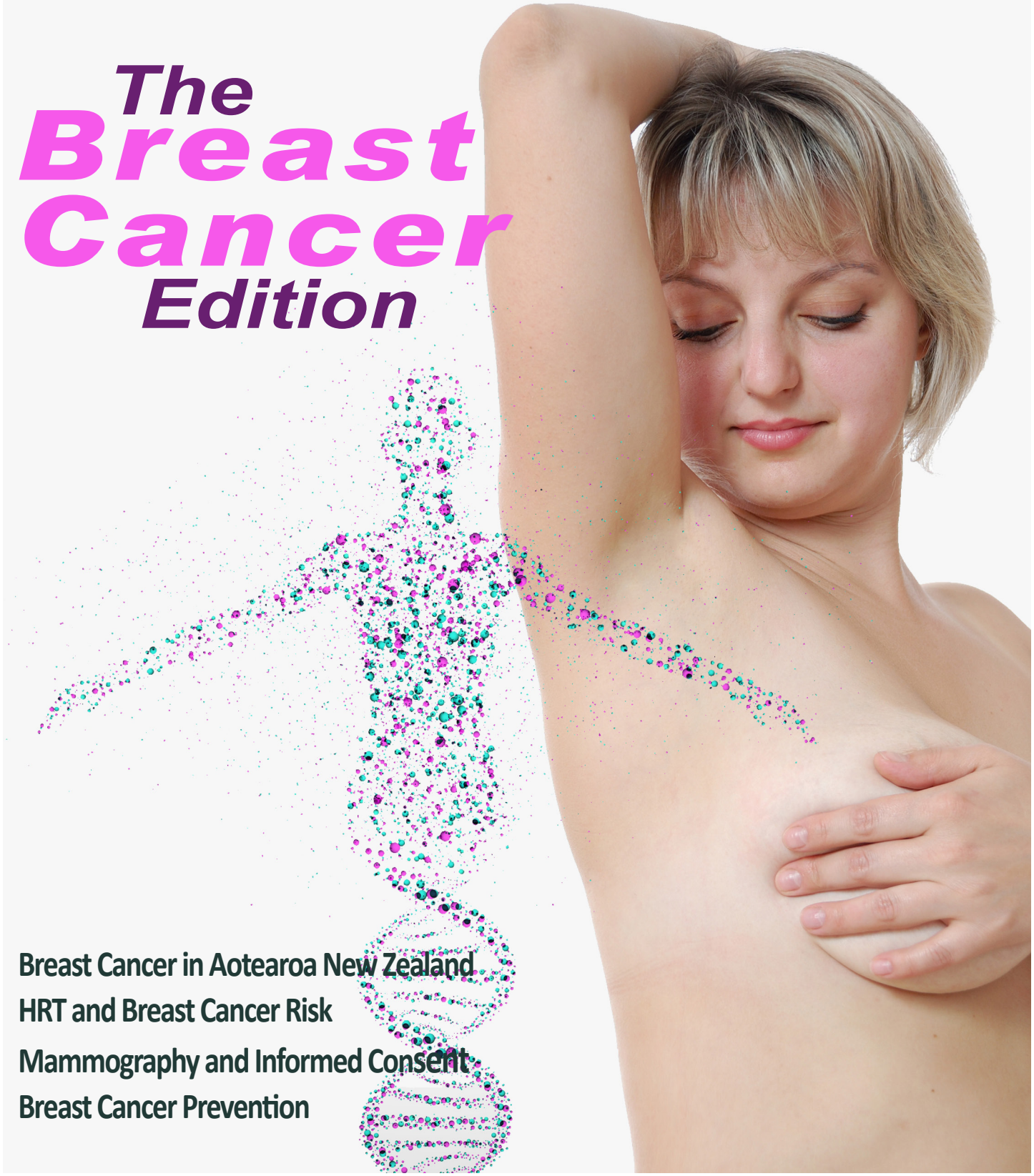
AUCKLAND WOMEN'S HEALTH COUNCIL

NEWSLETTER

OCTOBER • 2019

a voice for women's health

The Breast Cancer Edition



Breast Cancer in Aotearoa New Zealand

HRT and Breast Cancer Risk

Mammography and Informed Consent

Breast Cancer Prevention

Welcome to the Breast Cancer Edition

The October edition of the Auckland Women's Health Council Newsletter represents a completely different approach for this publication; we have focused the entire newsletter on breast cancer. Breast cancer awareness month seemed as good a time as any to review breast cancer in Aotearoa New Zealand. As you will read in our lead article, breast cancer is the most frequently diagnosed cancer in New Zealand women and is on the increase. The burden of this disease for our women, our families and our communities, is substantial and increasing.

Unfortunately, our Māori women bear the brunt of the increase in breast cancer – a fact that seems to have escaped mainstream media. They are also more likely to die from the disease. In a year in which there has been much focus on disparities in health care and outcomes for Māori, it is somewhat surprising that no mention seems to have been made of this fact during October's breast cancer awareness month.

As well as reviewing the breast cancer statistics in this country, we look at:

- the increased risk of breast cancer in those who use hormone replacement therapy to deal with menopausal symptoms, in light of recent research on this subject;
- informed consent and the benefits and harms of breast screening mammography; and
- breast cancer prevention.

I came up with a few questions as I undertook the research for this edition – some… no, most are really rhetorical questions because I suspect we actually know the answers for some of them and the answers are not very satisfactory.

1. Why are the Ministry of Health and other health officials not shouting from the rooftops the fact that the increase in breast cancer in this country is almost entirely among Māori women?
2. Assuming that someone in the MoH knows about this, when are they and the Government going to do something ***real*** about this?
3. Why are providers of breast screening mammography permitted to limit the information they provide to women to outdated and/or over-inflated statements about the benefits of mammography without adequately advising them of the risks and harms.
4. Why do researchers and health professionals continue to use misleading relative risk/ relative risk reduction figures in medical papers and information provided to consumers without at least including absolute risk/ absolute risk reduction figures as well?
5. Wouldn't prevention be better than "cure", when it is clear that our public health system has insufficient funds to provide all women with breast cancer in this country with the best possible treatment and latest drugs that claim to offer the best chance of survival?
6. Why is it that when environmental influences in breast cancer are being taken seriously overseas and there is burgeoning evidence of environmental risks, there is no publicly funded research in New Zealand on breast cancer and the environment?

