Over the past 3 decades, trends in breast cancer incidence rates have changed dramatically. Breast cancer has been the most common cancer diagnosed among women during this entire time period, with more than 180,000 women in the United States diagnosed annually. Approximately 4000 women in Wisconsin are diagnosed each year. This report briefly summarizes the major changes in breast cancer incidence and mortality rates that have occurred since 1980 and the contributions that Wisconsin population science has made to our understanding of the reasons for these changes.

**Increased Breast Cancer Incidence in the 1980s**

Current patterns of breast cancer incidence rates are based on events of the 1980s. As shown in Figure 1, incidence of breast cancer increased considerably beginning around 1982, coinciding with the dissemination of population screening mammography. This rise in incidence was concentrated in early-stage breast cancer, with localized breast cancer increasing by 37% and carcinoma in situ of the breast increasing by 328% between 1980 and 1988.

**Decreased Breast Cancer Mortality Rates after 1992**

Beginning in 1992, breast cancer mortality rates declined for the first time. Simulation modeling demonstrated that approximately half of the decline was likely due to early detection by screening mammography and the remainder from advances in adjuvant tamoxifen and multi-agent chemotherapy.

**Understanding the Causes of Breast Cancer**

Though the decline in breast cancer mortality rates was a landmark event, the consequences of the Women’s Health Initiative were no less important. The Women’s Health Initiative was a randomized controlled trial comparing postmenopausal hormone therapy to placebo among 16,000 women; more than 40 clinical sites recruited women for this trial, including a site at the University of Wisconsin-Madison (UW-Madison). In July 2002, the trial was stopped early due to the net adverse effects of the combined estrogen and progestin intervention. In the same month, a case-control study also including Wisconsin research participants showed nearly identical results: combined estrogen-progestin therapy increased risk of breast cancer by more than 20%.

The adverse effects of hormone use on breast cancer incidence, combined with the deleterious impact on coronary heart disease, stroke, and pulmonary embolism, led to the precipitous and widespread decline in hormone use among postmenopausal women; combined oral estrogen/progestin use declined by 74% between July 2002 and July 2003. Subsequently, the incidence of breast cancer declined by 8.6% between 2001 and 2004, the first decline in documented history (see Figure 1). This decline instigated a national debate regarding its causes.
In addition to the undeniable influence of the precipitous drop in combined oral estrogen and progestin use, other contributions include reductions in use of screening mammography,\textsuperscript{11} the anticipated decline (as observed with prostate cancer incidence rates) resulting from the decline in the pool of prevalent unscreened cases,\textsuperscript{12} and the mammographic detection of breast tumors of limited malignant potential.\textsuperscript{13} Continued surveillance is necessary to separate the contributions of these many factors.

A cautionary note is warranted. Although use of postmenopausal hormones has declined, several risk factors for breast cancer are becoming more common, most importantly obesity. Research conducted in Wisconsin agrees with studies conducted nationally that showed that obesity increases risk for postmenopausal breast cancer as much as 2-fold.\textsuperscript{14-15} Obese women who self-detect their breast cancers are 80\% more likely to have advanced disease as compared with leaner women.\textsuperscript{16} Obese breast cancer survivors are also more likely to experience a second breast cancer diagnosis and have poorer survival rates.\textsuperscript{17-18}

**Summary and Future Directions**

The recent decline in both incidence and mortality from breast cancer are reasons for optimism that the burden of this common cancer will continue to decrease. Studies at UW-Madison have demonstrated the value of our state as a population research laboratory due to the commitment of women in the general population to participating in research and the support of the Department of Health Services, the validity of multiple study design approaches to investigate important research questions, and the dramatic impact that health research can have on the population. The breast cancer research program at UW-Madison will continue to investigate the impact of early detection efforts and risk factors, including obesity. Sustained research and translation of research findings are necessary to further reduce breast cancer incidence and mortality rates.

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