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Perspectives

Correcting Decades of Misinformation About Breast Cancer Screening: An Open Letter to Women and Those Who Advise Them About Screening for Breast Cancer

Daniel B. Kopans, MD[1,*]

[1]Harvard Medical School, Waban, MA, USA

[*]Corresponding author: Daniel B. Kopans (dkopans@verizon.net)

Editor's note:

When I first received a query from Dr Kopans regarding the Journal's willingness to publish this open letter to women and to those who advise them about breast cancer screening, I was immediately concerned that the Journal of Breast Imaging (JBI) had no established "cubbyhole" for a publication such as this. It represented the written distillation of a professional lifetime of collected wisdom on a very important topic by a preeminent physician, professor, and Society of Breast Imaging gold medalist. Historically, Dr Kopans has unfailingly, forthrightly, and scientifically defended breast cancer screening from a withering and apparently unceasing international barrage of misinformation and addled science. The Journal of Breast Imaging determined that his submission deserves a place in our journal. To that end, JBI has created a new "Perspectives" section defined as scholarly articles that express a personal opinion or a new perspective about existing research on a particular topic. The contents are those expressed by the author alone and, as such, do not undergo peer review. Publication is at the discretion of the Editor-in-Chief. It is our hope that more submissions like this will follow because there is no shortage of knowledge and opinion in our subspecialty. Open, honest, and respectful discourse among us will serve to enhance our knowledge, broaden our perspectives, and ultimately benefit the women (and occasional men) we serve. More on the details of writing a Perspective will follow shortly in the JBI Instructions to Authors.

Introduction

The dissemination of misinformation in society has, unfortunately, become common and accepted by many. I had believed that medicine was the last place to expect this because I was taught that our efforts are based on "science and evidence." Unfortunately, as I have learned from the breast cancer screening "debate," the promotion of misinformation has been ongoing for decades in this area of medicine and has even been spread by our most respected medical journals. My goal is to provide the reader with the facts, with references for validation, and to expose some of the more egregious examples that mislead and misinform physicians as well as those who receive their care and guidance.

Upfront

Although mammography screening has been a major advance in women's health over the last half century by helping to save of hundreds of thousands of lives, it is still a "stop gap" measure. In the 1970s, when I first became involved, I thought that mammography screening would be a temporary effort, that we would soon find a cure for breast cancer, and that I could go on to other areas of health care. Needless to say, I was incorrect. More than 40 years later, there is still no universal cure, and none is on the horizon. Although we have become much better at delaying death, once a breast cancer has become successfully metastatic, there is no cure. Clearly early detection before successful spread is critical, and, in doing this, we have cut the death rate in half since 1990.

Some history

In the 1950s, it was thought that breast cancer was systemic before it could be found and that "early detection" would not make any difference, but the randomly assigned controlled trials (RCTs) of breast cancer screening proved that early detection can result in cures. Nevertheless, mammography screening does not find all cancers and does not find all cancers early enough to result in a cure. While we await a cure, we continue to try to find better ways to detect more breast cancers earlier, at a time when cure is possible. The good news is that mammography screening is available now and has been the main reason that deaths from breast cancer have been dramatically reduced.

Prior to screening, the death rate from breast cancer in the United States had been unchanged going back to at least 1940. Although we have no nationally organized screening program, it appears that widespread mammography screening began in the mid-1980s.[1] Soon after, as expected, in 1990, the death rate from breast cancer began to fall[2] for the first time in 50 years.[3] As more and more women have participated in screening and our ability to detect early cancers has steadily improved, the death rate has continued to fall. It has been estimated that >600 000 lives have been saved since 1990.[4]

There is no question that therapy has also improved, but studies suggest that the majority of women with access to modern therapy who still die from breast cancer have not participated in screening.[5,6] In Sweden, in a major study of >500 000 women, mammography screening was shown to be the main reason that deaths have declined[7] despite women having access to modern treatment.