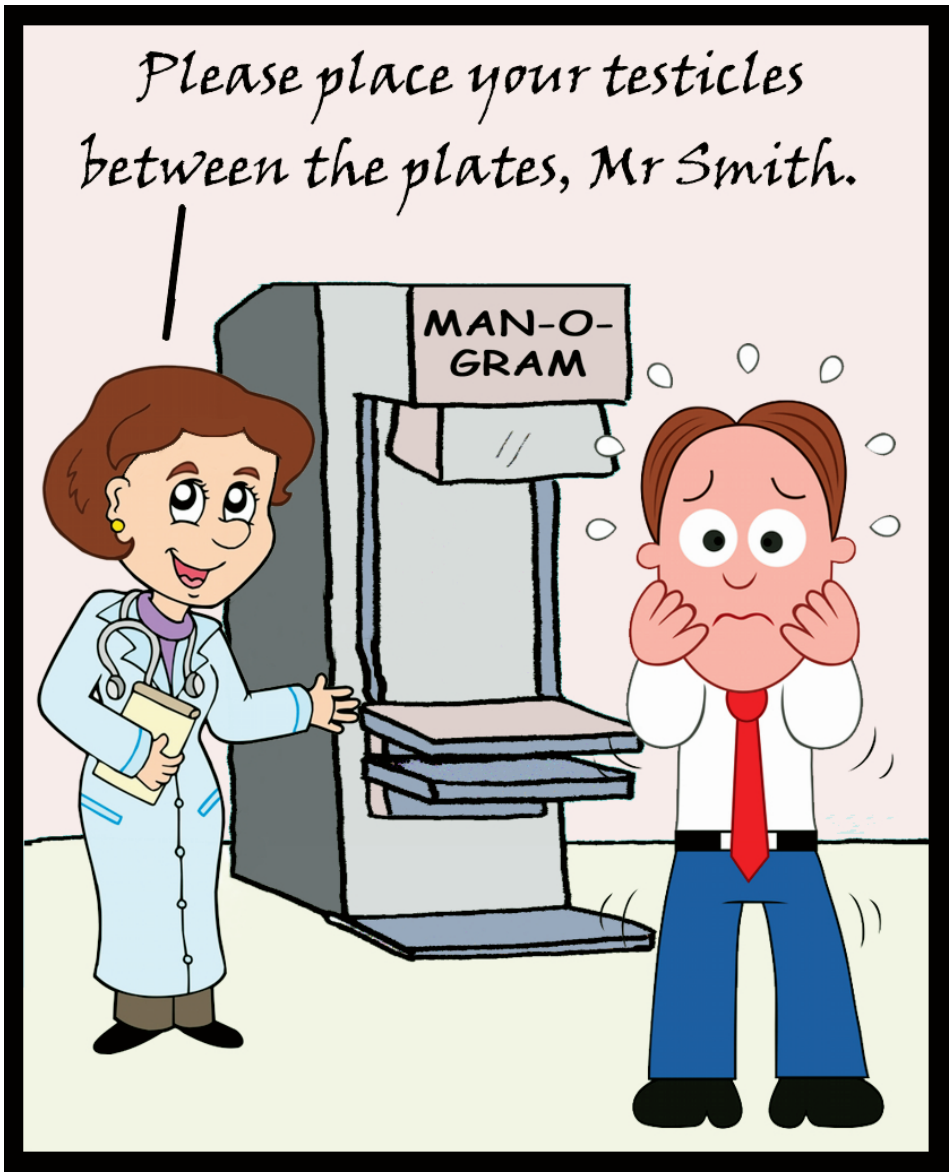
Auckland Women's Health Council

PO Box 32-445
Devonport
Auckland 0744

EMAIL:
awhc@womenshealthcouncil.org.nz

WEBSITE
www.womenshealthcouncil.org.nz

7. Just how much evidence is needed before we invoke the 'Precautionary Principle'?
8. Is the implementation of New Zealand Cancer Action Plan, released on the 1st of September, actually going to make a difference in breast cancer prevention?
9. Are successive New Zealand governments being lobbied to permit the continued use and sale of products known to contribute to the development of breast cancer?
10. Why are manufacturers not required to prove a chemical, compound or product is safe and not carcinogenic before they bring it to market, rather than the onus being on the public and independent researchers to prove that they are unsafe before anything is done about banning or limiting their use?
11. When are our young women going to be taught about what they can do for themselves to reduce their risk of breast cancer, including information on the links between alcohol consumption and tobacco smoking and subsequent breast cancer?
12. Is any serious research being done to investigate the women who don't get breast cancer and why?



If men had to undergo testicle screening in the same manner women have breast screening, perhaps someone would invent a better way of doing it...

AUCKLAND WOMEN'S HEALTH COUNCIL

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AWHC GENERAL MEETINGS

Our last Committee meeting was held on the 16th of October, 2019. Detailed minutes of meetings are available on request. Matters discussed recently include:

- Abortion law reform.
- Appinting a new co-ordinator.
- Election of new DHB board members.

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Breast Cancer in Aotearoa New Zealand

By Sue Claridge

"Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer-related death among women worldwide."[1]

Breast Cancer at a Glance

Breast cancer is the most frequently diagnosed cancer in New Zealand women and is on the increase.

Together with Australia, New Zealand women have the highest cumulative risk of breast cancer, at 10.16%, compared with the rest of the world.

Globally, breast cancer incidence is increasing. In part this has been attributed to decreased childbearing and breast-feeding, increased environmental hormone exposure, and detrimental dietary and lifestyle changes, including increasing levels of obesity and less physical activity.

In New Zealand, the increase in incidence is almost entirely among Māori women, while among non-Māori incidence is relatively stable.

Three lifestyle factors may make a significant contribution to the higher and increasing incidence in Māori women: tobacco use, heavy single session alcohol consumption and obesity.

Since 1997 the mortality rate has steadily declined in both Māori and non-Māori women; however, Māori bear a disproportionate burden of loss of life from breast cancer.

Those living in the areas of highest deprivation also bear a disproportionate burden in both incidence and mortality.

Breast cancer is by far the most significant cancer for women's health in New Zealand (see Figure 1). More than twice as many women are diagnosed with breast cancer every year compared with the second most prevalent cancer (colorectal cancer). Fortunately, the mortality rate for number of diagnoses is relatively low compared with colorectal and lung cancer. However, at 668 deaths in 2016, breast cancer is the second most common cause of cancer death in New Zealand women behind lung cancer (819 deaths), and is the fifth most common cause of death behind ischaemic heart disease (2002 deaths), cerebrovascular disease (1410 deaths) and chronic lower respiratory diseases (876 deaths), and lung cancer.[2]

So significant is the impact of breast cancer, it is the second most diagnosed cancer worldwide, after lung cancer, with 2.089 million new diagnoses (11.6% of all new cases) in 2018,[4] despite the fact that breast cancer predominantly affects only 50% of the population (a small percentage occurs in men; in New Zealand in 2016 0.48% of new breast cancer diagnoses were in men).

Breast cancer has the fifth highest mortality rate globally, causing 6.6% (627,000) of cancer deaths worldwide in 2018.[4]

New Zealand and Australia together have the highest cumulative risk of breast cancer at 10.16% (compared with North America 9.32% and Western Europe 9.90%; South-Central Asia has the lowest risk at 2.81%).[5] Lowest mortality is found in Eastern Asia (0.93% cumulative risk) while New Zealand and Australia together have mortality risk of 1.37%. The highest mortality rates are in Melanesia with a cumulative risk of 2.73% (Fiji has the highest mortality rate worldwide).[5]

The highest risk of breast cancer is in the most developed countries. Those countries with a very high human development index (HDI) have a cumulative risk of 8.16%, while areas with low HDI have a cumulative risk of 3.40%.[4] Conversely, mortality rates are

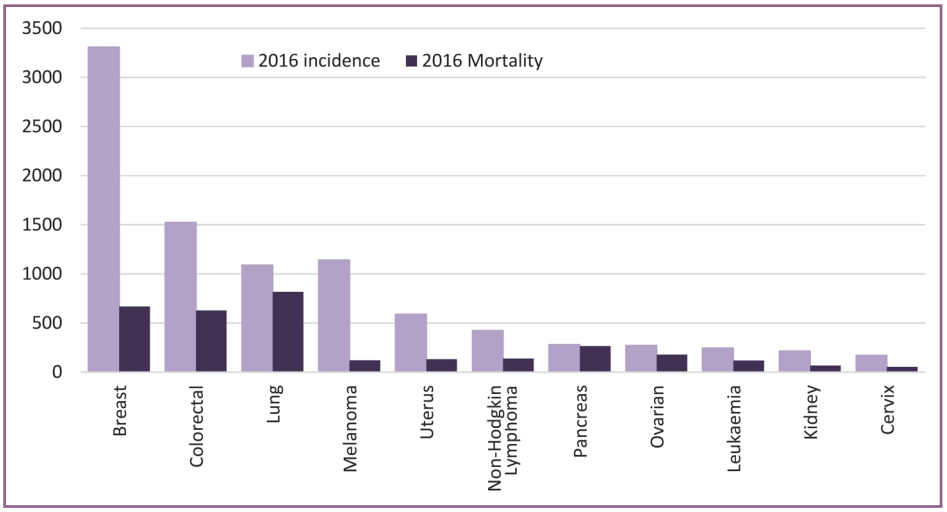

Figure 1 Incidence of and mortality from the most prevalent cancers in New Zealand women in 2016.[3]

highest in low HDI areas at 1.78% cumulative risk. Lowest mortality is found in high HDI countries (1.12% cumulative risk). The highest development status does not confer the greatest protection of dying from breast cancer, as very high HDI countries only have the second lowest mor-tality rate at 1.44% cumulative risk.

Breast Cancer in New Zealand

Over time the age-standardised* rate of breast cancer diagnoses in New Zealand has increased (see Figure 2). Mortality has been improving over this period with a general, albeit slow, downward trend. The mammography screening programme, BreastScreen Aoteroa (BSA), was introduced in 1999, and was responsible for a spike in diagnoses in 1999 and 2000. The age range covered by BSA was extended from 50-64 years to 45-69 years in 2004 and this change was likely responsible for another, smaller spike in diagnoses in 2005. However, despite this, the overall trend has been a steady increase in incidence over time.

