The Role of Mammography in Breast Health
an Overdue Paradigm Shift

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Introduction

Experts are publishing new evidence in peer-reviewed journals relating to the risks inherent in using mammography for breast screening. The findings are of no surprise to a growing number of doctors and specialists who have known for years that some of the cancers they have to treat are linked to the accumulative effects of mammographic radiation exposure.

Controversy has raged for years as to whether the risks related to the radiation exposure suffered from mammography are justified by the benefits gained …… new evidence relating to the particular type of radiation used and the hard evidence relating to the clinical benefits of mammography have caused a serious re-evaluation of the justification of mammography as a screening test.

If changes for the better are to be made, then the current paradigm needs serious evaluation by examining all of the existing evidence.

We should first clarify the difference between 'screening' and 'diagnostic' mammography. Screening mammography is performed on healthy women from the age of 40 to 70 and is aimed at identifying suspicious findings, which justify further investigation. Diagnostic mammography is performed on patients who have existing justification for this test, this could be one or more risk factors, clinical symptoms, or a palpable lump.
There is little augment about mammography's role as the 'gold standard' for evaluating suspicious symptoms but can we still justify subjecting women without symptoms to screening mammography and the radiation exposure which is known to be damaging.

This paper poses the question;
If Mammography is found to be an inappropriate test for screening or early diagnosis, "What alternatives do we have"?
This paper proposes a paradigm shift and suggests a new model for breast screening and the reduction of mortality from breast disease .

Background

The risks from radiation produced by mammography are far greater than the proponents of this test are aware of or have been promoting to women. Mammography does pose a wide range of risks of which women are still uninformed.

Radiation from routine mammography cannot be directly compared to other types of X-ray like chest X-ray etc because they are very different types of radiation.

The comparisons that have been used between a chest x-ray and mammography, 1/1,000 of a rad (radiation-absorbed dose) for a chest X-ray and the 1 rad exposure for the routine four films taken of both breasts for a mammographic screening exam results in some 1,000 times greater exposure. This is considered a significant risk factor when extended over a ten year screening period and a potential accumulative dose of 10 rads.
Unfortunately this is not the major risk posed by the particular type of radiation used by mammograms, mammography X-rays use a low energy form of ionising radiation which causes greater biologic damage than the high energy X-ray. The very low energy electrons affects the density of ionisation tracks that pass through the tissue which can cause complex damage to the DNA and carcinogenic changes.
The radiation used by mammography is almost 5 times more effective at causing cancer.

(Alpha particles, possessing both charge and a large mass, deposit their energy in a relatively small volume when compared with x-rays which have neither mass nor charge. Double strand breaks or even more extensive damage to the DNA can arise from the ionisations from a single alpha particle track through a cell, whereas multiple x-ray photons would normally be required to cause similar damage. So the degree of cell killing or the probability of cancer induction, as examples of biological effects, differ for 1 Gy delivered by alpha particles compared with Gy delivered by X-ray)

Current estimates for radiation-induced cancer are based on people exposed to the high energy radiation (eg, atomic bomb survivors) or patients exposed either diagnostically or therapeutically. These cancer risk estimates are then applied to all x-ray exposures (including mammography) on the basis that the radiation weighting factor for all x-rays is equal.

The conclusion reached in a recent study published in the Journal, Radiation Research was that their findings corroborated data previously published and that this suggests that the risks associated with mammography screening may be approximately five times higher than previously assumed and that the risk–benefit relationship of mammography exposures may need to be re-examined.

Under current guidelines, premenopausal women undergoing annual screening over a ten-year period are exposed to a total of about 20 rads. The premenopausal breast is highly sensitive to radiation, each rad of exposure increasing breast cancer risk by 1 percent, resulting in a cumulative 10 percent increased risk over ten years of premenopausal screening. Risks are even greater for baseline screening at younger ages, but when an additional five fold increase of the risks are factored into the equation by the correct assessment of mammography radiation risk we have a much harder case to justify continued use of screening mammography for premenopausal women.
Each new dose adds risk, because a single x-ray photon, acting alone, is capable of causing unrepairable, permanent damage to DNA and chromosomes --- including carcinogenic mutations
The news gets worse for the 1 to 2 percent of women who are silent carriers of the ataxia-telangiectasia gene and thus highly sensitive to the carcinogenic effects of radiation, they already have a fourfold higher risk of breast cancer from mammography; by some estimates this accounts for up to 20 percent of all breast cancers annually in the United States.

The principle of informed consent in medicine is ignored if women are not informed of the evidence relating to the risk and if women more readily consent to annual mammograms because they have been given ‘misinformation’ this is as bad as obtaining consent by deliberately blocking valid information. Women are entitled to know the full range of responsible opinion about the benefits, the risks, and the many uncertainties of mammography.

Some years ago a British surgeon blasted American doctors as "immoral" for screening women under 50 for breast cancer. Dr. Baum said the screening was "opportunistic" and did more harm than good. "Over 99 percent of premenopausal women will have no benefit from screening. Even for women over 50, there has been only a one percent biopsy rate as a result of screening in the United Kingdom. The density of the breast in younger women make mammography a highly unreliable procedure."

The United States is the only country that routinely screens premenopausal women by mammography. The U.S. also extends its screening practice by taking two or more mammograms per breast annually in postmenopausal women. This contrasts with the more restrained European practice of a single view every two to three years.

The conclusion from all the available evidence and experience gained since mammography was first introduced, is that there is a justifiable role for mammography to play in a breast cancer screening program but the role is very different from the one currently in place.

Conclusion
The scientific and medical evidence indicates that:

No ‘screening’ mammography is justified for premenopausal women.
A baseline mammogram may be justified at between age 50 and 60.
Accountability and responsibility should be considered in regard to all radiation exposure and the accumulative biological effects.
Reducing ionising radiation exposure from all other sources whenever possible should be practiced.
Up-to-Date and accurate information must be given to patients for informed consent.
Other non invasive tests should be promoted as part of a breast screening program.
Thermography, BSE. CBE. Ultrasound.
More invasive tests like MRI and PET should be explored and adapted.

An extensive literature review provides overwhelming evidence that reform and a paradigm shift is overdue. Quotes from studies include:

"The capacity of ionising radiation to produce breast cancer has been repeatedly confirmed."
From Chapter 8 (at p.131), "Epidemiology and Etiology," by Professor John S. Spratt, M.D., FACS (Brown Cancer Center, University of Louisville School of Medicine, KY), Prof. William L. Donegan, M.D., FACS (Sinai Samaritan Medical Ctr., Milwaukee, WI), and Prof. Curtis P. Sigdestad, Ph.D. (Radiation Oncology Dept., Brown Cancer Center, Univ. of Louisville Sch. of Med., KY).

"The strongest evidence for a particular initiating factor in breast cancer is that for irradiation ... Evidence that other carcinogens initiate breast cancer development is extremely limited."
From Chapter 9 (at p.143), "Prevention of Breast Cancer," by Richard R. Love, M.D. (Prof. of Human Oncology, Univ. of Wisconsin at Madison) and Polly A. Newcomb, Ph.D. (Asst. Professor, Dept. of Human Oncology, Univ. of Wisconsin Medical School at Madison).

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