For unclear reasons, but likely because of the rarely expressed reluctance to pay for screening and associated costs,[8,9] there are those who have continued to advise women to delay their participation in screening by waiting until the age of 50 years and to be screened every 2 years instead of every year. This has largely been due to the misinformation that has been reported[10] and has been passed on to the public by the media. Until recently, national panels such as the U.S. Preventive Services Task Force (USPSTF), which has purposely excluded experts in breast cancer screening, had promoted delaying screening until the age of 50 years and then biennially instead of annually. Now recognizing that science and evidence clearly support screening starting at the age of 40 years, the USPSTF modified their advice[11] and now once again (as they did 20 years ago) recognize that screening has been proven to save lives for women ages 40 through 74 years (the ages of women who participated in the screening trials) and once again support screening starting at the age of 40 years. Their only failure is that they continue to advise screening every 2 years. This latter delay makes no sense, as is discussed below. The American College of Physicians (ACP) still advises delaying until the age of 50 years and biennial screenings. This advice has never been supported by science and evidence, and it has been estimated that it would result in tens of thousands of lives being lost that could be saved by annual screening starting at the age of 40 years.[12]

Is mammography the only way to find breast cancer early?

The only way to prove that a medical intervention works (unless it works most of the time) is through RCTs. It can be argued that the RCTs of mammography screening have proven that early detection by any method will save lives, but this has not been generally accepted. Mammography is the only test that has been appropriately studied and proven to save lives in RCTs.

That said, MRI detects many more breast cancers earlier than any other study. Unfortunately, MRI is very expensive, is limited in availability, and requires the intravenous injection of a contrast agent to highlight the abnormal blood vessels that are developed by breast cancers.

US can find cancers that are not evident by mammography, but it has a higher "recall rate" and has not been studied in RCTs to prove its use saves lives.

Digital breast tomosynthesis is an advance in mammography and is replacing standard mammograms.[13]

Contrast-enhanced mammography is a way to show new blood vessels (neovascularity) that can indicate a breast cancer, but it requires the administration of an iodinated contrast agent that can cause reactions, and it too has not been directly proven to save more lives.

"Molecular imaging" (formerly known as "nuclear medicine") can highlight breast cancers, but because the intravenous administration of radioactive tracers is required, the entire body is exposed to the radiation.[14]

The bottom line is that mammography screening has been specifically proven to save lives for women ages 40 to 74 years. It is available and has been detecting cancers earlier for >40 years, and common sense and evidence show that it should be used every year (see below).

The facts about breast cancer screening have been distorted by misinformation

The following addresses the evidence-based facts about mammography screening and summarizes some of the misinformation that, unfortunately, has been promoted.

The facts

1. *Screening saves lives*

Randomly assigned controlled trials are the most rigorous scientific studies that we have. Large groups of women have been randomly divided to produce 2 identical groups. One group has been offered screening, while the other has had "usual care." The women offered screening have had "statistically significantly" fewer deaths from breast cancer, proving that early detection saves lives.[15]

We must not forget that RCTs underestimate the benefit. Women assigned to the "study" group are offered screening. Some refuse the offer ("noncompliance") and are not screened, but the rules for RCTs require that they must be counted with the screened women. If they die of breast cancer, their deaths are counted with the screening arm. Similarly, those assigned to be unscreened controls can (and many did) go out and get screened on their own ("contamination"). If their lives were saved by the "outside the trial" screening, they are still counted as unscreened controls. Analysts have often ignored these facts, but they mean that the RCTs underestimate benefit. Observational studies of women who have participated in screening in the general population show an even greater decrease in deaths than the RCTs.[16]

2. *Screening saves lives specifically for women ages 40 to 49 years*

False claims were made in the 1980s and 1990s that screening only benefited women ages ≥50 years. This was because of, scientifically, inappropriate analyses that were disputed[17] and have, subsequently, been confirmed to have been wrong. The RCTs have proven that screening reduces deaths for women ages 40 to 74 years (the ages of the women who participated in the trials) with proof, specifically, of lives saved for women ages 40 to 49 years.[18]

3. *The death rate from breast cancer began to decline with the introduction of screening*

The death rate from breast cancer had been unchanged dating back to at least 1940.[19] Incredibly, there has been no organized screening program in the United States, and the national database (Surveillance Epidemiology and End Results [SEER]) does not track the "method of detection" (MOD) (how breast cancers are found), but, as best we can tell, screening began in large enough numbers to affect national statistics in the mid-1980s.[1] Screening does not save lives immediately, but, as expected, not long after it began, deaths began to fall in 1990.[2] It has been estimated that >600 000 lives have been saved since then,[4] in large part because of screening and early detection.