The slight dip in incidence against the overall trend in increasing incidence, in 2003 and 2004 may have been as a result of research that showed a strong link between hormone replacement therapy (HRT) for treating menopausal symptoms and increased breast cancer risk (see article this edition on page 10), and a subsequent drop in the use of HRT.[3] That the significant reduction in HRT use of 70% contributed to the drop in incidence in 2003 and 2004 is disputed in the limited discussion in the medical literature[7], and difficult to prove. However, the reduction in HRT use is likely to have modified the rate of increase in incidence over a longer period of time, that is, the increase may have been steeper without the reduction in use of HRT.

The incidence of breast cancer globally is increasing[8, 9] – due in part to decreased childbearing and breast-feeding, increased exogenous† hormone exposure, and detrimental dietary and lifestyle changes, including increasing levels of obesity and less physical activity.[5] However, the 2014 IARC *World Cancer Report*[8] found that incidence rates had plateaued in some developed countries and in some had even declined (e.g. Spain and among white Americans).

Between 2014 and 2017, there was a sustained, gradual downward trend in incidence in New Zealand (see Figure 2) but it remains to be seen if this will continue and may or may not be part of the natural fluctuation in incidence rates seen in the past.

Breast Cancer Disparities and Ethnicity

It is widely recognised that there are considerable disparities and inequities in health and well-being, and health outcomes between Māori and non-Māori.[10, 11, 12] The statistics on breast cancer incidence and mortality paint no better a picture for Māori women.

Figure 3 shows the ASR incidence and mortality per 100,000 women from 1997 to 2017. For incidence the trendlines show very clearly that among non-Māori there has been no increase over 20 years to 2017 (the last year for which

* Age-standardized rates – usually of incidence or mortality – adjust for differences in population age distribution by applying the observed age-specific rates for each population to a standard population. ASRs allows accurate comparison year by year based not only on the actual and changing population of women in NZ, but the changing and varying populations in different age-groups.

† exogenous hormones are external or environmental sources of hormones sometimes referred to as EDCs or endocrine Disrupting Compounds, such as synthetic oestrogen as found in chemicals, such as phthalates and bisphenol A (BPA) among many hundreds of others. External or environmental sources of oestrogen are also known as xenoestrogens.

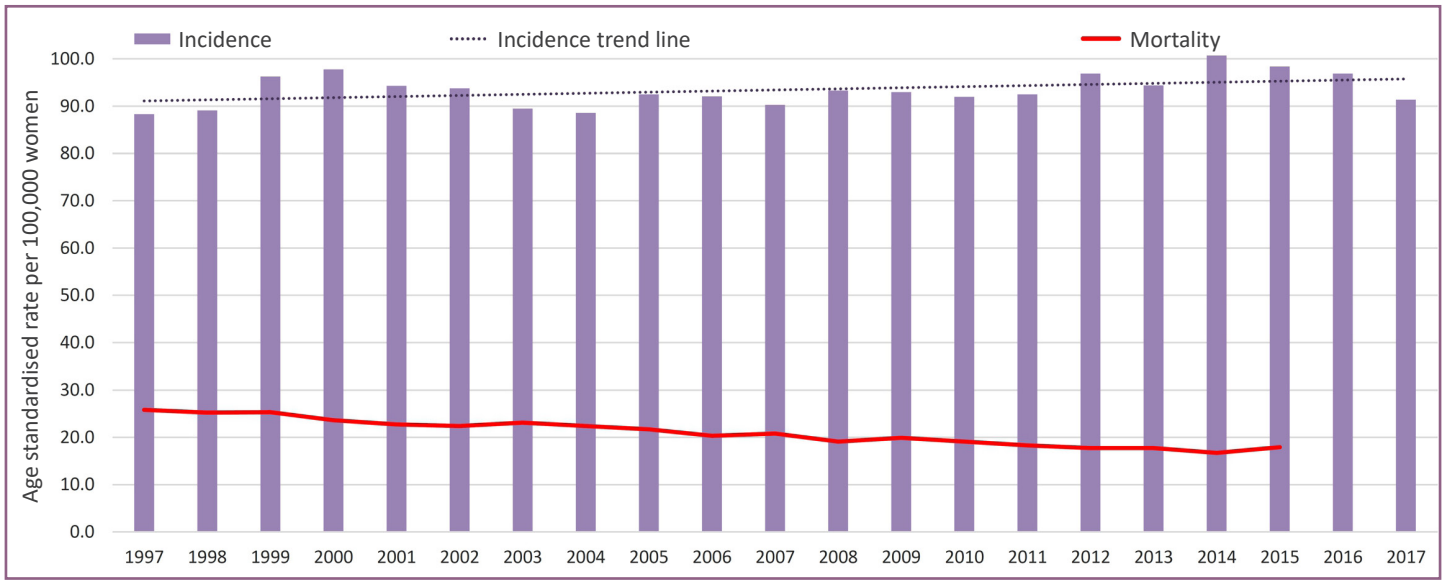

Figure 2 Incidence of and mortality from breast cancer in New Zealand 1997-2017 (age standardised rates per 100,000 women).[6] Note: mortality data is not yet available for 2016 and 2017.

data is available), and that all the increase in incidence evident in Figure 2 (page 5) can be attributed to an increase in incidence among Māori women. This is significant in that, internationally, increases in breast cancer incidence are attributed to a range of lifestyle and exposure risk factors (e.g. a decrease in number of children and later age at first pregnancy, reduced breast-feeding, increased exogenous hormone exposure, and detrimental dietary and lifestyle changes, including obesity and less physical activity).

Three significant factors that are major contributors to the risk of breast cancer are smoking, alcohol consumption and body weight/BMI; factors that also contribute to a range of other non-communicable diseases, including cardiovascular disease.

A considerable volume of research has linked tobacco smoking with an increased risk of breast cancer for many years, and some research has found that risk is higher when smoking commences in adolescence and before a first full-term pregnancy.[14] A number of studies have also found that smoking at the time of diagnosis led to higher breast cancer mortality rates.[10]

Māori women have the highest rates of smoking in New Zealand at 37% (compared with all adult smokers at 13%)[13] and are three times more likely to smoke than non-Māori women.[15] Māori are the youngest to start smoking at only 14 years of age on average.[16]

Alcohol consumption is also causally related to increased risk of breast cancer[5] with a 50% increase in risk with daily consumption of five standard drinks. There is no safe limit for alcohol consumption[5] and risk increases with as little as one standard drink per day.†

A continuously updated report by the World Cancer Research Fund and the American Institute for Cancer Research, *Diet, Nutrition, Physical Activity and Breast Cancer*, concluded that there is a significant dose-dependent increased risk of both pre- and post-menopausal breast cancer with increasing alcohol consumption, with no safe limit of consumption.[17]

According to the Ministry of Health (MoH) information on Tatau Kahukura: Māori health statistics, Māori women are less likely than non-Māori women to drink four or more times a week, but twice as likely to drink large amounts of alcohol at least weekly.[18]

Being overweight or obese is associated with the increased risk of many cancers, including breast cancer.[16, 19] With every increase in weight of 10kg over a healthy weight (BMI of 18-24.9) post-menopausal breast cancer risk increases by 40%.[16] In addition, obesity correlates with a poorer prognosis in breast cancer and higher mortality, with a US study finding that women with a BMI of 40 or more had twice the risk of dying from breast cancer than those with a healthy BMI.[18]

While there is little difference in the percentage of overweight Māori compared with non-Māori (27.6% and 28.2% respectively) there are many more obese Māori women than non-Māori (47.2% and 24.7% respectively).[20]

These three modifiable risk factors are significant in raising the risk of breast cancer among Māori and there needs to be a significantly greater focus on addressing these issues and ensuring adequate education to reduce the incidence of smoking, excess alcohol consumption and obesity among Māori women in order to reduce the increasing incidence of breast cancer.

When breast cancer mortality is considered (see Figure 3), it is evident that overall mortality is declining, and while mortality for Māori is still significantly higher than for non-Māori, the decline in mortality for Māori women matches the decline in mortality for non-Māori.

