Testimony

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Breast Cancer Screening Improvement Means Considering the Entire Process

Statement of
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Thank you for the opportunity to speak to you today. I am Dr. Stephen Taplin, the Chief of the Applied Cancer Screening Research Branch at the National Cancer Institute (NCI) within the National Institutes of Health (NIH), an agency of the Department of Health and Human Services (HHS). The National Cancer Institute, dedicated to the understanding, diagnosis, treatment, and prevention of cancer, supports research on all aspects of breast cancer, including numerous research projects to understand and improve breast cancer screening. In my Branch, our research promotes the appropriate use of efficacious cancer screening tests, as well as strategies for informed decision-making regarding cancer screening technologies. Before coming to NCI, I spent 20 years as a practicing family physician while managing an organized breast cancer screening program and conducting screening research at the Group Health Cooperative health plan.

We have nearly 50 years of research in breast cancer screening and treatment that is now having a positive impact on the lives of women. Breast cancer incidence increases markedly as women age. If we count cancers for a year among 100,000 women ages 20-24, 1.4 breast cancers will be

diagnosed but if we look instead among the same number of women ages 75-79 the number increases to 454 (Figure 1). While research and infrastructure is required to establish those incidence numbers, a demonstrated reduction in death due to breast cancer (breast cancer mortality) is more convincing evidence of our progress. Across all age groups we have seen breast cancer mortality drop in the United States since 1975. The absolute magnitude of the drop differs by age group such that mortality has dropped since 1975 from 5.3/100,000 to 3.1/100,000 among women ages 20-39, and from 110.6/100,000 to 95.2/100,000 among women ages 70-79. Since 1990 the rate of decline has accelerated and the annual percent reduction in mortality has been a fairly consistent 2-3% per year over the past 10 years across all age groups.(1) This reduction in mortality is due to both improvements in treatment and improvements in screening. It seems clear that most, if not all, of the decrease in breast cancer mortality in women under age 40 is due to improvements in treatment, since women under age 40 are not the typical target for screening efforts in the U.S. An elegant set of modeling studies by Berry and colleagues demonstrated that approximately half the reduction in mortality among women ages over 40 is due to screening.(2)

Screening for cervical, breast, and colon cancers by Papanicolaou tests (Pap smears), mammography, and fecal occult blood tests or endoscopy, respectively, are a major part of health care in the United States. Together they are used by at least 82 million people each year. These tests have been recommended by national expert groups based on national cohort studies (cervix) and randomized trials (breast, colon).(3-6) Randomized trial results in breast cancer screening have been a source of controversy since the mortality reduction among women ages 40-49 is less than among older women and appears later in the course of life after screening.(4;7) Using data from studies supported by NCI and international groups, the United States Preventive Services Task Force (USPSTF), a group supported by HHS's Agency for Healthcare Research & Quality that includes researchers and practitioners responsible for national evidence summaries and recommendations, concluded that the relative risk of breast cancer death is 0.84 (95% CI, 0.77-0.91) for women ages 40 to 74, and they therefore recommend screening begin at age 40.(4)

As a result of these randomized trial results and national recommendations, there has been encouragement of breast cancer screening among average risk women in the United States since the mid 1980s and we saw a rise in use of mammography throughout the 1990s. Recommendations for screening vary. The USPSTF suggests screening every 1-2 years starting at age 40, while the American Cancer Society (ACS) recommends annual mammography from age 40 onward.(4;8) The USPSTF has been reviewing the literature since their last statement in 2002 and an update is anticipated this year.

There are also recommendations from the ACS regarding screening among women at high risk of developing breast cancer. The 1-2% of the population of women at greater than 25% lifetime risk for breast cancer are recommended to screen with magnetic resonance imaging (MRI) based on its higher sensitivity in dense breast tissue.(9) MRI also offers the advantage that it does not use ionizing radiation and therefore avoids the problem that women at high risk may also be more susceptible to the mutagenic potential of mammography.(10) A great deal of work is underway to improve the specificity of MRI since false positive testing continues to be a limitation.(11) There is some concern expressed that MRI screening may identify non-life threatening tumors in the breasts (known as over-diagnosis) that may lead to unnecessary

treatments and this is an area of needed research. One approach is to more closely examine biomarkers and biomarker profiles that may identify the lethal cancers or that may someday be the preliminary screening test. (11;12)

In the average-risk population, breast cancer screening occurs primarily by screen-film techniques but digital mammography now accounts for 42% of screenings in NCI's Breast Cancer Surveillance Consortium and that proportion is rising.(13) While there was concern that screening rates were dropping during the middle of this decade, they appear to be stabilizing at about 66%.(14)