4. *The stable death rate from breast cancer in men is additional support for screening*

Although it is much less common, men also develop breast cancer. Men are treated in a similar fashion as women with breast cancer, yet, while the death rate for women has fallen since 1990, deaths for men have remained essentially unchanged over the same period.[20] There is no way to be certain, but the difference in death rates is almost certainly because women have participated in screening and have had their cancers detected early enough for many to be cured, while men are not screened. The data show that breast cancer in men presents later and at more advanced stages than women.[21] This is almost certainly because men are not screened and more often present when cure is no longer possible.

5. *There is no scientific support for using the age of 50 years as the threshold for screening*

The effort to limit screening began in the 1970s with the false claim that there was no benefit from screening women ages 40 to 49 years. Randomly assigned controlled trials have strict and important requirements. There need to be enough women who participate so that if screening reduces deaths, there will be a large enough number of deaths such that the fewer number of deaths in the screening group will be "statistically significant." If I told you that there were 10 deaths among the control women and 7 deaths among the screened women, you would, legitimately, suggest that 10 vs 7 is not a big difference and could be due to chance. However, if I told you there were 100 deaths among the control women but only 70 in the screening group (the same ratio but larger numbers), you would suggest that that difference sounds "significant." Mathematical analysis does exactly that. It determines the likelihood that the difference is "statistically significant" and unlikely due to chance.

Randomly assigned controlled trials are expensive, so that they often include marginally enough individuals to show that differences are "statistically significant." None of the RCTs of breast cancer screening were designed to analyze women ages 40 to 49 years separately except the Canadian Trial, and it was compromised with unreliable results.[22-26] Nevertheless, some analysts seeking to limit access to screening ignored the basic tenants of scientific analysis. The first fact that was ignored was that periodic screening is not expected to save lives immediately. For breast cancer screening it was expected (and ultimately shown) that it would take ≥5 years for deaths to begin to decline. Confusion arose because analysts misinterpreted a statistical fluke. Screening appeared to save lives for women ages ≥50 years as soon as screening began.[27] You can flip a coin and have it come up heads 5 times in a row, but this is simply "statistical fluctuation" due to small numbers. The benefit in the first major screening trial appeared to be immediate for women ages ≥50 years, while it was "delayed" for women ages 40 to 49 years.[26] In fact, the delayed benefit seen in younger women is what was expected, but it was ignored. Furthermore, the trials were never designed to evaluate women ages 40 to 49 years separately. Even all the trials together did not include enough women ages 40 to 49 years to permit separate analysis in the early years of follow-up. Their lack of statistical power for this unplanned analysis was ignored despite our explaining why it was scientifically inappropriate,[17] and the data were inappropriately interpreted, and misinformation was disseminated.

There were additional efforts to make the age of 50 years appear as a place to start based on grouping and averaging data to make factors that actually change gradually with increasing age appear to change suddenly at the age of 50 years. For example, if I asked, "When do the hairs on our head become grey?", and I grouped and averaged the percent of individuals with grey hair under the age of 40 years (say 10%) and compared them to the percentage of individuals

grouped age 40 years and over (say 70%), it would appear as if there was a sudden change to grey at the age of 40 years! This is precisely what has been done to make it appear that factors associated with screening change suddenly at the age of 50 years[28] when there is no sudden change. None of the parameters of screening change suddenly at the age of 50 years.[29]

The RCTs proved that screening saved lives for women ages 40 to 74 years. In fact, there were not enough women in the RCTs at these younger ages in the early years of follow-up, so that even when there was a benefit, it could not reach "statistical significance" and was ignored. We raised this fundamental concern in 1993 and 1994,[17] but it was ignored by those seeking to limit access to screening.[30] By 1997, more women had died from breast cancer in the RCTs, and the difference in deaths between the "screens" and "controls" reached "statistical significance" for women ages 40 to 49 years even when analyzed separately,[18] proving that screening saves lives for women ages 40 to 74 years with no exception.