However, a "disproportionate number of Māori women are diagnosed with [a] more advanced stage of cancer"[21] and a later stage at diagnosis results in poorer outcomes and higher mortality. As well as later stage at diagnosis, Lawrenson *et al*. found that other contributors to higher Māori mortality include that they are more likely to experience a delay in the time from diagnosis to treatment, are less likely to receive radiotherapy, and are less likely to adhere to long-term adjuvant endocrine therapy.[21]

As with many other diseases and health outcomes, equitable access to appropriate and best practice health care is essential in reducing mortality and improving outcomes for Māori. Institutionalised racism – as discussed in the AWHC article "Māori Health: Addressing Inequities and Racism in the Health System" in the August edition of this newsletter[22] – must be addressed as a matter of urgency if we are to close the current breast cancer mortality gap between Māori and non-Māori.

Breast Cancer Disparities and Deprivation

Disparities between Māori and non-Māori women in the incidence of and mortality from breast cancer are as much an issue with poverty and deprivation as ethnicity. Robson and Harris found that such inequities are a consequence of the differential distribution of social, environmental, economic and political determinants of health[23] and this seen when the distribution of incidence and mortality across deprivation quintiles is considered.

† risk rises with each alcoholic drink per drinking session; one standard drink per day imposes a far smaller increase in risk than drinking seven drinks on a Saturday night.

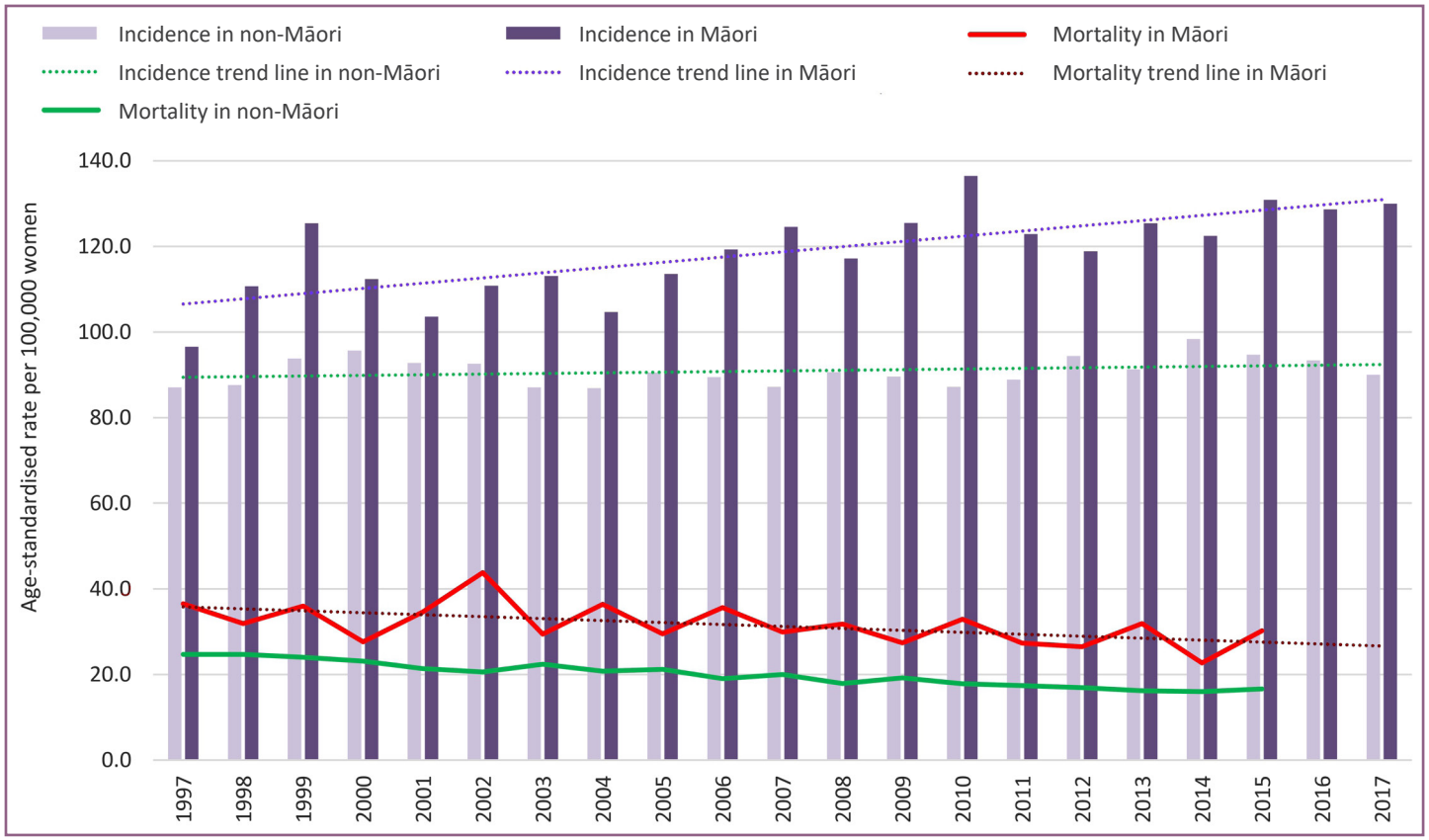

Figure 3 Incidence of and mortality from breast cancer in New Zealand 1997-2017 (age standardised rates per 100,000 women) in Māori and non-Māori.[4, 13] Note: mortality data is not yet available for 2016 and 2017.

Recent data show that generally among non-Māori/non-Pasifika women breast cancer incidence increases with increasing deprivation.†† The Māori deprivation data is very similar, just more extreme, reflecting the overall higher rates of breast cancer in this population (Figure 4 – page 8). The pattern in both is not entirely linear, with the lowest incidence in quintile 2, while women living in the lowest deprivation quintile have a higher incidence, although still lower than the bottom three quintiles.

The mortality picture is less straight forward (Figure 5, page 8). For non-Māori/non-Pasifika women there is a strong linear association of increasing mortality with increasing deprivation. However, among Māori women, the lowest mortality is seen in quintile 3 with higher mortality seen in quintile 1 (the least deprived), declining somewhat in quintile 2, while increasing significantly in quintiles 4 and 5 (most deprived).

While non-Māori/non-Pasifika data follows the expected mortality trend across deprivation quintiles, there is no obvious explanation for what we see among Māori women with higher mortality in the two least deprived quintiles. Current medical literature does not describe this pattern (the data was provided directly by the MoH in October and would not be included the most recently published papers).

AWHC sought comment from Prof Diana Sarfati, a cancer epidemiologist at Otago University. She said she could not think of an obvious reason for this mortality/deprivation pattern, but pointed out that total numbers were small.[24] Across the five years of data there were a total; of 33 Māori deaths in quintile 1 and 35 in quintile 2 (compared with 511 and 551 respctively in non-Māori).[25] Prof Sarfati said with small numbers a few more or a few fewer deaths might make a significant difference to the ASR rates,[24] thus changing the picture entirely. It will be interesting to see how the picture changes over the next ten years and beyond.

Despite the unexpected association of higher mortality in quintiles 1 and 2, Māori women living in the most deprived areas of New Zealand are far more likely to be diagnosed with and die from breast cancer than their non-Māori neighbours.

Robson, Purdie and Cormack write in *Unequal Impact II: Māori and Non-Māori Cancer Statistics by Deprivation and Rural–Urban Status, 2002–2006* that "In New Zealand, as in other countries, markers of socioeconomic position (such as income, employment, living standards and deprivation) and geographical distribution of the population are patterned by ethnicity."[26] Thus, Māori women

†† The New Zealand Index of Deprivation (NZDep) is an area-based measure of socio-economic deprivation in New Zealand based on nine census variables, where Quintile 1 represents people living in the least deprived 20 percent of small areas and Quintile 5 represents people living in the most deprived 20 percent of small areas.

