**Studies re Screening mammography for women aged 40-49**

Below are references explaining why the Canadian Task Force guidelines to not screen women in the 40s and to not offer supplemental screening to women with dense breasts are outdated and flawed.

**OVERVIEW**

[Annual screening mammography, starting at 40, saves the most lives.](https://pubmed.ncbi.nlm.nih.gov/21257850/)Randomized controlled trials (RCTs) performed from the 1960s to the 1980s proved the efficacy of mammography for women starting at age 40, and subsequent observational studies of service screening show mortality reduction of 40+ percent among screened women. [There is no biological or scientific reason to delay screening mammograms at age 50.](https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1524-4741.1998.430139.x)

Breast cancer is the leading cause of death for women aged 40-49. Women of that age account for 17.5% of eventual breast cancer deaths. Women in their 40s represent [27 percent of the life-years lost](https://jamanetwork.com/journals/jama/fullarticle/2463262) to breast cancer and have the [most years of life to gain when screening is performed](https://pubmed.ncbi.nlm.nih.gov/29064760/).  Breast cancer incidence increases with increasing age. [Seventeen percent of breast cancers are found in women in their 40s, and no decade of life accounts for more than 25% of cancers.](https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/breast-cancer-facts-and-figures/breast-cancer-facts-and-figures-2019-2020.pdf) Cancers in younger women, and postmenopausal women on hormone therapy tend to be more aggressive because of the presence of hormones. [Black and Asian women have a peak incidence of breast cancer in their 40s](https://jamanetwork.com/journals/jamasurgery/fullarticle/2673936). In addition to improvements in breast cancer treatment, [survival depends on the size of their tumor at diagnosis](https://pubmed.ncbi.nlm.nih.gov/26442924/).

Screening mammograms not only reduce deaths from breast cancer starting at age 40, but by allowing early detection of breast cancer, [they allow less aggressive treatment](https://academic.oup.com/jbi/article/1/3/161/5553855?login=true), which increases quality of life for women with cancer. When found early, cancer can be treated with lumpectomy instead of mastectomy, node staging can be done with sentinel node biopsy rather than axillary dissection (and avoid lymphedema) and many women can avoid chemotherapy and return sooner to productive lives in the community.

The Canadian Task Force on Preventive Health Care (CTF) recommends that women of average risk have a mammogram every two to three years from the ages of 50 to 74.  But the Task Force guideline recommending against routine screening in the 40s was based only on randomized controlled trials done from the 1960s to the 1980s. The trial that significantly influenced the recommendation that women 40-49 not be routinely screened was the Canadian National Breast Screening Study-1 (CNBSS). Of eight randomized trials of screening done globally, the CNBSS had the largest number of women aged 40-49, but were the only ones to not show reduced mortality in screened women ages 40-49. They showed mortality excess! We now know that the results were skewed due to protocol deviations bypassing the randomization process. Yaffe et al describe the tampering of the randomization in this recent publication:  <https://journals.sagepub.com/doi/full/10.1177/09691413211059461>

A [second](https://academic.oup.com/jbi/article/4/2/135/6555326) and [third](https://academic.oup.com/jbi/article/4/2/108/6555324) paper by Dr. Seely et al about this compromised study, which focuses on interviews with 29 former staff have now been published. The revelations of numerous flaws have been shared with the Research Integrity office at the University of Toronto (home institution of the authors). The only reasonable outcome will be for the study to be retracted and the Task Force guidelines revised.

The Task Force ignored a[2014 observational study](https://pubmed.ncbi.nlm.nih.gov/25274578/) of screening in Canada that showed 44% fewer deaths among women aged 40-49 who had screening mammograms, than women who did not, because they decided to use only randomized controlled trials. They claim to use [GRADE](https://pubmed.ncbi.nlm.nih.gov/21195583/) guidelines but have misapplied them. GRADE ranks RCTs higher quality than observational studies, but indicates that the quality of an observational study can be raised if it is large, and shows a large effect. The Pan-Canadian study meets both these criteria: it is the largest published observational study of screening in the medical literature, including 2.8 million women in Canada, and showed 44% mortality reduction in women aged 40-49. It even included a sub-study that found no evidence that self-selection biased the reported mortality results.

