furniture, and other surfaces in the room or rooms in which the smoking takes place. If a child or other nonsmoker then enters that room in which TSNA-contaminated dust settles or has contact with a carpet that’s permeated with nicotine and resultant TSNAs (a toddler on the floor, for example), he or she is directly exposed to potent carcinogens.

“The closer the person is to the floor,” explains Dr. Gundel, “the more house dust would contain these compounds. The more the inhalation route would be important because the bigger dust stays close to the floor where the kids would be playing. House dust would pick up nicotine just like these other surfaces do.”

**Tobacco-Specific Nitrosamines**

One of the most alarming characteristics of TSNAs is their longevity. “[TSNAs] are among the most broadly acting and potent carcinogens present in burned tobacco and tobacco smoke,” write Sleiman et al.

Smokers may have long believed that they were not exposing nonsmokers to their carcinogens if they smoked in an enclosed space without others being present. In fact, the findings of Sleiman et al clearly demonstrate that anyone who smokes in a home, car, or other enclosed area in which nonsmokers later are present is exposing those nonsmokers to potent carcinogens.

“We know that these compounds are quite stable under indoor relevant conditions, so the levels can build up with time, the levels can be higher and higher if someone keeps smoking at a regular pace in the home,” Dr. Sleiman says. The more a person smokes in the home or car, the more TSNAs are formed and sorbed onto environmental surfaces, and into materials such as cotton, cellulose, upholstery, and carpeting.

**The Public Health Message**

Complicating this public health picture is the finding that the removal of TSNAs from real-world contaminated contexts (including hair, skin, homes, cars, bars, and hotel rooms) may be more difficult than simply dry cleaning or washing with soap and water. In fact, cleansers that dissolve nicotine into water must be acidic. “We can wash a marble countertop with vinegar and the nicotine will go away,” notes Dr. Gundel. Most soaps, however, are alkaline and will not effectively remove nicotine residue, even from smooth stone or metallic surfaces.

Removing thirdhand smoke in the form of nicotine residue from carpet, for example, especially carpet with long-term exposure, would be nearly impossible. “When we consider the carpet,” continues Dr. Gundel, “we don’t see how to get rid of the nicotine and the TSNAs. Carpet will continue to uptake nicotine continually. We can’t see the end of the nicotine off-gassing. There’s so much nicotine coming to the surface from the years of deposition that I couldn’t say how to remediate it.”

Dr. Gundel offers this solution: “We should keep public places 100% smoke free and smokers should not smoke in or near their homes if they have children.”

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**Tamoxifen Infrequently Used by Women at Risk for Breast Cancer**

The prevalence of tamoxifen use for the primary prevention of breast cancer is “exceptionally low” among women in the United States, according to an analysis of National Health Interview Survey (NHIS) data published recently in *Cancer Epidemiology, Biomarkers & Prevention* (2010;19: 443-446).

According to results of the Breast Cancer Prevention Trial published in 1998, tamoxifen reduced the risk of developing invasive breast cancer by 49%, and the relative risk reduction for estrogen receptor-positive invasive breast cancer was 69% (*J Natl Cancer Inst*. 1998;90:1371-1388). Despite this substantial risk reduction, subsequent studies have indicated that tamoxifen is used for chemoprevention by only a very small percentage of eligible women.

A 2003 analysis of data obtained from the 2000 NHIS suggested that 15.5% of white women and 5.7% of black women ages 35 to 79 years were eligible for tamoxifen chemoprevention based on the eligibility criteria of the
US Food and Drug Administration and that the benefits outweighed the risks for 4.9% of white women and 0.6% of black women (J Natl Cancer Inst. 2003;95:526-532.).

Nonetheless, in their current study of NHIS data, lead author Erika A. Waters, PhD, et al reported that “In 2000, 0.2% of US women ages 40 to 79 [years] without a personal history of breast cancer took tamoxifen for chemoprevention (95% confidence interval [95% CI], 0.13-0.31). In 2005, the prevalence was 0.08% (95% CI, 0.03-0.17).”

Although data limitations in this study precluded the optimal identification of eligible high-risk patients and of those who had chosen raloxifene rather than tamoxifen for risk reduction, the wide gap between the estimated proportions of women using tamoxifen and those likely to have a net benefit is clearly apparent.

A Difficult Choice
“We are not suggesting that tamoxifen is appropriate for everyone,” Dr. Waters tells CA. “The decision to take tamoxifen, and raloxifene now, is a very important decision that should be made on an individual basis between a woman and her doctor. It’s a difficult decision and there are a lot of factors to consider beyond…the probability of developing breast cancer.” Dr. Waters is an assistant professor at the Washington University School of Medicine in St. Louis, Missouri.

Dr. Waters adds that tamoxifen is not for everyone. “Its appropriate use is among high-risk women,” she says. “I hope that [this study] will encourage physicians to sit down and talk with their patients about these possibilities.”

Very Effective Drug, Very Little Use
The study by Waters et al was not designed to address reasons for the prevalence of tamoxifen use, although the authors offer some hypotheses. According to Dr. Waters, physicians, particularly those who do not believe themselves to be well informed regarding breast cancer risk reduction options, are often reluctant to discuss tamoxifen with patients who are eligible to consider chemoprevention. She also notes that few women at high risk choose tamoxifen after being offered this option by their physicians. “There is a growing body of evidence showing that concern about side effects is one of the primary drivers for women’s reluctance to take tamoxifen,” she adds.

Some women may simply be concerned about taking a drug every day. Of course, taking a drug that potentially has serious side effects and from which a woman does not see direct benefits is a very difficult decision. “If I were taking tamoxifen and I didn’t get breast cancer, how would I know if that was because of tamoxifen or because of something else?” Dr. Waters asks. “On an individual basis, it’s a very difficult choice. I would say that concerns about side effects are prevalent and legitimate.”

“If the drug had no toxicity at all, I think that women would be more accepting of chemoprevention,” Christy Russell, MD, tells CA. “They’re certainly willing to take oral contraceptives or hormone replacement therapy because they view [these] as medicines that are having a very specific effect even though those same hormones cause many of the same toxicities that tamoxifen does.” Dr. Russell is associate professor of medicine at the University of Southern California (USC)/Norris Comprehensive Cancer Center at the University of Southern California School of Medicine in Los Angeles and director of the USC Norris Breast Center.
Both tamoxifen and raloxifene can increase a woman’s risk of blood clots. Both drugs can cause hot flashes. “In some women, [hot flashes] are mild and in others they are debilitating,” Dr. Waters says.

**What Can Doctors Do?**
Given the clear benefit that chemoprevention with tamoxifen or raloxifene can confer on women at high risk of developing breast cancer, physicians have an interest in helping these women make informed choices about the use of these drugs. “Well-constructed decision aids can help patients understand the risks and benefits of treatment,” Dr. Waters says. “These decision aids use a variety of strategies to present the probabilities to people. For example, we know that using pictographs [such as] groups of shaded and unshaded blocks to convey numerical estimates of benefits and risks improves understanding. In addition, highlighting the incremental change in risk/benefit conferred by taking the drug, rather than just the probabilities, also helps.”

**A Significant Study?**
“I think it’s absolutely significant,” Dr. Russell says. “I think we need to continue to emphasize the huge impact of breast cancer on women in this country. Chemoprevention is something that needs to stay in our vision and minds.”

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