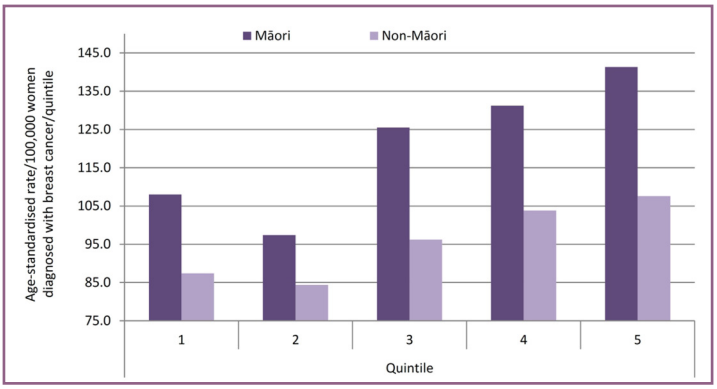

Figure 4: Breast cancer incidence in each deprivation quintile as ASR per 100,000 Māori and non-Māori/non-Pasifika for the years 2012-2016 combined.[25]

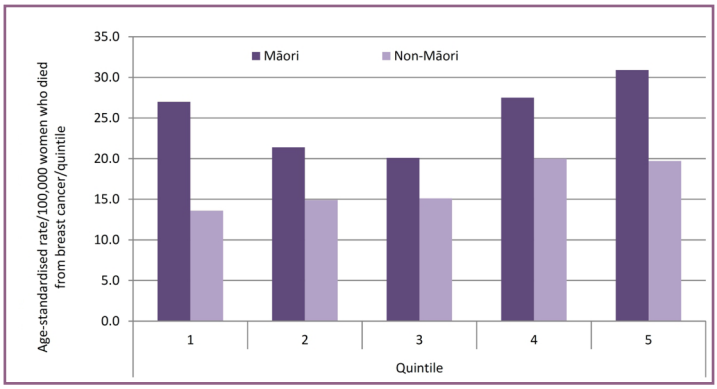

Figure 5: Breast cancer deaths in each deprivation quintile as ASR per 100,000 Māori and non-Māori/non-Pasifika for the years 2012-2016 combined.[25]

are over represented in higher deprivation quintiles and in age-standardised rates of breast cancer.

Robson *et al*. go on to say that "an increased risk of overall cancer incidence and mortality has been found to be associated with lower socioeconomic status, a pattern that is particularly pronounced for some specific types of cancer";[26] in New Zealand, our deprivation statistics show that breast cancer is one of those. In addition, among breast and other cancers, women with higher levels of deprivation are also more likely to be diagnosed at a later stage than women from areas of higher affluence.[26]

In research published in 2016, Seneviratne *et al*.[27] found that "Māori and Pacific women were around two and three times more likely respectively, to be diagnosed with metastatic disease compared with NZ European women." They also found that "Significantly higher proportions of more advanced cancer, including metastatic cancer were observed in women from high deprivation compared with low deprivation groups and rural compared with urban residing women."

The New Zealand patterns contrast with international patterns of breast cancer incidence and mortality when considered through a socio-economic lens. As a whole, New Zealand has a breast cancer incidence rate that is typical of a highly developed nation – in fact, together with Australia we have the highest breast cancer rates in the world. In Europe the highest rates of breast cancer are found in the women with the highest socio-economic status, although this was found to become insignificant when controlled for reproductive factors.[28] Conversely, mortality was lowest in women with higher socio-economic status; we see this in non-Māori women but not in Māori women.

Breast Cancer and Young Women

High profile media reports and breast cancer awareness stories might give the impression that breast cancer incidence among young or pre-menopausal women is increasing. However, that is not the case and breast cancer is still very much a post-menopausal disease.

Figure 6 shows that there is still a significant gulf between the incidence of breast cancer among pre-menopausal women compared with post-menopausal women. While there is a small increase, it is in line with population growth in this group. The significant increase in incidence in post-menopausal women appears to be greater as seen in the steeper gradient of the trendline in this group, however this increase is also inline with population growth.

Between 2001 and 2017 the premenopausal population grew by 16% while the post-menopausal population grew by 50%, in line with reports on our "aging population". Stats NZ says this is the result of both people having fewer children (sub-replacement fertility) and people living longer, accentuated by the large number of people born between 1950 and the early 1970s moving into the older age groups.[29]

Figure 7 shows that the absolute numbers of young women dying from breast cancer actually decreased between 2005 and 2016, while absolute numbers increased among post-menopausal women.*

Conclusion

Breast cancer is the most significant cancer affecting New Zealand women and is the fifth most common cause of death. Thus, breast cancer imposes a significant burden on our population. However, the burden is not borne equitably, with Māori women and those living in areas of greatest deprivation bearing a disproportionate burden of both breast cancer incidence and mortality.

One in nine New Zealand women will develop breast cancer in their lifetime[30] – the risk increases

* this contrasts with the declining mortality as shown in Figure 3, because Figure 3 uses age-standardised rates while Figure 7 uses absolute numbers of deaths in each year in the age groups. It is beyond the scope of this article to compare ASR rates between pre- and post-menopausal groups.

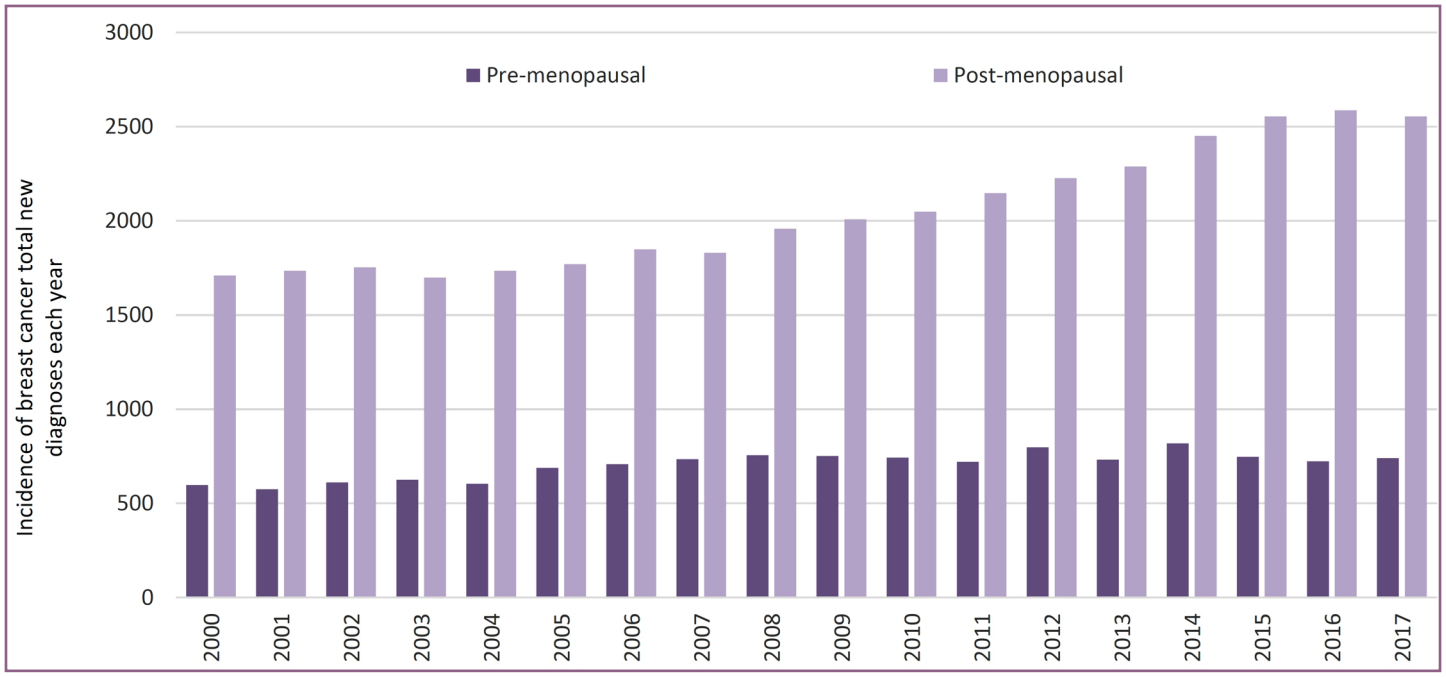

Figure 6 Incidence of breast cancer in pre- and post-menopausal women from 2000 to 2017.[3]