The CTF also overstated the occurrence of overdiagnosis, the likelihood of a diagnosed breast cancer not causing death, to be [41 percent based on the CNBSS studies.](https://pubmed.ncbi.nlm.nih.gov/6802546/)  Experts in screening calculate overdiagnosis to be [in the range of 1-10 percent](https://pubmed.ncbi.nlm.nih.gov/22972810/), substantiated by the [Swedish screening trials.](https://pubmed.ncbi.nlm.nih.gov/16517548/)

The CTF overstated the risk of anxiety when a woman is recalled from screening for additional tests. It pejoratively used the term “false positive” instead of “false alarm” or “recall” to describe when a woman is recalled after a mammogram shows a finding that requires additional investigation, when the vast majority of recalls are resolved with additional mammographic views or ultrasound. Recalls cause [anxiety for many women, but the anxiety is transient, and studies show that it doesn’t harm women long-term](https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1861037).

Below are references expanding on the points relating to screening women in the 40s.

**SECTION 1: BENEFITS OF SCREENING IN THE 40s**

**1. Coldman et al:** Found 44% mortality reduction in women 40-49 who screened vs women who did not screen, and "The substudy found no evidence that self-selection biased the

reported mortality results, although the confidence intervals of this assessment were wide."

<https://pubmed.ncbi.nlm.nih.gov/25274578/>

Coldman A, Phillips N, Wilson C, Decker K, Chiarelli AM, Brisson J, et al. Pan-Canadian Study of Mammography Screening and Mortality from Breast Cancer. JNCI J Natl Cancer Inst. 2014; 106(11): dju261

**2. Tabar et al:** By studying only breast cancer fatalities, these authors eliminated lead-time bias. Women were all treated with stage specific treatment, whether they presented with clinically- or screen-detected cancer. Over a 39-year period, women 40-69 who participated in screening were 60% less likely to die of breast cancer in the first 10 years after diagnosis, and 47% less likely to die in the 20 years after diagnosis, compared with women who did not participate in screening.

<https://pubmed.ncbi.nlm.nih.gov/30411328/>

Tabár L, Dean PB, Chen TH-H, Yen AM-F, Chen SL-S, Fann JC-Y. The incidence of fatal breast cancer measures the increased effectiveness of therapy in women participating in mammography screening. Cancer 2018 125, 4: 485-653. https://doi.org/10.1002/cncr.31840

**3. Tabar et al:**  29 year follow up of the Swedish 2 county trial (started in 1977/1978, screening ages 40-74) showed 31% mortality reduction (one death prevented for every 414 or 519 women screened for a 7-year period). They used one-view mammography at intervals of 24-33 months. "There is good reason to believe that had two-view mammography and a shorter interval been used in our trial, the impact on breast cancer mortality would have been even greater.”

"The number of over diagnosed cases in this study has been estimated as less than half the number of breast cancer deaths prevented and, thus, is a small fraction of all cases."

<https://pubmed.ncbi.nlm.nih.gov/21712474/>

Tabár L, Vitak B, Chen TH, Yen AM, Cohen A, Tot T, Chiu SY, Chen SL, Fann JC, Rosell J, Fohlin H, Smith RA, Duffy SW. Swedish two-county trial: impact of mammographic screening on breast cancer mortality during 3 decades. Radiology. 2011 Sep;260(3):658-63. doi: 10.1148/radiol.11110469. Epub 2011 Jun 28. PMID: 21712474.

**4. Webb et al:** Performed a “failure analysis.” They looked at 7301 women diagnosed with breast cancer 1990-1999 at 2 hospitals in the Harvard system in Boston.

71% of deaths occurred in the 20% of women who did not undergo regular mammographic screening and 29% occurred in regularly screened women. Median age at diagnosis of fatal cancers was 49 years. Of all breast cancer deaths, only 13% occurred in women 70 years or older but 50% occurred in women under age 50; 31% occurred in women initially diagnosed between ages 40 and 49 years. "Unfortunately, shared decision-making narratives tend to emphasize the harms of screening rather than the benefits. Indeed, it may even be difficult to discuss the primary advantage of screening, namely, early discovery of cancer, as a benefit. Participating in mammography can be likened to purchasing home insurance. The insured pay a premium, despite the rarity that they ever file a claim. In the event of disaster, however, the insured are protected from financial ruin. Likewise, all suitably aged women should participate in mammography screening even though only a few will ever develop breast cancer. In the event of the diagnosis of breast cancer, however, the disaster of death is largely avoided due to early detection. Our study found that most women who died of breast cancer had not been screened." <https://pubmed.ncbi.nlm.nih.gov/24018987/>

Webb ML, Cady B, Michaelson JS, Bush DM, Calvillo KZ, Kopans DB, Smith BL. A failure analysis of invasive breast cancer: most deaths from disease occur in women not regularly screened. Cancer. 2014 Sep 15;120(18):2839-46. doi: 10.1002/cncr.28199. Epub 2013 Sep 9. PMID: 24018987.

