest endorsement of the statement.

*p < 0.05 Analyses controlled for age, education, and race.

Ref, reference group.
The groups reported similar perceptions about how severe cervical cancer would be if their daughters developed it.

Screening attitudes

Women’s trust in Pap testing to detect cervical cancer was relatively high—92% trusted the test a moderate amount or a lot—and did not differ across groups (each \( p > 0.05 \) (Table 3). Women who reported a history of cervical cancer or hysterectomies believed Pap tests were more effective at reducing the chance of getting cervical cancer than did mothers who had normal Pap results (each \( p < 0.05 \)). Of women who had a history of cervical cancer, 96% thought Pap tests would reduce the chances of getting cervical cancer a lot, compared with 57% of women with normal Pap tests.

Screening behavior

Ninety-one percent of women reported they received a Pap test within the last 3 years. Women who had hysterectomies were less likely than women who received normal results to have reported that their last Pap test was on time (83% vs. 90%, \( p < 0.05 \)), and women who had not had cervical cancer but were treated for precancerous lesions were more likely than women who received normal results to have reported that their last Pap test was on time (98% vs. 90%, \( p < 0.05 \)). No other groups differed in the timing of their last Pap test from women with normal results. Most (91%) respondents reported being very likely to receive their next recommended Pap test in the next 3 years. Intentions to be screened were similar across groups.

HPV vaccination

Twelve percent of women reported that their daughters had received at least one dose of HPV vaccine, and daughters’ vaccine initiation did not differ by mothers’ cervical health. Among mothers who had not already vaccinated their daughters (\( n = 730 \)), intentions to vaccinate their daughters against HPV were fairly high (mean = 2.90 on a 4-point scale). Women who were treated for precancerous lesions, women who had hysterectomies, and women who had a history of cervical cancer all had greater intentions to vaccinate their daughters against HPV than women who had normal Pap test results (each \( p < 0.05 \)) (Table 3).

Discussion

Women from a geographic area with high cervical cancer incidence and mortality held generally positive attitudes toward cervical cancer prevention regardless of their history of cervical abnormalities. Women with more severe cervical abnormalities typically reported greater attention to cervical cancer and its prevention, both for themselves and for their daughters, than women with less severe or no cervical abnormalities. At the same time, women who had cervical cancer had the greatest anxiety about cervical cancer, followed by women who had a hysterectomy, women who had been treated for precancerous lesions after a colposcopy, and finally women who had an abnormal Pap test result.

The finding that experiences with cervical health, on the whole, were related to mothers’ intentions to vaccinate their daughters against HPV presents an opportunity for intervention. Healthcare providers treating cervical abnormalities could take advantage of this attention to cervical health and counsel mothers to ensure their adolescent daughters receive HPV vaccine and begin Pap testing when appropriate. These educational opportunities could also extend to routine Pap testing and during discussion of all Pap test results, as women with no or only minimal cervical abnormalities (such as an abnormal Pap result) may be the least attentive to cervical cancer prevention.

Most of the outcomes in this study (such as the belief that screening is accurate and the intention to get screened) addressed beliefs and attitudes in favor of cervical cancer prevention. Anxiety about cervical cancer is the only outcome that may be detrimental to women. We found that the association of having cervical abnormalities and experiencing anxiety about cervical cancer was strong. Indeed, among women who had neither cancer, hysterectomies, nor treatment for dysplasia, having had one or more abnormal Pap test results (with or without colposcopy follow-up) was still associated with greater anxiety about developing cervical can-

<table>
<thead>
<tr>
<th>Table 3. Attitudes and Behavior Related to Cervical Cancer Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cervical cancer</strong></td>
</tr>
<tr>
<td><strong>n</strong></td>
</tr>
<tr>
<td><strong>Hysterectomy, no cancer</strong></td>
</tr>
<tr>
<td><strong>Abnormal Pap test</strong></td>
</tr>
<tr>
<td><strong>Treated for cervical dysplasia</strong></td>
</tr>
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<td><strong>Received colposcopy but not treated (false positive)</strong></td>
</tr>
<tr>
<td><strong>Did not receive colposcopy</strong></td>
</tr>
<tr>
<td><strong>Normal (Ref)</strong></td>
</tr>
<tr>
<td><strong>All</strong></td>
</tr>
</tbody>
</table>

<sup>a</sup>Item was not asked of women with hysterectomies.

<sup>b</sup>All attitude, belief, and intention measures were assessed on 4-option response scales, with 4 representing the strongest endorsement of the statement.

<sup>c</sup>Item was not asked of women who reported their daughters had already initiated HPV vaccination.

<sup>*</sup>\( p < 0.05 \). Analysis controlled for age, education, and race.