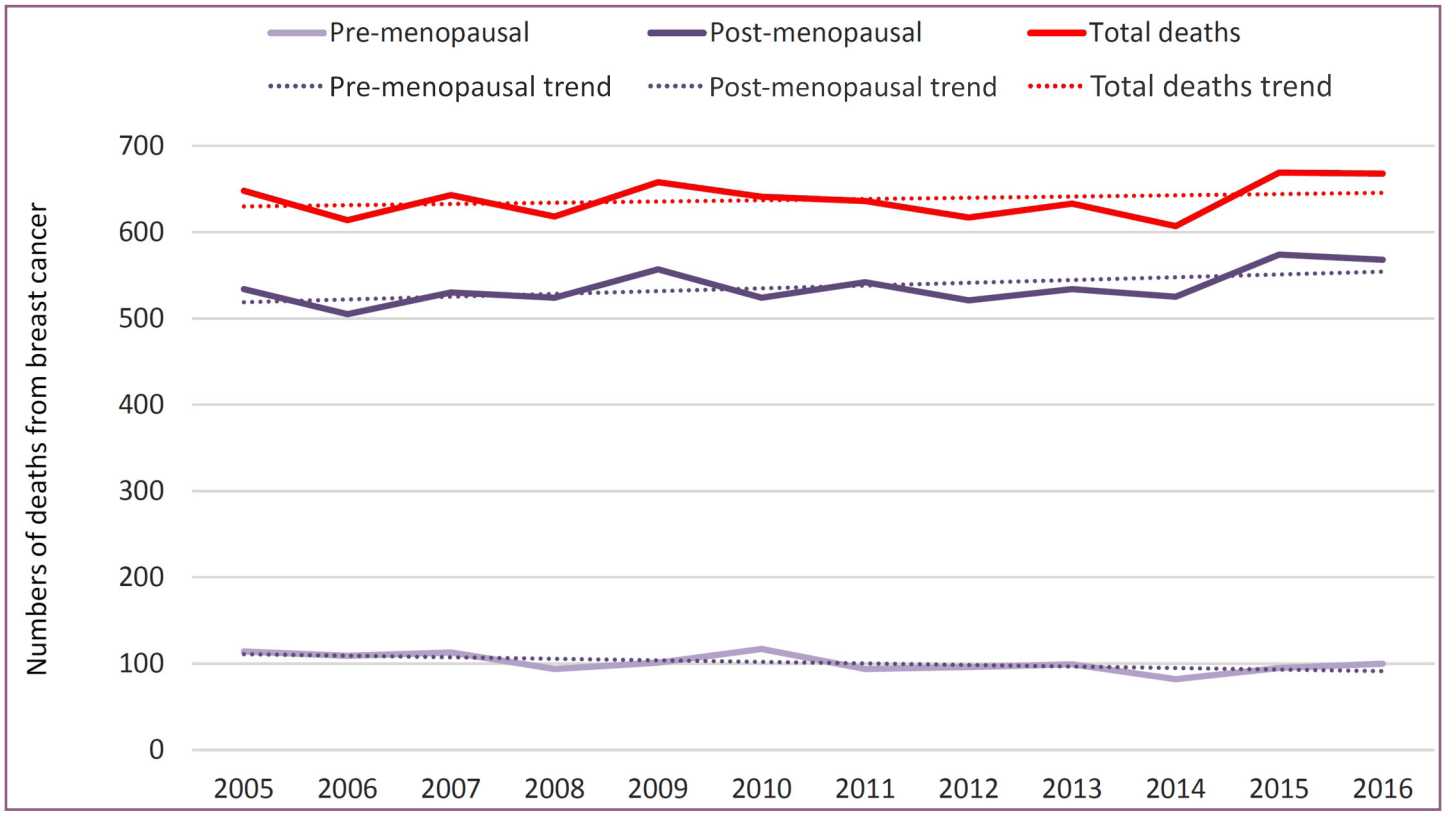

Figure 7 Breast cancer mortality in pre- and post-menopausal women from 2005 to 2016.[3]

with age, but women as young as 15 have been diagnosed with breast cancer in the last 20 years. Fortunately, the incidence of breast cancer in young women is not increasing, but it is in Māori women.

As a significant cause of morbidity and mortality in this country more must be done to address our breast cancer statistics, in particular among Māori. While better and more timely treatment, and earlier diagnosis among Māori to ensure that more women are diagnosed with early breast cancer are critical to reducing deaths and addressing inequities in outcomes, what is essential is that the incidence of breast cancer is addressed. Even for those who survive breast cancer the burden of this disease is significant for individuals, families and our communities, and it imposes an enormous financial burden on our health system. Incidence can only be addressed through risk reduction and prevention strategies and these must be addressed at a policy level as a matter of urgency.

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The Latest on HRT & Breast Cancer Risk

By Sue Claridge

What You Need to Know About HRT

Research results published in 2002 found that hormone replacement therapy increased the risk for breast cancer as well as coronary heart disease, stroke and dementia.

Women were quickly advised that HRT should be taken at the lowest dose for the shortest period of time necessary to control symptoms, and continued use should be reviewed at six-monthly intervals.

Globally, HRT use dropped dramtically in the wake of the research results, including declining by 70% in New Zealand between 2002 and 2005.

From 2006 there were reports in the medical literature that breast cancer incidence had also dropped in response to the drop in HRT use.

The latest research, published in the *Lancet* in September 2019 found that that:

- **women who used any type of HRT, with the exception of vaginally-inserted oestrogen, were at increased risk of developing breast cancer;**
- **the longer women used HRT the greater the risk – those who used HRT for ten years had twice the relative risk of those who used it for only five years;**
- **in women who had ceased using HRT, the relative risks were lower than in current users, but risks remained elevated more than 10 years after stopping HRT;**
- **the estimated incidence of breast cancer was 6.3% for never users of HRT versus 8.3% for five years of use of continuous combination HRT starting at age 50 – an absolute increase of 2%, or one extra cancer for every 50 users;**
- **there was no increased risk for women who took HRT for less than one year.**

The researchers estimate that the use of HRT in western nations since 1990 has already led to approximately one million cases of breast cancer, out of a total of 20 million.

From as early as the 1950s, hormone replacement therapy (HRT†) was promoted as a miracle cure. Not only was it going to eliminate the often debilitating side-effects of menopause that many women suffer, but it said to protect women against coronary heart disease, stroke and dementia.

Then, in 2002 the results of two very large studies – the US Women's Health Initiative (WHI) study[1] and the UK Million Women study (MWS)[2] showed that, in fact, HRT increases the risk for these conditions. Worst of all, HRT was found to increase the risk of breast cancer.

The New Zealand Guidelines Group* immediately updated their guidelines on the use of HRT[3] in response to the US and UK studies. Their key messages included that the use of HRT is associated with an increased risk of pulmonary embolism, stroke and breast cancer, and in women over 65 an increased risk of developing dementia, and that these risks in-crease with age and duration of use.

The guidelines recommended that HRT should be taken at the lowest dose for the shortest period of time necessary to control symptoms, and continued use should be reviewed at six-monthly intervals. In October 2002, Medsafe NZ, sent a letter to healthcare professionals advising of the increased risks of breast cancer, coronary heart disease, stroke and dementia for women on HRT and stating that "All prospective and current users of HRT should be advised of the risks and benefits of oestrogen and progestogens."[4]

After publication of the results of the WHI and MWS analysis of the risks of HRT, prescriptions for HRT in the US dropped by about two thirds in just six months.[5] Co-author of the Women's Health Initiative study, Dr Peter Ravdin, said that 96% of Women's Health Initiative patients discontinued therapy within the year.[5]

In the years following, substantial declines in the use of HRT were reported, with a reduction of approximately 66% for all hormone therapies and 33% for oestrogen-only therapies between 2001 and 2003 in the US.[6]

Declines in HRT use were also seen in other countries:

- HRT use in Australia halved between 2003 and 2008.[7]

† also known as menopausal hormone therapy or MHT.

* The New Zealand Guidelines Group was liquidated in 2012.

- HRT use declined by 62% in France between 2000 and 2006.[8]
- In the Netherlands, HRT use decreased by 12% between 2002 and 2003, followed by a further 26% between 2003 and 2004.[9]
- In New Zealand HRT use declined by about 70% between 2002 and 2005.[10]

From 2006 there were reports in the medical literature of declines in the incidence of breast cancer, declines that were directly related to the drop in HRT use.

