Breast Screening and Diagnostic Accuracy

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Unless breast screening programs are reinstated in the United States, or there is a major breakthrough in the treatment of breast cancer, the current high United States death rate due to this disease will continue for many years. For white women in the United States, the median survival time following the diagnosis of breast cancer is approximately 7 years; for American black women, it is approximately 4 years. Detection of breast tumors at a stage when they are noninvasive or less than 5 mm in size, along with application of the most recent advances in the treatment of breast cancer, are the keys to decreasing the death rate from this disease. Currently, the two most common means of breast examination in the United States are manual palpation and x-ray mammography. If a physician carries out a manual palpation examination, the smallest tumor detected will be of the order of 1 cm in size; if the subject herself carries out breast self examination, the smallest detected tumor is of the order of 1.6 cm in size. Clearly, manual palpation is not an effective means for detecting small breast masses and has only limited benefit in terms of the life span of the breast cancer patient.

X-ray mammography, the second most commonly used technique for breast examination, is capable of detecting small masses in the breasts of those subjects most at risk for breast cancer, namely, the older woman, and it can thus exert a significant influence on the life span of these patients. However, in the United States, this technique is not widely used in terms of the number of women at risk for breast cancer, i.e., women over the age of 35. There are approximately 52 million women in the United States in this age range; based on a 1977 figure, approximately 4% of that population receive an x-ray mammography examination. This wide gap between the number of patients at risk and the number of patients being examined is partly associated with the current dilemma that exists in the United States in regard to breast cancer screening by means of x-ray techniques. Despite the low radiation doses currently used in x-ray mammography, it does not appear likely that an x-ray mammography screening program will be reinstated in the United States any time in the near future. The failure of previous x-ray screening programs to show a benefit for the younger woman may be one of the factors associated with the current apathy towards a breast screening program in the United States. It is reasonable to assume that this failure is at least partially dependent on the fact that x-ray mammography does not provide good contrast images of the normally dense breast of the young subject.

One approach to eventual solution of the breast screening dilemma is to: (1) provide a diagnostically accurate, non-ionizing technique for examination of young symptomatic subjects, and (2) to apply multiple examination techniques for the purpose of attaining nearly 100% accuracy in the diagnosis of the symptomatic patients most susceptible to breast cancer, i.e., the middle-aged and older subjects. A suggested approach for accomplishment of the immediate and long-term goal is the subject of this paper.

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