**5. Duffy et al** conducted the UK AGE trial, where 160,921 women aged 39–41 years were recruited and randomized, stratified by general practice, in a 1:2 ratio, to yearly mammographic screening from the year of inclusion in the trial up to and including the calendar year that they reached age 48 years (intervention group), or to standard care of no screening until the invitation to their first National Health Service Breast Screening Programme (NHSBSP) screen at approximately age 50 years (control group), and followed up for a median of 22·8 years.

They observed a significant 25% mortality reduction at 10 years of follow-up, which was attenuated thereafter. Mortality reduction would almost certainly be better but for [two significant limitations of the trial:](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045%2815%2900057-1/fulltext) they obtained only one view per breast rather than the standard 2, and did not perform biopsies on clustered microcalcifications. The attenuation can be partially explained because most of the women started regular screening immediately after the trial, which would gradually wash out the effect of the earlier intervention, which was only for a short period. This would be further affected by variability in terms of which of the women previously in the two arms of AGE continued to be screened and which didn't.

There was a substantial reduction in mortality in the intervention group from grade 1 and 2 breast cancers, but no difference in mortality from grade 3 breast cancers. This was similar to findings in in the Swedish Two-County trial. There were no compensatory additional breast cancer deaths after 10 years of follow-up, and so the absolute benefit from the intervention remains the same in the long term.

Results with respect to breast cancer incidence suggest at worst modest overdiagnosis in this age group, and that any overdiagnosed cancers would otherwise be diagnosed at NHSBSP screening from age 50 years onwards. Therefore, screening in the age group of 40–49 years does not appear to add to overdiagnosed cases from screening at age 50 years and older.

“There are several limitations to this study, some relating to the period of the intervention. The screening in the intervention period took place throughout the 1990s and early 2000s, during which considerable changes in diagnosis, screening, and therapy took place. The screening method was film screening and was mainly single-view mammography. The average nonparticipation rate was 31%, and three centres had to cease screening early because of capacity problems……Our results suggest a reduction in breast cancer mortality
with annual mammography in women aged 40–49 years within the first 10 years of follow-up, and **no overdiagnosis in addition to that which arises from screening at age
50 years and older.**"

[https://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045(20)30398-3.pdf](https://www.thelancet.com/pdfs/journals/lanonc/PIIS1470-2045%2820%2930398-3.pdf)

Duffy, SW, Vulkan, D,Cuckle, H. et al. Effect of mammographic screening from age 40 years on breast cancer mortality (UK Age trial): final results of a randomised, controlled trial *Lancet Oncol* 2020; 21: 1165–72

**SECTION 2: BENEFITS BEYOND MORTALITY**

The Task Force panel that made the breast screening guidelines only looked at mortality reduction in RCTs, not reduction of aggressive treatment or surgery. The Task Force should have considered that early detection allows successful treatment with less aggressive therapy, and therefore better quality of life for women with cancer. There are numerous studies showing reduced need for mastectomies, axillary dissection and chemotherapy in women whose cancers have been detected earlier by screening.

**1. Ahn:** Screening mammography is associated with decreased stage at diagnosis and receipt of less-extensive treatment. This was evident in all groups, including the 40–49 years age group, where controversy exists on whether screening is even necessary.

<https://pubmed.ncbi.nlm.nih.gov/29987612/>

Ahn S, Wooster M, Valente C, Moshier E, Meng R, Pisapati K, Couri R, Margolies L, Schmidt H, Port E. Impact of Screening Mammography on Treatment in Women Diagnosed with Breast Cancer Ann Surg Oncol. 2018 Oct;25(10):2979-2986. doi: 10.1245/s10434-018-6646-8. Epub 2018 Jul 9.