Despite the stabilization of screening in the population as a whole there are subpopulations in which screening rates are lower, and those are primarily defined by economic status and access to care. Apparent lower rates of screening among African-Americans, Hispanics, and Asian/Pacific Islanders compared to white non-Hispanics disappear when socioeconomic status is taken into account. Women in lower socio-economic groups are less likely to be screened, in large part because they do not have access to preventive care. People with less than 12 years education are the one group in the United States in which we have not seen a significant drop in breast cancer mortality.(15)

Access to medical care is critical to screening because screening is a process, not just a test.(16) Even when access exists, the screening process has multiple steps that are managed in clinical trials but not necessarily in usual practice in the United States (Figure 2): identifying the individuals at risk for specific types of cancer, offering screening to those individuals (recruitment), performing the screening test (detection), evaluating abnormalities (diagnosis), and treating the individuals who are diagnosed with pre-malignant conditions or cancer are all steps in the screening process.(16)

To address the challenge of prevention and care for low income and underinsured populations, which, unlike the nation as a whole, have not experienced that reduction in breast cancer mortality rates, HHS's Centers for Disease Control and Prevention (CDC) administers the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). This program provides breast and cervical cancer screening to low income, under- and uninsured women throughout the U.S. through grants to all 50 States, the District of Columbia, 12 American Indian tribes and tribal organizations, and 5 U.S. territories.(41) The NBCCEDP is based on a public health model and encourages these populations to utilize the full screening process by incorporating public education, professional development, and outreach; assuring quality through tracking and surveillance; facilitating screening follow-up, patient navigation, and case management; and referral to treatment for these underserved women. Furthermore, the NBCCEDP is keeping pace with the practices in the field by offering reimbursement for digital mammograms. Ongoing studies indicate that over the past 15 years, the NBCCEDP has saved more than 100,000 life years, creating significant health impacts.(40)

There is evidence of overuse, underuse, and misuse of cancer screening tests in the United States, but documentation of the complete screening process, its adverse consequences, and the potential improvements is limited.(17-19) There is also growing concern about the impact of false positive tests and the treatment of pre-cancerous conditions and cancers that may not affect

survival.(20) NCI is currently considering ways to increase our capacity for multi-site, coordinated, transdisciplinary research to evaluate and improve the screening process.

Screening has a large impact on health care and its costs. We used U.S. population census data and published screening rates to estimate that at least 82 million people in the U.S. are screened for breast, colon, and cervical cancers, and 8 million more undergo evaluations of abnormalities to find the 350,000 people who will have one of these cancers. Using these same data and available estimates of the costs of screening tests and follow-up, we estimate that the total costs of screening and follow-up testing each year are at least $8.8 billion.(21-24)

If we just consider breast cancer, then we estimate at least 22 million women are screened each year. We expect 192,370 new cases of invasive breast cancer by the end of 2009.(25) Over the 10-year period from 1990-2000, the U.S. spent an estimated $166 billion on breast cancer screening.(23) Analysis of actual practice during that time period suggests there is a need to optimize the screening process because additional quality adjusted life years could have been achieved, as well as $6 billion in cost savings could have been achieved with more optimal screening schedules than those demonstrated.(23) NCI is currently considering research to evaluate the screening process in the United States and how it can be systematically improved.

Although we have evidence of the benefit of screening, there is growing concern regarding its consequences for all those who will not get cancer, and some have argued that healthy people should be very skeptical of screening.(2;20;26;27) A small proportion of abnormal screening tests are cancers: 3-19% of abnormal mammograms, 2-29% of abnormal stool occult blood tests, 11% of abnormal virtual colonoscopies, and 0-5% of Pap smears.(28-32) These numbers change with the prevalence of cancer in the screened population and with the specific test (e.g., digital vs. screen film), but the majority of screened people do not have cancer even with a positive test. Therefore, limiting the adverse impact of screening involves both improving the screening test and evaluating how to improve the additional evaluation of abnormal tests so there are fewer false-positive tests that lead to biopsies and/or unnecessary treatment.

