The Editor interviews:
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Editor: Dr. Strax, how do you respond to allegations that breast screening programs using mammography in addition to clinical examination may do more harm than good?

Dr. Strax: I have been involved in mammography for more than 20 years. I have always had a healthy respect for the potential impact of x-rays on the breast and I agree with those who note the need for taking precautions with mammography.

However, I question the assertion that mammography may cause more harm than good. I am particularly concerned that a negative view has been emphasized by the media, with the result that many women have deprived themselves of a technique that can detect their breast cancers in a more curable stage than can other methods. The risk of mammography has been maximized, while the benefits have been minimized.

There are always problems with mass screening, but we have to be careful as to what we should do about them. The efforts of all physicians, and especially of radiologists, should be directed to developing techniques for mammography with negligible risk. Instead, emphasis has been placed by some on the avoidance of mammography by creating artificial guidelines based on age, symptoms and risk factors that the average
woman and even her physician do not understand. This does nothing to make the use of mammography rational; it merely shuts the door to the most sensitive detection method we have for the most common cancer in Western women.

Editor:

Criticism of breast cancer screening programs has been focused on mammography. What role do clinical examination and thermography play, and what relative emphasis would you give the three techniques?

Dr. Strax:

Let’s begin with clinical examination, which is an essential part of a breast cancer screening protocol. First of all, the value of palpation is in direct proportion to the expertise of the examiner. Also, palpation does not always find early, very small cancers, which often have characteristics associated with benign lesions. In the 1950’s, prior to the use of other techniques, it was estimated that 30 percent of cancers were initially missed by clinical examination. And in the HIP study and the BCDDP project, which included mammography, a significant percentage of all breast cancers found were not palpable. On the other hand, in the HIP study, 40 percent of cancers were detected by clinical examination alone. This is clear evidence of the value of clinical examination, but it also indicates that palpation alone is not sufficient in a mass screening program.

Thermography may become useful in that it indicates physiologic changes in the breast that produce a localized increase in temperature, measured by special heat sensors and translated into photographic images. Since many breast conditions other than cancer are associated with increased temperature, thermography can only alert the clinician to the possibility of cancer. It is not a cancer detector as such. Thermography may also serve as a means of identifying high-risk populations.

The great strength of mammography lies in its ability to detect very early cancers, and especially those smaller than one cm. There has been, over the years, a substantial increase in finding these small cancers using newer, improved mammographic techniques. For example, in the HIP study, 33 percent of all cancers were found by mammography alone, while in the later BCDDP project, 48 percent were discovered by mammography alone.

Obviously, none of these methods is 100 percent accurate; each yields false positives and negatives. But in combination they comprise an extremely efficient screening method.

Editor:

What about breast self-examination?

Dr. Strax:

Breast self-examination should be taught as part of a regular screening program. A combined-method screening program will pick up about 90 percent of breast cancers, but approximately 10 percent of cancers will be missed, usually becoming evident within a year after a “negative” comprehensive examination. It is breast self-examination that we rely on to discover these cancers.
Fig. 1 Improvements in mammographic technique are shown (a through e). The quality of films has improved considerably, and radiation exposure has been reduced from 6R to .3R.
Editor: Are there statistics available concerning axillary nodal metastases at the time of diagnosis, when comparing the effectiveness of mammography with clinical examination?

Dr. Strax: Interesting observations regarding axillary nodal involvement came out of both the HIP and BCDDP projects. In both studies, when cancers were found by mammography alone, the incidence of negative nodes was over 75 percent. In the HIP study, also, there was no axillary nodal involvement in 75 percent of those cancers detected by clinical examination alone. However, in the usual cancers brought to physicians by their patients, the vast majority are detected on mammography and clinical examination and have a 50 percent incidence of positive nodes. Obviously, early cancers were usually found on only one modality in the HIP study.

Editor: You mentioned improvements in mammographic techniques. What are they?

Dr. Strax: There have been two main improvements. One has been the lowering of the radiation exposure. The earliest studies, as in the HIP study, delivered 7 to 8 R to the skin per examination of two views, while the newest techniques deliver .4 to .6 R to the skin for two views. This is important because risk is directly proportionate to dose. In addition, new techniques produce considerable improvement in definition and detail.

Improvements in technique have been dramatically demonstrated by the fact that in all age groups, especially those under age 50, significantly larger percentages of cancers have been found by mammography alone in the BCDDP project as compared to the HIP study. Thus, in women under age 50 in the HIP study, 19 percent of cancers were found on mammography alone, with 68 percent having no nodal involvement, compared to 45 percent on mammography alone with 73 percent having no nodal involvement in the BCDDP. Also, a substantially larger percentage of cancers found in the BCDDP program were less than one cm (3.5 percent in HIP vs. 13.8 percent in BCDDP).

Editor: What is the estimated risk with the new, low-dose technique of mammography?