**2. Coldman:** Breast conserving surgery (BCS) rates were higher (OR = 2.3, p < 0.001) and chemotherapy use lower (OR = 0.53, p < 0.001) among regular participants compared with nonparticipants after adjustment for age.

<https://pubmed.ncbi.nlm.nih.gov/17290404/>

Coldman AJ, Phillips N, Speers C. A retrospective study of the effect of participation in screening mammography on the use of chemotherapy and breast conserving surgery. Int J Cancer. 2007 May 15;120(10):2185-90. doi: 10.1002/ijc.22545. PMID: 17290404.

**3. Herrman:** Screening participants are significantly less likely to receive a mastectomy compared to non-participants, which must be attributed to additional factors than just lower stages. Lower mastectomy rates lead to a higher quality of life for many patients.

<https://bmccancer.biomedcentral.com/articles/10.1186/s12885-021-07917-2>
Herrmann et al. BMC Cancer (2021) 21:229 https://doi.org/10.1186/s12885-021-07917-

**4. Yaffe, Jong, Pritchard:** The effects of earlier detection of breast cancer in reducing morbidities associated with treatment have often also been neglected. For regimens such as annual screening of average-risk women from ages 40–74 years, estimated benefits greatly outweigh estimated harms. The effects of screening on morbidity are important and should

be considered in guideline setting.

<https://academic.oup.com/jbi/article/1/3/161/5553855>

Yaffe, MJ, Jong, RA, Pritchard, KI, Breast Cancer Screening: Beyond Mortality, Journal of Breast Imaging, Volume 1, Issue 3, September 2019, Pages 161–165, <https://doi.org/10.1093/jbi/wbz038>

**5. Barth, Gibson, Carney**: Barth *et al.* found that cancers identified at screening mammography (versus those detected by physical examination) were smaller and more frequently node-negative compared to cancers found by clinical examination. Hence, the former group of breast cancer patients was more likely to be treated with less morbid therapy. Patients whose cancers were detected by screening mammography were more likely to be treated with breast conservation surgery (56% vs 32%) and less likely to receive chemotherapy (28% vs 56%) than patients whose cancers were detected by physical examination. Presumably, this is because patients in the former group were more frequently node-negative (84% vs 58%) and had smaller tumors (1.5 vs 2.9 cm) than patients in the latter group.

<https://www.ajronline.org/doi/full/10.2214/ajr.184.1.01840324>

Barth RJ Jr, Gibson GR, Carney PA, Mott LA, Becher RD, Poplack SP. Detection of breast cancer on screening mammography allows patients to be treated with less-toxic therapy. AJR 2005:184:324–329).

**SECTION 3: RACIAL DISPARITIES**

[Black, Asian and Hispanic women have a peak incidence of breast cancer in the mid-to-late forties, compared to white women in the early-sixties](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5875337/). Given the younger age of onset and the higher incidence of aggressive breast cancer, black women are [even more likely to die in their 40s](https://doi.org/10.1093/jbi/wbaa067) from breast cancer.

**1. Hendrick et al:** Showed the importance of screening minority women earlier and more frequently
<https://pubmed.ncbi.nlm.nih.gov/34427920/>

Hendrick RE, Monticciolo DL, Biggs KW, Malak SF. Age distributions of breast cancer diagnosis and mortality by race and ethnicity in US women. Cancer. 2021 Dec 1;127(23):4384-4392. doi: 10.1002/cncr.33846. Epub 2021 Aug 24. PMID: 34427920.

**2. Yaffe:**Editorial on Hendrick
<https://pubmed.ncbi.nlm.nih.gov/34427912/>

Yaffe MJ. Looking at breast cancer through the ethnic and racial lens. One size definitely does not fit all. Cancer. 2021 Dec 1;127(23):4356-4358. doi: 10.1002/cncr.33841. Epub 2021 Aug 24. PMID: 34427912.

**3. Rebner MD, Pai VR.** Breast Cancer Screening Recommendations: African American Women Are at a Disadvantage, Journal of Breast Imaging 2020; 2:416–421.

**4. Stapleton SM et al.** Race/Ethnicity and Age Distribution of Breast Cancer Diagnosis in the United States. *JAMA Surg*. 2018;153(6):594-595. doi:10.1001/jamasurg.2018.0035

5. **Yaffe MJ.** Looking at breast cancer through the ethnic and racial lens𠄄One size definitely does not fit all. Cancer 2021; 127:4356-4358.