The fact is that there is no abrupt change at the age of 40 years either. The incidence of breast cancer is the same for women in their late thirties[31] as it is for women in their early forties, but we only have scientific proof of the benefit of screening from the women who participated in the RCTs, which only included women ages 40 to 74 years. A screening test will only be supported if it is proven scientifically to save lives. This is why the threshold for starting to screen is age 40 years.

6. *Radiation risk was overestimated and is so low it cannot be directly measured*

In the 1970s, concern was raised that the radiation from mammography screening might cause as much cancer as would be cured.[32] This led to reduced access to mammography screening for women ages 40 to 49 years. In fact, no one has ever been found to have developed breast cancer from a mammogram. The risk for women ages 40 years and over is so small that it is not directly measurable. Analyses have shown that the risk from radiation to the breast is highest at very young ages[33] before the breast has "differentiated." Risk then drops rapidly so that by the age of 40 years, there is no measurable risk. Even the extrapolated risk is way below even the smallest benefit.[34-39] Opponents of screening have stopped using radiation risk as an argument against screening.

7. *Screening does not find "fake" cancers:the claim of "overdiagnosis" ("fake" cancers) is based on false claims and ignoring the facts*

Efforts have been made for years to try to show that screening detects "fake" cancers. This has been called "overdiagnosis." The claim is that, if left undetected, these cancers would disappear on their own and never harm anyone. Some analysts have claimed that mammography screening finds breast cancers that have the pathological characteristics of cancer but would never harm anyone and would disappear if left alone. They have cited a handful of cases in which large, clinically evident cancers have miraculously disappeared without therapy.[40] In fact, no one has ever seen a mammographically detected breast cancer disappear on its own.[41] It is unclear why, because it is only clinically evident cancers that have miraculously disappeared; it is only mammographically detected breast cancers that are being challenged, while no one is arguing to stop finding clinically evident cancers!

Many of the studies evaluating "overdiagnosis" have included women diagnosed with ductal carcinoma in situ (DCIS). There are legitimate concerns about the significance and appropriate therapy for DCIS. The following discussion only involves invasive breast cancers, for which the data for any major rate of "overdiagnosis" are weak.

One way that analysts have looked for "overdiagnosis" in screening is comparing the number of breast cancers detected in the RCTs screening arm with the total cancers detected in the unscreened control women. Unfortunately, most of the trials screened the control women at the end, so this cannot be done. In the Malmo Trial, the older, control women were not screened. A comparison of the number of cancers (including DCIS) in the screened group compared with those in the control groups suggested that there was, at most, a 10% rate of "overdiagnosis," which falls to only 7% if DCIS is not counted.[42]

Other analyses looked at the studies that compared women in one part of a country who had screening access with those in other areas without screening access. Unfortunately, many of the studies did not take into account the "leadtime"—namely, that screening finds some cancers many years before they become clinically evident, and so the follow-up is premature. In addition, they did not account for differing risks between the groups. Older women are at higher risk. The comparisons that did take these into account showed that the range of "overdiagnosis" was small at 1% to 10%.[43]

8. *False claims of overdiagnosis and misleading analyses in the United States*

The comparisons noted above were from data outside the United States. The U.S. analyses have literally been based on "guesses."

Our national database, called the SEER program, extrapolates the incidence of breast cancer in the United States from about half of the country, where the data are actually tracked. The SEER program did not begin until 1974 and, for unexplained reasons, has never included how cancers (including breast cancers) are detected in the United States. (We are trying to get SEER to start including MOD.) The failure to track MOD has allowed "analysts" to develop wildly inaccurate estimates of what we should have expected breast cancer incidence would do had screening not begun

sometime in the 1980s. In fact, because we have no national tracking system, we do not even have accurate data on who has participated in breast cancer screening and which cancers have been found earlier by screening. This has allowed some "analysts" to develop their own theories and publish misinformation that is grossly inaccurate.