Dr. Strax: Dr. Arthur Upton, eminent radiobiologist and Director of the National Cancer Institute, has given the following estimate of radiation risk from mammography: “One rad to the body of the breast given to one million women would produce six cases of breast cancer per year, after a latent period of six to 10 years.” With the very low doses now in use (.02 to .03 rad to the body of the breast), risk from mammography may be considered negligible in comparison with the presumed benefit from its value in the early detection of breast cancer.
Editor:  
*What would the benefit be?*

Dr. Strax:  
If we used mammography plus palpation to screen the estimated 40 million women at risk for breast cancer in the United States with our present low dose techniques, over a 30-year period, we would reduce the annual number of deaths by one-third, or we would save 12,000 women. The cost per year for a given screening, after a latent period of 10 years, would be six cases of breast cancer, at least two of which probably be detected and cured by current methods of diagnosis and treatment.

Editor:  
*That sounds impressive. Where, then, is the controversy?*

Dr. Strax:  
The disagreement mainly involves mammographic screening of younger, asymptomatic women, namely those under age 50.

Editor:  
*Are there any data from the HIP study or the BCDDP project that shed light on the controversy?*

Dr. Strax:  
In the more recent studies there has been a substantial increase in the detection of cancers by mammography alone in women under 50, and particularly of cancers smaller than one cm. As mentioned, in the BCDDP studies, 45 percent of the cancers were found by mammography alone in women under 50, as compared to 19 percent in the HIP study.

Editor:  
*Have we seen a reduction in breast cancer mortality as a result of the screening projects?*

Dr. Strax:  
The HIP study showed a persistent reduction in the mortality rate for breast cancer, and this decrease has been maintained over a nine-year follow-up period. However, the entire reduction in mortality has occurred in women over the age of 50 (in whom the reduction was 40 percent). While this observation has amply demonstrated the value of mammography as part of a periodic screening program in this older age group, it naturally raises questions about mammography in the under-50 group. It is entirely possible that the mammographic screening in the under-50 age group has contributed significantly to keeping down the death rate in the over-50 age group. That is to say, some cancers were perhaps discovered in women under 50 which, without mammography, would not have been found until much later, when the curability potential was greatly diminished. This possibility is currently under investigation.

Editor:  
*What guidelines, then, would you propose concerning mammographic screening of women under age 50?*

Dr. Strax:  
At this point, policy is largely dictated by the presence or absence of symptoms in younger women, and by risk factors. Women under 50 who have the substantial risk factors of previous breast cancer or a family history of breast cancer in a mother or sister should have a periodic complete examination,
Fig. 2 Non-palpable cancer is demonstrated in two ways. a. Non-palpable mass. b. Non-palpable microcalcifications.

under the age of 35, these young women should be excluded unless there are symptoms of breast disease or a previous breast cancer.

The issue of symptomatology, however, is complex. When does a lump, or pain, or nipple discharge represent suspicious symptomatology? Such symptoms are certainly not uncommon, and do not usually indicate cancer. But I believe that the symptomatic woman with a mass, localized pain or nipple discharge should use all available means, including mammography, to determine the nature of her breast problem.

The feelings of the woman must also be taken into account. One of the objectives of the BCDDP program was to find out whether women could be motivated to accept screening, and the quota of screenees in all participating centers was rapidly met.

Editor: Accusations that “mammography screening resulted in unnecessary mastectomies” were given wide publicity.

Dr. Strax: The public and physicians alike must be made aware that screening, diagnosis and treatment are separate procedures, performed by different physicians. If a question arises concerning the “correctness” of the treatment in a particular in-
stance, it is unrealistic to allege that the screening technique is responsible for the differences of opinion concerning diagnosis and treatment. And now we have learned that the mastectomies done for minimal cancers, which were publicized as "unnecessary," have been thoroughly reevaluated. The conclusion is that the accusations were mostly based on incomplete data, misinterpretations and understandable differing evaluations of borderline lesions.

Editor: Where is there consensus about mammography among the experts?

Dr. Strax: There is general agreement among clinicians that the earlier a breast cancer is detected and treated, the more women will survive the disease. There is also general agreement that early detection involves at least three factors: (1) In those over 50 years of age there is proof that screening, including palpation and mammography, substantially reduces the mortality from breast cancer. Since the older the woman, the greater her risk of developing breast cancer, periodic screening is advisable as part of a routine health exam; (2) Since the symptomatic woman of any age may have an underlying cancer, a complete breast examination, including mammography, should be performed; (3) Under all circumstances, the mammographic technique used should be the one producing the greatest detail and resolution with the lowest amount of radiation required to produce high quality films.

Editor: Would you summarize your view—a radiologist's—on this subject?

Dr. Strax: In light of the vastly improved technique now available—and the certainty that technologic advances will continue to be made—it seems prudent to me to expand our concept of who is a symptomatic woman. We have ample proof of the benefit of screening programs in older women, and a review of previous studies plus data from new projects may well show a similar reduction in mortality in younger age groups. If this should happen, periodic low dose mammography could then be indicated for all women over the age of 35 or 40.

One in 13 American women develops breast cancer. Mass screening can save lives. We physicians should emphasize its benefits, rather than the risks—which have become negligible, and get on with the real task that faces us: the development of more cost-effective, efficient and practical methods of mass screening for breast cancer.

Editor: Thank you, Dr. Strax.