**SECTION 4: HARMS VS BENEFITS OF SCREENING IN 40s**

**1. Yaffe, Jong, Pritchard:** The Canadian Task Force has never published quantitative estimates of the ratio of benefit to harm for different screening regimens. Analyses that do this using quality adjusted life years as a metric show acceptable ratios for screening younger women. For example, using a validated NCI microsimulation model the benefit: harm ratio of transition from a program of biennial screening between ages 50 and 74 to annual screening between ages 40 and 74 was estimated as 6:1**.**

<https://academic.oup.com/jbi/article/1/3/161/5553855?login=true>

Yaffe MJ, Jong RA, Pritchard KI. Breast Cancer Screening: Beyond Mortality. Journal of Breast Imaging, Volume 1, Issue 3, September 2019, Pages 161–165

**2. Seely et al:** For women 40–74 years of age who actually participate in screening every 1–2 years, breast cancer mortality is reduced by at least 40%. With appropriate corrections, overdiagnosis accounts for 10% or fewer breast cancers. “False positives” occur in about 10% of screened women, 80% of which are resolved with additional imaging, and 10%, with

breast needle biopsy.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6001765/>
Seely, J M, and T Alhassan. “Screening for breast cancer in 2018-what should we be doing today?.” *Current Oncology* 2018; 25: S115-S124. doi:10.3747/co.25.3770

**3. Ganott et al:** "A substantial fraction of women in this study would have preferred the inconvenience of and anxiety associated with a higher recall rate if it resulted in the possibility of detecting breast cancer earlier."

<https://pubmed.ncbi.nlm.nih.gov/16505392/>

Ganott MA, Sumkin JH, King JL, Klym AH, Catullo VJ, Cohen CS, Gur D. Screening mammography: do women prefer a higher recall rate given the possibility of earlier detection of cancer? Radiology. 2006 Mar;238(3):793-800. doi: 10.1148/radiol.2383050852. PMID: 16505392.

**SECTION 5: OVERDIAGNOSIS**

“Overdiagnosis” is also a pejorative misnomer. It refers to the detection of a cancer that would not harm a woman if it went undetected. This would be the case if a woman were treated for breast cancer, but died of another cause before her cancer would kill her: another cancer, cardiovascular disease or a motor vehicle accident. It can occur through screening, but also in cases of cancers detected by palpation in screened and unscreened women. Overdiagnosis cannot be measured directly, and must be estimated, is far less common that the estimate used by the CTF (see below). But overdiagnosis is vanishingly rare in younger women, because they are far less likely to have other cancers or life-threatening diseases than older women.

Screening does not diagnose breast cancer. It detects it, along with benign entities such as cysts and fibroadenomas, etc. Pathologists diagnose cancer. It is generally not possible for the pathologist to determine with high certainty which cancers will remain indolent and which will progress, metastasize and become lethal. Overdiagnosis becomes a harm if women with cancer are overtreated by surgeons and oncologists. The CTF says that women 40-49 should not be screened, and lose the opportunity for early detection, less aggressive therapy and mortality reduction, for the sake of sparing a small number of women the theoretical risk of overdiagnosis.

**1. Puliti et al**: Used data from European population-based mammographic screening programmes.

Compared to unadjusted estimates of over diagnosis ranging from 0% to 54%, reported estimates adjusted for breast cancer risk and lead time were 2.8% in the Netherlands, 4.6% and 1.0% in Italy, 7.0% in Denmark and 10% and 3.3% in England and Wales. The most plausible estimates of overdiagnosis range from 1% to 10%. Substantially higher estimates of overdiagnosis reported in the literature are due to the lack of adjustment for baseline incidence trends and/or lead time.

<https://pubmed.ncbi.nlm.nih.gov/22972810/>
Puliti D, DuffySW, Miccinesi G, de Koning H, Lynge E, Zappa M, Paci M and the EUROSCREENWorkingGroup. Overdiagnosis in mammographic screening for breast cancer in Europe: a literature review. J Med Screen 2012;19 Suppl1:42–56.

**2. Helvie et al:** The primary harm of overdiagnosis relates to subsequent (unnecessary) treatment. Importantly, overdiagnosis concerns must be balanced with the lifesaving and morbidity benefits of screening mammography and the prevention of some invasive cancer by detection and treatment of ductal carcinoma in situ. Reasonable estimates of overdiagnosis of women aged 40–80 years are in the order of 1%–10%, with lower values when overdiagnosis is restricted to invasive cancer and among younger women.