The Connecticut Tumor Registry (CTR) is the oldest continuously operating registry in the country. It is highly respected and is now part of the SEER program. The CTR has been tracking data on breast cancer since 1940. For many years, analysts have relied on data from the CTR.[44-47] The CTR has shown that the incidence of breast cancer had been increasing steadily by 1% to 2% since at least 1940,[3] long before there was any mammography screening. Those trying to claim massive "overdiagnosis" have ignored the fact that the incidence had been increasing steadily for decades. In 2012, a paper ignoring the CTR data claimed that, based on their interpretation of the SEER data, the baseline incidence of breast cancer would have increased by only 0.25% per year.[48] Because they actually had no real data, they admitted that their analysis was based on what they called their "best guess." Their paper claimed that because the actual increase in incidence recorded by SEER was much higher in 2008 than their "guess" as to what it should have been, there were >70 000 "overdiagnosed" ("fake") breast cancers in 2008 alone, which (based on no data) were due to mammography screening. In fact, had they used actual data from the CTR showing an annual increase of 1% to 2% instead of their "best guess," they would have found that there were actually fewer cancers in 2008 than would have been expected,[40] completely belying their analysis. Other analyses also showed their claims of "overdiagnosis" to be unsupportable,[49,50] but these were ignored, and those opposing screening cited massive "overdiagnosis" as the reason to delay screening. These false claims led groups like the USPSTF and the ACP to advise against screening women in their forties.

Four years later, another paper reiterated the false claim of massive "overdiagnosis" using the same SEER data, but this time claiming that there would have been no increase in incidence—an annual increase of 0.0%—had it not been for screening[51]: Same data different "guess"! This (falsely) made the claim of massive "overdiagnosis" look even greater. In fact, data from the CTR over the same period of time suggest that the increasing incidence that had been seen for decades had continued as participation in screening was increasing, the expected "prevalence" cancers were merely added to the increasing baseline, and there was no "overdiagnosis" of invasive cancers.[40]

Subsequently, 2 other articles[52,53] claimed that because the rate of advanced cancers had decreased only slowly over the years while the rate of early cancers had increased very rapidly, the early cancers must be "overdiagnosed" because they had not reduced the rate of advanced cancers, and, therefore, the early cancers must be "fake" and due to screening. This claim required the false argument that the baseline incidence had remained a flat line—unchanged over time. The fact that the baseline incidence had actually been increasing steadily meant that if the rate of early cancers were increasing, but with no effect on the advanced cancers, then the rate of advanced cancers would have had to increase in parallel to keep the ratio the same. The fact that the rate of advanced cancers did not increase while the rate of early cancers increased and made up the bulk of the total cancers showed that early detection had reduced the rate of advanced cancers.

10. *The only factor that is reduced by delaying screening is "recalls" for a few extra pictures or an US*

In order to keep the costs of screening down so that women can have access, it needs to be conducted very efficiently. In the past, we would obtain the screening study, and the woman would wait for it to be reviewed. If additional pictures were needed, they were taken the same day so that any questions were resolved during that visit. It became apparent that it was more efficient and less expensive to obtain the screening images, allow the patient to leave, and review the screening studies from the day in batches later. This was very efficient and allowed us to keep the cost of screening down. However, some women are found to have questionable findings on their screening study. When we read "online," we could obtain the additional imaging and resolve the questions right away. With "batch reading," some women have to be recalled for additional evaluation. Although questions are often resolved with a few extra pictures or an US, the recalls have been pejoratively called "false positives." They are, in fact, not women who have been falsely told that they have breast cancer when they do not (the definition of "false positive"). In truth, most are ultimately told that they do not have evidence of breast cancer.

The only "harm" (another pejorative term) that will be reduced by delaying screening is, actually, a reduction in the number of recalls. If women do not have mammograms in their forties, then they will not be recalled! Because "recalls" are the only factor that is reduced by delaying screening until the age of 50 years, those who advise women to delay participating in screening have never explained how many fewer recalls balance allowing one woman to die unnecessarily by delaying screening.