In December 2006, researchers from the MD Anderson Cancer Center at the University of Texas, told the 29th Annual San Antonio Breast Cancer Symposium that there had been an overall 7% relative decline in breast cancer incidence between 2002 and 2003 in the US – 14,000 fewer women were diagnosed with breast cancer in 2003 than in the previous year.[11]

In a subsequent paper, Ravdin *et al*. wrote that the "decrease was evident only in women who were 50 years of age or older and was more evident in cancers that were estrogen-receptor-positive than in those that were estrogen-receptor-negative. The decrease in breast-cancer incidence seems to be temporally related to the first report of the Women's Health Initiative and the ensuing drop in the use of hormone-replacement therapy among postmenopausal women in the United States."[12]

Professor Donald Berry, the study's senior investigator, said in a press release issued by the MD Anderson Cancer Center,[13] that he was, at first, very surprised by both the magnitude and the rapidity of the decline in incidence, but added that "it makes perfect sense" if you consider that use of HRT may be an important contributing factor to breast cancer development.

Berry's colleague, Dr Ravdin, said "Research has shown that ER-positive [oestrogen receptor positive] tumors will stop growing if they are deprived of the hormones, so it is possible that a significant decrease in breast cancer can be seen if so many women stopped using HRT."

Berry went on to say that "It takes breast cancer a long time to develop, but here we are primarily talking about existing cancers that are fuelled by hormones and that slow or stop their growing when a source of fuel is cut. These existing cancers are then more likely to make it under mammography's radar."

Thus, the decline in incidence may just represent a slow down, and that the cancers that failed to be diagnosed in the immediate aftermath of women ceasing to use HRT, would show up in subsequent years.

Whatever the truth of the matter, it seems clear that HRT use contributed to breast cancer incidence.

Chlebowski and Anderson, in their 2012 paper, explain the biological mechanisms for this:

"The rapid decrease in largely estrogen receptor–positive breast cancers seen in the United States and other countries is biologically reasonable given that a sudden change in hormonal environment likely represents a therapeutic intervention for subclinical breast cancers."[14]

So, the reduction in HRT use had a similar 'therapeutic' effect to the use of tamoxifen (which blocks oestrogen from oestrogen receptors in breast cancer cells) or aromatase inhibitors (which prevents androgen converting to oestrogen thus reducing the amount of circulating oestrogen in the body) used to reduce the growth of breast cancer cells that are stimulated by oestrogen. Chlebowski and Anderson say the effect would be a one-time phenomenon, and that ultimately the rise in incidence would return to the previous pattern without the impact of some other preventative or risk-reduction effect.[14]

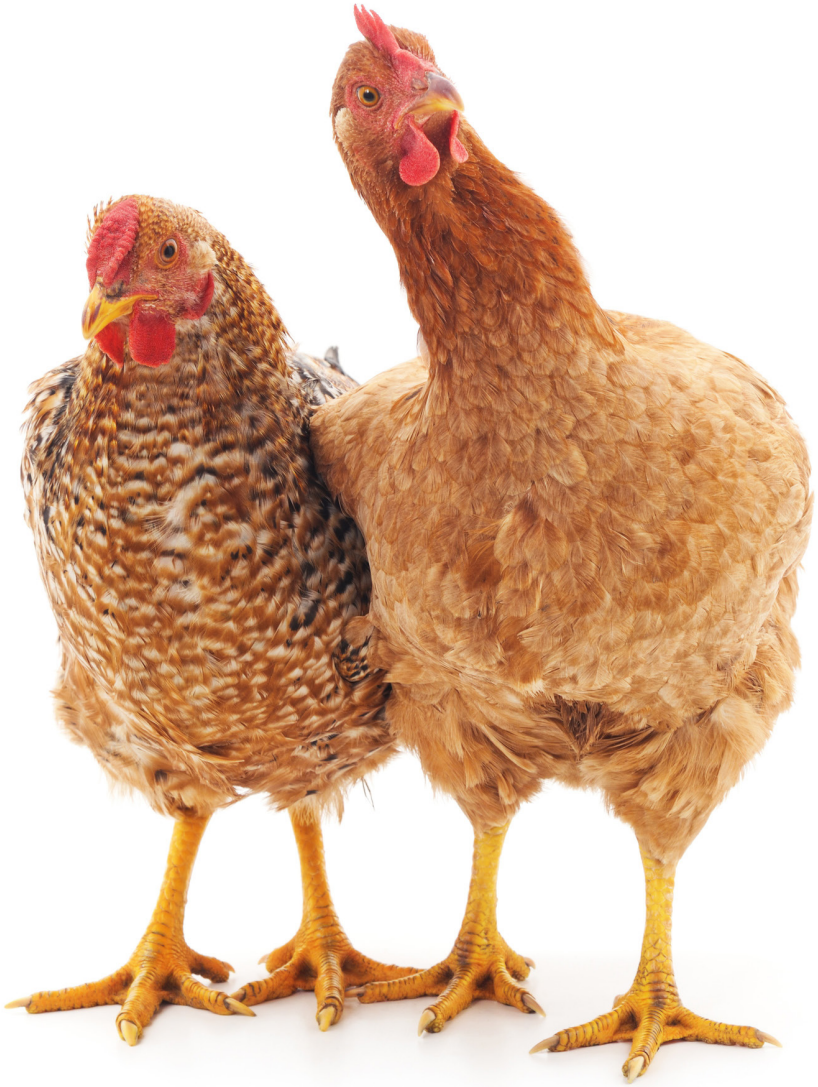
There appears to have been little discussion about the New Zealand incidence trends in the wake of the dramatic drop in HRT use here. Martin Johnstone reported in the *New Zealand Herald* in 2006 that the decline in HRT use had been linked to a reduction in breast cancer incidence in this country.[15]

He quoted then clinical director of BreastScreen Aotearoa, Dr Madeleine Wall as saying "There is on the face of it a decline in the numbers, which may be related since 2002 to the decline in hormone replacement therapy."

However, Farmer and Fenton in their 2016 paper[10] refute any causal link between the lower incidence of breast cancer in 2003 and 2004 and a drop in HRT use. In fact, the authors are quite dismissive of the original research referring to the increased risk of breast cancer associated with HRT use as "non-statistically significant".

Breast cancer is a complex disease with many contributing factors, including multiple factors that reduce risk and multiple factors that increase risk. Research has failed to unravel a simple "recipe" for prevention and there are still many, many unknowns including likely as yet unknown genetic factors. Women who on the surface of it fall into low risk categories may still develop breast cancer, and not all women with numerous high-risk factors develop breast cancer.

It will likely be impossible to fully ascertain the impact of HRT on breast cancer incidence, and it is possible that there are other factors behind the drop in breast cancer rates in 2003 and 2004.



Menopause is easy - after you stop laying eggs, they eat you!

However, it is interesting to note that Dr Anna Fenton, a gynaecological endocrinologist in private practice in Christchurch, has been overtly pro-HRT for managing menopausal symptoms, and critical of advice to avoid its use if possible. In a 2011 *Climacteric* editorial she and co-editor Nick Panay, ask "Has the time for the definitive, randomized, placebo-controlled HRT trial arrived?"[16] They suggest in the article that the response to the WHI results (and presumably the WMS results as well) were alarmist and an over-reaction and say that fears over HRT use are "largely unfounded". They say that the WHI data should be "consigned to history as completely irrelevant to the population of women typically treated with HRT."

Fenton and Panay go on to recommend a randomised placebo-controlled HRT trial[16] that some people might view as unethical in light of the increased risk of breast cancer in a population of women for whom breast cancer is one of the greatest threats to their health, quality of life and longevity.

It would be interesting to know if Dr Fenton has changed her views in light of the most recent research.

The Latest Research

In the years following the publication of the results of the WHI and MWS there has been contradictory research results on the impact of HRT on breast cancer risk.[14, 17]

In the September 28, 2019, edition of *The Lancet*, the Collaborative Group on Hormonal Factors in Breast Cancer reviewed the relevant randomised evidence for a link between HRT use and subsequent risk of breast cancer.[18] The analysis "used individual participant data from 58 eligible prospective studies that had sought information on the type and timing of [HRT] use" between January 1, 1992, to January 1, 2018. In particular they investigated the effects of different types of HRT and about long-term risks after HRT use had ceased.

The analysis included data on sociodemographic, reproductive, and anthropometric factors, and on last reported HRT use prior to the date of cancer diagnosis for cases and the equivalent date for matched controls, and investigated the two common HRT categories: oestrogen-only and oestrogen-progestogen preparations.