<https://academic.oup.com/jbi/article/1/4/278/5584369>

Helvie, MA, Perspectives on the Overdiagnosis of Breast Cancer Associated with Mammographic Screening, Journal of Breast Imaging, Volume 1, Issue 4, December 2019, Pages 278–282, <https://doi.org/10.1093/jbi/wbz059>

**3. Falk & Hofvind:** The proportion of inevitable overdiagnosed women in a screened versus nonscreened cohort was 1.9% for England and Wales and 1.8% for Norway. Sensitivity analyses using various assumptions increased the estimates up to a maximum of 4%.

<https://pubmed.ncbi.nlm.nih.gov/26976857/>

Falk RS, Hofvind S. Overdiagnosis in Mammographic Screening because of Competing Risk of Death. Cancer Epidemiol Biomarkers Prev. 2016 May;25(5):759-65. doi: 10.1158/1055-9965.EPI-15-0819. Epub 2016 Mar 14. PMID: 26976857.

**4. Chaltiel and Hill:** The type of data used in overdiagnosis studies has a meaningful effect on the estimation: no study based on individual data provides an estimate higher than 17%, while studies based on aggregated data often provide estimates higher than 40%. Many estimates of overdiagnosis associated with breast cancer screening programmes are serious overestimations.

<https://pubmed.ncbi.nlm.nih.gov/34158298/>

Chaltiel D, Hill C. Estimations of overdiagnosis in breast cancer screening vary between 0% and over 50%: why? BMJ Open 2021; 11:e046353.

**5. Kopans, Smith and Duffy:** In general, estimates of overdiagnosis that take into account lead time and the other factors influencing incidence noted in the previous section are in agreement with or lower than those of the Malmö trial (30). Studies that do not take these factors into account tend to have much higher estimates of overdiagnosis, which is due to some clear, and other perhaps less intuitive, flaws rendering them implausible (13,31). In a review of the data from two Swedish RCTs— the Two-County and Gothenburg Trials— Duffy et al (19) estimated an overdiagnosis rate of only 1%. Olsen et al (32) found a similarly low rate in the Copenhagen program, as did Puliti and colleagues (33) in Italy. Thus, RCT estimates and service screening estimates, which properly take into account the complexities of cancer incidence in the presence of screening, tend to find levels of overdiagnosis of 10% or less, which is likely to be closest to the true level.

**Kopans DB, Smith RA, Duffy SW.** Mammographic screening and "overdiagnosis". Radiology 2011;260:616-20.

**6. Yaffe M, Mainprize JG**. Overdetection of Breast Cancer. Curr Oncl *2022; 22:3894-3910.*

**SECTION 6: ANXIETY FROM CALLBACKS**

**Yaffe and Alter:** “It would be naive not to expect that any examination whose result could inform an individual that she had cancer would elicit at least some anxiety. Therefore, it is not surprising that women would experience a level of heightened anxiety before, during, and after receiving a screening mammogram.” There is “commonly held confusion between anxiety—a normal and healthy response to uncertainty—and anxiety disorder, which is a clinical condition.” “We would add one more idea: Discontinuing use of the term false positive associated with a screening examination. While breast imaging radiologists understand that in most cases this occurs as part of an effort to ensure that cancer is not indeed present, it is interpreted by many others as being an error—in fact, a false diagnosis of cancer—which it is not. This gives the public (and many guidelines groups) an erroneous message, and the anxiety that it causes, possibly due more to the term itself than what it means, has been suggested by some as a major harm of screening (7,8). Perhaps, to avoid misinterpretation, a slightly clunkier, but more precise term such as “screening recall—no evidence of cancer” could be used instead for quantifying this phenomenon.
<https://academic.oup.com/jbi/article-abstract/3/3/273/6260880>

Alter, RC, Yaffe, MJ. Breast Cancer Screening and Anxiety, Journal of Breast Imaging, Volume 3, Issue 3, May/June 2021, Pages 273–275, <https://doi.org/10.1093/jbi/wbab023>

**Appavoo:** Barriers to the acceptance of imaging as an important component in reassurance may be rooted in old ideas minimizing the importance of mental health.