11. *Annual screening almost certainly saves more lives than screening every 2 years or taking longer between screens*

Unfortunately, there has never been an RCT to compare the benefits of annual screening vs biennial screening or longer intervals between screens. Consequently, some guidelines panels have chosen to advise women that delaying the time between screens is fine.

Despite the fact that it has never been studied directly, it is almost certain that more-frequent screening will save more

lives. The following are reasons why annual screening makes sense.

a. *Common sense*

Mammography screening is a periodic effort to detect cancers that, as far as we can tell, are growing randomly in the population. The only way to cure breast cancer is to find it and treat it before it has spread to other organs and become "successfully" metastatic because we are unable to cure metastatic breast cancer. It makes sense that more-frequent screening provides a better opportunity to detect breast cancers at a time before metastatic spread has taken place and when cure is possible.

The risk of metastatic spread increases as cancers grow. At some point in time, most cancers become visible on mammography. Assume that a woman has her mammogram today, but her cancer is just below our detection threshold and not visible on today's mammogram. She is told that everything is fine. However, if we had done the mammogram tomorrow, it would have become visible. The "common sense" question would be, "Because it was missed this year but becomes visible tomorrow, is it more likely to be cured if we let it grow for 1 year or if we wait 2 or more years for the next mammogram?" Clearly, more-frequent screening makes sense.

b. *Computer modeling*

Computer modeling reinforces the concept that more-frequent screening provides a better opportunity to find breast cancers that are still curable. Because cancers probably continue to grow and only rarely, if ever, stop growing, the risk of metastatic spread increases with the number of cells in the cancer, which is related to how long it has been growing. The longer it has been allowed to grow, the more cells it contains and the greater the chance for metastatic spread leading to incurability.

A computer study by Michaelson et al[54] concluded, "On the basis of the data available at this time, the results of the simulations suggested that a screening interval of 2 years would result in a 22% reduction in the rate of distant metastatic disease, an interval of 1 year would result in a 51% reduction."

c. *National Cancer Institute models*

The National Cancer Institute supports 6 groups that have developed independent computer models used to predict breast cancer outcomes. The groups are called the Cancer Intervention and Surveillance Modeling Network (CISNET). All 6 groups have independently concluded that annual screening saves the most lives.[55] "Annual screening ages 40-74 reduces breast cancer deaths by 39.6%,"[56] but if screening is delayed, "Screening every 2 years 50-74 reduces deaths by 23.2%."

More recently The National Cancer Institute's computer models (CISNET) all show that annual screening saves more lives than waiting 2 years between screens.[56]

d. *Observational studies*

Observational studies have also shown that annual screening is preferable to a longer interval.

Miglioretti et al wrote, "Premenopausal women diagnosed as having breast cancer following biennial vs annual screening mammography are more likely to have tumors with less favorable prognostic characteristics."[57]

e. *More-frequent screening has additional advantages*

Hunt et al concluded, "Annual screening mammography results in lower recall rates than does biennial screening ($P < .0001$). Moreover, annual screening results in the detection of smaller tumors that have a more favorable prognosis ($P = .04$)."[58]

Zuley et al also concluded, "Annual mammographic screening was associated with lower risk of late-stage cancer and better Overall Survival across clinical and demographic subgroups. Our study suggests benefit of annual screening for women 40 years and older."[59]

f. *Breast cancers at smaller size*

Finally, when breast cancers are found at a smaller size, they offer the opportunity for less disfiguring surgery and less traumatic therapy.

12. *The vast majority of women diagnosed with breast cancer have no known increased risk*

The vast majority of women (75%) diagnosed with breast cancer each year have no known increased risk factors.[60] There are some women who are at higher risk of developing breast cancer, but there has never been an RCT to prove that screening only high-risk women will save any lives. If we only screen women with known risk factors, most women, whose lives can be saved by screening, would not be screened.