HPV, human papillomavirus.
cancer, compared with women who have had only normal Pap test results. Even the threat of disease was associated with having higher anxiety about cervical cancer. A review of determinants of screening for cervical cancer noted that the misperception of an abnormal Pap test result as a diagnosis of cancer may be responsible for heightened distress. Further studies may help to explain if this finding of increased anxiety is due to such a misperception. Our study found no other differences between these women who had at least one abnormal Pap test results and women with only normal Pap results, suggesting that aside from their higher levels of anxiety about developing cervical cancer, their attitudes toward prevention may not have been greatly affected by their experiences with cervical cancer screening.

It is possible that anxiety about cervical cancer is useful. Anxiety could lead to a higher likelihood of getting screened or ensuring that one’s daughter receives HPV vaccine. Ultimately, it is important to minimize unnecessary anxiety about cervical cancer while maintaining any positive influence it has on screening attendance and vaccination. Whether changes in cervical health lead to changes in anxiety about cervical cancer and whether this anxiety increases uptake of preventive measures merit further study using a longitudinal design.

Our study revealed that receiving a false positive Pap test result was associated with heightened anxiety about cervical cancer. Although studies have shown that receiving abnormal Pap test results can increase anxiety in the short term and follow-up colposcopy can have further negative psychological consequences (see refs. 10 and 13 for reviews), we are aware of no studies that have investigated whether abnormal Pap tests are associated with anxiety about cervical cancer after additional testing has ruled out cancer or treatable precancerous lesions. Lerman et al. found that 3 months after an abnormal Pap test, women who underwent colposcopy were more worried about cancer than were women who received a normal Pap test result. However, the women with abnormal Pap test results included some who had been treated for precancerous lesions as well as those who had not been treated after colposcopy (i.e., likely had false positive results), and it is not known if both experiences triggered lingering worry about cancer.

Our finding that women with a history of abnormal Pap tests, regardless of the outcomes of follow-up testing, had greater anxiety about cervical cancer is troubling because false positives are common in cervical cancer screening. Up to 14% of Pap tests yield positive results when colposcopy finds no abnormal cervical cells. Given that women in the United States annually receive about 60 million Pap tests, millions of women each year face false positives from these tests. Despite the high incidence of false positive Pap tests, the consequences of false positives on future screening behavior and well-being are not well known. Whether doctors use a subsequent normal Pap test result or a colposcopy to rule out cervical cancer, women’s anxiety may linger. In breast cancer, this effect is better established. A recent systematic review found that women who received false positive mammogram results were more anxious and worried about breast cancer. Further, they were more likely to conduct breast self-examinations, which is often interpreted as an indicator of anxiety. Findings from the present study suggest that false positive cervical cancer screening results may have similar consequences.

This study has several potential limitations. The temporal association of receiving a false positive or having another cervical health issue and any of the psychosocial outcomes cannot be determined from this cross-sectional study. A longitudinal study would further clarify how cervical health relates to later cervical cancer-related attitudes, beliefs, and behaviors and if differences would diminish over time. Self-report of a history of cervical cancer yielded 37 cases of 835 women in the study, which may be higher than typical, even in these North Carolina counties with high incidence and mortality. It is possible that some women confused cervical dysplasia with cancer, and they may have been categorized more appropriately as treated for dysplasia or even having had a false positive. Similarly, a meta-analysis of the accuracy of self-report of Pap test results has shown that although women accurately remember abnormal results (sensitivity 90%), they are more prone to remembering normal results as abnormal (specificity 48%), suggesting that some of the women in this study may have inaccurately recalled a Pap test result as being abnormal. Women who reported more health problems than they actually experienced may have a heightened awareness of cervical cancer and increased concern about this issue, thus potentially making the effects found in this study larger than they would otherwise be. However, the survey specifically asked whether a doctor had diagnosed the cervical cancer, which should reduce this type of misclassification. Similarly, the survey thoroughly described both colposcopy and treatments for dysplasia, with the intent of clarifying any confusion between the two.

Our findings suggest that women who have a history of cervical abnormalities have heightened anxiety about cervical cancer, a stronger belief in the usefulness of prevention, and greater intentions to participate in cervical cancer prevention for themselves and their daughters. This effect was less pronounced for less severe abnormalities (such as having had at least one abnormal Pap test) and most prominent among women who reported having been diagnosed with cervical cancer. In this high-risk and ethnically diverse population, it is especially important to understand behavioral factors that contribute to the high incidence and mortality of cervical cancer. These findings identify opportunities for intervention to increase uptake of cervical cancer screening and HPV vaccination and to reduce unnecessary anxiety about cervical cancer.

Acknowledgments

This study was funded by grants from the Centers for Disease Control and Prevention and the American Cancer Society (MSRG-06-259-01-CPPB).

Disclosure Statement

T.S. and S.L.G. have no conflicts of interests to report. N.T.B. has received research grants from GlaxoSmithKline and Merck & Co. for studies of attitudes toward HPV vaccination after he completed the present study. J.S.S. has received research grants or contracts, honoraria, or consulting fees during the last 4 years from GlaxoSmithKline and Merck & Co.

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Health and Human Services, CDC and the National Cancer Institute, 2007.


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