<https://journals.sagepub.com/doi/full/10.1177/08465371211021996>

Appavoo S. Imaging, Paternalism and the Worried Patient: Rethinking Our Approach. *Canadian Association of Radiologists Journal*. 2022;73(1):121-124. doi:[10.1177/08465371211021996](https://doi.org/10.1177/08465371211021996)

**SECTION 7: SUPPLEMENTAL SCREENING/MORE SCREENING FOR WOMEN WITH DENSE BREASTS

Wu and Warren**: 7 additional cancers found per 1000 women via screening ultrasound (in women with dense breasts)

<https://pubmed.ncbi.nlm.nih.gov/34134531/>
Wu T, Warren LJ. The Added Value of Supplemental Breast Ultrasound Screening for Women With Dense Breasts: A Single Center Canadian Experience. Can Assoc Radiol J. 2022 Feb;73(1):101-106. doi: 10.1177/08465371211011707. Epub 2021 Jun 16. PMID: 34134531.

**Seely:**Found that provinces that screen annually in women with dense breasts have fewer interval cancers

<https://pubmed.ncbi.nlm.nih.gov/34279132/>

Seely JM, Peddle SE, Yang H, Chiarelli AM, McCallum M, Narasimhan G, Zakaria D, Earle CC, Fung S, Bryant H, Nicholson E, Politis C, Berg WA. Breast Density and Risk of Interval Cancers: The Effect of Annual Versus Biennial Screening Mammography Policies in Canada. Can Assoc Radiol J. 2022 Feb;73(1):90-100. doi: 10.1177/08465371211027958. Epub 2021 Jul 19. PMID: 34279132.

**Gordon:** Editorial on Seely

<https://pubmed.ncbi.nlm.nih.gov/34482760/>

Gordon PB. Breast Density and Risk of Interval Cancers. Can Assoc Radiol J. 2022 Feb;73(1):19-20. doi: 10.1177/08465371211030573. Epub 2021 Sep 5. PMID: 34482760.

**SECTION 8: CRITIQUES OF THE CNBSS**

For decades it has been known that the randomization in the CNBSS studies had to have been compromised. Now we have eyewitness accounts of how the randomization was compromised. Critiques go back to the early 90s.

Boyd NF, Jong RA, Yaffe MJ, Tritchler D, Lockwood G, Zylak CJ. A critical appraisal of the Canadian National Breast Cancer Screening Study. Radiology. 1993 Dec; 189(3):661-3.

Kopans DB, Feig SA. The Canadian National Breast Screening Study: a critical review. AJR Am J Roentgenol. 1993;161(4):755-60.

Tarone RE. The Excess of Patients with Advanced Breast Cancers in Young Women Screened with Mammography in the Canadian National Breast Screening Study. Cancer 1995; 75:997-1003.

Boyd NF. The review of randomization in the Canadian National Breast Screening Study. Is the debate over? CMAJ 1997; 156:207–9.

Yaffe MJ, Seely JE, Gordon PB, Appavoo S, Kopans DB. The Randomized trial of mammography screening that was not – A cautionary tale. J Med Screen 2022; 29:7-11. https://journals.sagepub.com/doi/full/10.1177/09691413211059461

Seely JM, Eby PR, Gordon PB, Appavoo S, Yaffe MJ. Errors in Conduct of the CNBSS Trials of Breast Cancer Screening Observed by Research Personnel. Journal of Breast Imaging 2022; 4:135–143. <https://academic.oup.com/jbi/article/4/2/135/6555326>

Jean M Seely, MD, Peter R Eby, MD, FACR, FSBI, Martin J Yaffe, PhD, The Fundamental Flaws of the CNBSS Trials: A Scientific Review, Journal of Breast Imaging 2022; 4:108–119. <https://academic.oup.com/jbi/article/4/2/108/6555324>.

**SECTION 9: CONCLUSION**

There is ample peer-reviewed data to prompt revision of the Task Force guidelines for breast cancer screening in women at average risk. By using only RCTs conducted in the 1960s to the 1980s (the critical study from Canada having now been discredited) to determine the benefits of early detection, and by overstating the risks of screening, the Task Force has denied women aged 40-49 (including many minority women) and women with dense breasts the opportunity for early detection, less aggressive therapy and mortality reduction. The health of Canadian women should be a priority for our government and cancer agencies.