Of course, it would be ideal if we only had to screen women who are likely to develop breast cancer or at least were able to not have to screen those women who will never develop a breast cancer. Unfortunately, we are unable to accurately identify either group. Women who inherit a BRCA1 or BRCA2 genetic mutation have a major risk of developing breast cancer.[61] There is no "proof," but they can likely benefit from MRI screening alternating every 6 months with mammography screening. However, these women account for a little less than 10% of all of the breast cancers diagnosed each year.[62] Other women with a family history or biopsy-proven high-risk lesion account for another 15% of breast cancers each year. The total of known risk factors accounts for ~25% of all breast cancers diagnosed each year. This means that ~75% of women diagnosed each year have none of the known factors that increase risk.[63] Although it would be far more efficient if we only had to screen women who were at high risk of developing breast cancer, this would mean that the vast majority of women diagnosed each year would not have the

benefit of early detection. At this point in time, as far as we can tell, although some women are at increased risk of developing breast cancer, the vast majority of women who are diagnosed each year are not at increased risk. Among the women who account for the most breast cancers each year, it appears that their cancers are sporadic and unpredictable. As far as we can tell, it is this majority group of "average risk" women whose lives have been shown to be saved by screening.

13. *Contrary to more recent false claims, saving lives from breast cancer does reduce "all-cause mortality"*

The (false) assertion has been made that, in the RCT, although screening reduced deaths from breast cancer, the overall death rate among the screened women was claimed to be no different from the control women.[64,65] The term for overall deaths is "all-cause mortality"—deaths from all causes. "All-cause mortality" is most important to evaluate in treatment trials, as in a trial for a breast cancer treatment. One group has the new treatment, and the other does not. The main measure is the question, "Were breast cancer deaths reduced?" However, because the treatment may have unexpected secondary effects, the investigators also look at "deaths from all other causes." In fact, this is the way it was learned that treatment with postoperative radiation could cause subsequent cardiac problems, because the radiation to the breast damaged the coronary arteries.

There is a major difference, however, for women being screened for breast cancer. In treatment trials, all of the women have breast cancer. Consequently, the vast majority of deaths will be due to breast cancer. Because they have been randomly divided, deaths from other causes should be fewer than those from breast cancer and should be the same for both groups. If breast cancer deaths are reduced and deaths from all other causes are the same, we would expect that the total "all-cause mortality" would be reduced.

The same is not true in screening trials that involve the general population. In the general population in the United States, only 3% of deaths each year are due to breast cancer. "All-cause mortality" is not a practical measure in a screening trial.[66] The majority of deaths in a screening trial will be from causes other than breast cancer. If we reduce deaths from breast cancer by 30% (as was seen in the RCT), this will be a 1% decrease in deaths from all causes. It has been estimated that to show a "statistically significant" decrease in "all-cause mortality" in the RCT of the general population would require >2.5 million women in the trial.[67] This is far more women than have participated in the RCTs of screening, so it was statistically impossible for the test that saved lives from breast cancer to be reflected in "all-cause mortality." However, Tabar et al have shown that if you look at "all-cause mortality" among women with breast cancer in a screening trial (similar to a treatment trial), "all-cause mortality" is reduced.[62]

Conclusion

Unfortunately, the above does not cover all of the scientifically unsupportable claims that have been used to try to limit access for women to breast cancer screening. Misinformation has been published in some of our major journals, leading to confusion among physicians and women.

Breast cancer screening has been proven to save lives. The RCTs have proven this for the women who participated from the general population whose ages were 40 to 74 years. There are no data to support delaying screening until the age 50 years, which is an arbitrary threshold. There is little, if any, scientific support for the claim of massive "overdiagnosis" due to screening.

Early detection is a "stopgap" measure until we can find a universal cure for breast cancer, but such a cure has not yet been found. Because there is no cure for metastatic disease, the best way to cure breast cancer is by detecting it and treating it before it becomes "successfully" metastatic.

Although a major advance, mammography is not the ultimate answer. It does not find all cancers at a time when cure is possible. Adding US to mammography screening may further reduce deaths. MRI screening is likely the single best way to find breast cancer and reduce even more deaths. While we await a cure, mammography screening is saving thousands of lives. More lives could likely be saved using MRI screening, but this would take a national effort to make MRI screening available to all.

To avoid unnecessary deaths, medical journals should stop publishing scientifically unsupportable claims and disseminating misinformation and provide women and their physicians with accurate information.

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