While we have some estimates of specific screening tests' performance we do not have those same estimates for the process as a whole, and furthermore, there is clear evidence that the screening process breaks down in practice.(3-5;33-35) For example, among people in a population where breast and cervical cancer screenings were available without additional charge, breakdowns in recruitment, detection, and follow-up after an abnormality accounted for 50%, 40%, and 10% of the poor outcomes, respectively.(34;35) Addressing these three parts of the screening process, and improving treatment of people with precursor lesions could therefore result in early diagnosis and reduce late-stage cancer rates and cancer mortality.(34-36)

NCI is supporting research across the continuum of steps in the screening process. Key areas relevant to optimizing screening for breast cancer include risk estimation using biologic data acquired before women develop disease; comparative effectiveness studies to evaluate the use of MRI (37), 3D ultrasound (38), and other emerging technologies as screening and diagnostic techniques; comparison of alternative screening and diagnostic strategies; and estimates of false positive screening rates, over-diagnosis, and biologic markers of cancer progression that can guide treatment and anticipate prognosis. Ongoing research includes work to understand methods

of presenting screening to low-income and ethnic minorities, evaluations of imaging technology, how to address the concern that screening is leading to cancer diagnoses that would otherwise not have affected women's lives, and work to personalize screening regimens and treatment by identifying biomarkers of cancer risk and progression.(39) Work supported by NCI through the American College of Radiology Imaging Network and through the American Recovery and Reinvestment Act is testing new technology to improve diagnostic testing, evaluate the effects of treatment, and reduce false positive testing. While we have made great progress in breast cancer screening and treatment we need to do more work to optimize the screening tests, explore the use of biomarkers as screening technology, and improve the screening process as whole.

My major messages are that 1) fewer women have died of breast cancer because research has led to progress in breast cancer screening and treatment, 2) the research provides evidence for women and their physicians to choose wisely among the options they face, but it is their behavior that changes care and improves outcomes, and 3) we have much more research to do to understand the screening process; to identify biomarkers of risk, cancer progression, and treatment response; and to use all of this information to personalize screening.
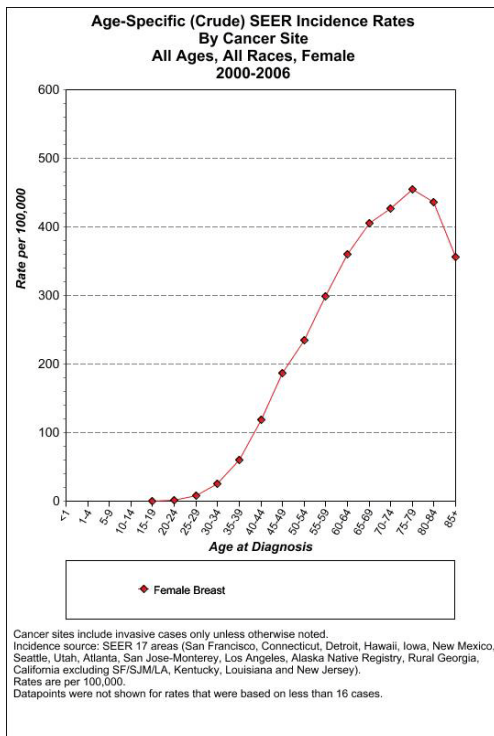
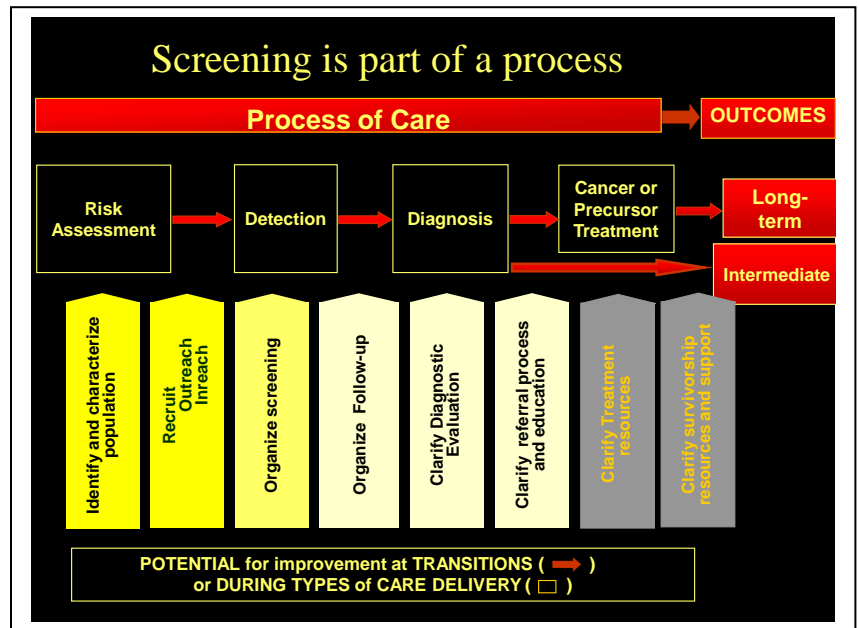Thank you for the opportunity to testify.

Figure 1:   Figure 2:

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