The study found:

- that women who used any type of HRT, with the exception of vaginally-inserted oestrogen, were at increased risk of developing breast cancer, compared with women who had never used HRT;
- the longer women used HRT the greater the risk. Those who used HRT for ten years had twice the relative risk of those who used it for only five years;
- the risk for use for 1 to 4 years was 1.17 for oestrogen alone, and 1.60 for oestrogen combined with progestogen;
- for users of 10 to 14 years duration the risks increased to 1.43 for oestrogen alone, and 2.26 for oestrogen combined with progestogen;
- in women who had ceased using HRT, the relative risks

were lower than in current users, but risks remained elevated more than 10 years after stopping HRT;

- the estimated incidence of breast cancer was 6.3% for never users of HRT versus 8.3% for five years of use of the continuous combination HRT starting at age 50 – an absolute increase of 2%, or one extra cancer for every 50 users;
- there was no increased risk for women who took HRT for less than one year.

The researchers estimate that the use of HRT in western nations since 1990 has already led to approximately one million cases of breast cancer, out of a total of 20 million.

The reaction from the UK drug regulator, Medicines and Healthcare Products Regulatory Agency, was immediate. In an alert sent out through the NHS central alerting system the day after online publication of the *Lancet* paper, the agency told prescribers to "inform women who use HRT or are considering starting HRT of new information on the risk of breast cancer at their next routine appointment" and "regularly review patients to ensure HRT is used for the shortest time at the lowest dose."[19]

Although our own drug regulator, Medsafe, sent out advice to healthcare professionals[33] in the wake of publication of the original research in 2002, they have not – as yet – updated the advice in light of the recent *Lancet* paper. When specifically asked if they intended to, this was their response:

"There is some information on the risk of breast cancer in the data sheets for HRT medicines. We expect that health care professionals are using this information and discussing the benefits and risks of treatment with their patients. We are planning on reviewing this topic and this includes any communication that may be needed."

There is no doubt that some women suffer significant symptoms and loss of quality of life in menopause. For some, the benefits of HRT may outweigh the risks. This is a decision that each woman must make for herself and it is important that she receive unbiased and helpful advice on the risks and benefits of HRT and the alternatives, including lifestyle changes that she might be able to make to reduce or eliminate symptoms.

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Mammography and Informed Consent

By Sue Claridge

Mammography! It is often touted as the most important thing a woman can do for her health over the age of 40, and that message is never more prominent than during October, breast cancer awareness month.

There is good reason for women to be concerned about breast cancer – it is the biggest cancer threat to women's health over their lifetimes, and breast screening is the most prevalent means that national health agencies use to assess their female population for breast cancer, with the rationale that it detects tumours early before they spread beyond the breast and become more difficult to treat.

But are women being given clear and unbiased information about mammography and its benefits and harms?

Hersch *et al*. write:

"Throughout the history of breast screening … women invited to participate have not been given all the relevant information. Consensus is growing that information on screening benefits and harms, including overdetection, must be communicated clearly and transparently to women offered screening so that they can make informed decisions about whether to be screened. This is all the more important because of evidence that women hold misconceptions about breast screening and its effects."[1]

There is certainly a lot of misinformation about mammography circulating in New Zealand. For example, in undertaking research for the HRT article in this edition, I came across the following on the Radio New Zealand website:

"Making sure mammograms were taken every two years was one way to decrease risk."[2]

This is simply incorrect!

The statement followed on from one that said, "other factors that increase the risk of breast cancer for women include high alcohol intake, being overweight, and a family history of breast cancer." When we talk about risk reduction in breast cancer, we are specifically talking about preventing breast cancer.

Mammograms screen for breast cancer that already exists.

Mammograms **DO NOT** prevent breast cancer!

This is a recurrent issue. For some women the "take home" message that they get from advertising is that mammograms "prevent" breast cancer or reduce the risk. It is not that those promoting mammograms actually make that claim, but somehow, the way in which the promotional messages are worded give some women that impression.

While working for the Breast Cancer Network (BCN) from 2003 to 2016, I interviewed Auckland breast surgeon Trevor Smith (now retired) on a number of occasions. He related that he had women diagnosed with breast cancer coming to him distraught, saying "but I've been having regular mammograms; how did I get breast cancer?"

In 2005, he wrote in an opinion piece for the *New Zealand Herald* that "women overestimate what mammograms can achieve and are not aware of the limitations and associated risks. These unrealistic expectations can result in a sense of betrayal when breast cancer develops despite regular mammograms, sometimes over many years."[3]

He went on to say "women attending for screening mammograms are seldom provided with objective information on the risks and benefits."

The evidence is that little has changed in the last 14 years.

A 2018 study found that there was variability in the knowledge that women had about mammographic screening and, in particular, issues of cessation age, overdiagnosis, and mortality reduction were poorly understood.[4]

For some years there has been ongoing and heated international debate regarding the benefits and risks of breast screening,[1] and it was described by Spagnoli *et al*.[5] as "one of the most controversial and emotional within the scientific community"

In August 2015, the Cartwright Collective, of which the Auckland Women's Health Council is a member, held a day-long forum on *The Future of Cancer Screening in New Zealand: balancing the benefits and risks*. Then working for BCN, I was invited to be a panellist for the breast screening session.

The four breast screening panellists – Professor Diana Sarfati, Emeritus Professor Charlotte Paul, clinical Leader of BreastScreen Aotearoa Dr Marli Gregory, and myself – brought a wide spectrum of views to the table. Despite the sometimes disparate views presented, I was impressed that speakers and attendees seemed to genuinely be interested in hearing others' view points, and finding a way forward in a way that makes cancer detection and diagnosis safer for all and leads to better outcomes. Four years on we still have a long way to go to achieve true consensus, but I felt that most people were there in

How Many Lives Does Breast Screening Save?

This is a highly contentious and complex issue. Beau *et al*., in a 2018 paper write that their findings "highlight the complexity of evaluating the long-term impact of screening on breast cancer mortality rates."

BreastScreen Aotearoa state:

"Screening mammograms save lives by finding breast cancer early, when it can be treated before it grows or spreads to other parts of the body. Having regular mammograms can reduce your risk of dying from breast cancer by more than a third."[8]

This is grossly misleading. Firstly, the percentage reduction in risk of dying from breast cancer by participation in breast screening is one of the most debated in breast screening, only matched by the debate over the percentage of over-diagnosis.

Secondly, BSA insist on using relative risk reduction figures rather than absolute risk reduction, which inflates the benefits of screening.

Finally, that there is over-diagnosis through screening effectively loads the statistics in favour of a higher mortality benefit, by including all the women who are diagnosed with "cancers" that would never progress and never cause death.

If one takes into account the number of over-diagnosed cancers that would never have become life-threatening, there is possibly a much smaller number of women saved by screening. If the proportion of detected cancers that are over-diagnosed (international debate puts the figure as high as 33%) are removed from the mortality statistics because they would never have progressed and caused death, then the difference in mortality between screening detected and clinically detected cancers may look very, very different.

When researchers calculate the mortality benefit of screening, they compare the mortality in screened populations with the mortality in matched unscreened populations. In an unscreened population, if it is assumed that all clinically detected tumours (e.g. found as palpable lumps) are already invasive and have progressed to the point where they may metastasise, you have already effectively removed all the cancers that would have been over-diagnosed by screening and that would not lead to recurrence or death. To be a fair mortality comparison, in calculating the mortality difference between screen detected and clinically detected cancers, you would have to remove 10%-33% (depending on your determination of over-diagnosis) of the women who survived from the calculation. This would lead to a much lower mortality benefit.

The Beau *et al*., (2018) study found a 20% reduction in breast cancer mortality after invitation to screening.[14] Løberg *et al*., (2015) concluded that relative reductions vary from about 15 to 25% in randomised trials to more recent estimates of 13 to 17% in meta-analyses of observational studies. Both of these recent studies offer a mortality benefit from screening a substantial 25% to 60% lower than BSA are currently advising New Zealand women.

Given the inflated figures that are women are provided with and the complexity of calculating accurate mortality benefit from screening, it is no wonder that research has found that the majority of women overestimate the ability of mammographic screening to save lives.[4]

the interests of open and honest debate.

One of the concerns that the majority of the panel expressed was the lack of balanced information on the benefits and harms of breast screening available to women having mammograms, including the lack of adequate information provided by BreastScreen Aotearoa (BSA).

There has long been a fear among those who promote mammography that if women were told of the risks and harms they would not have mammograms. However, they have a right – upheld by law – to make informed decisions[6] about their health care, and that includes being advised of the harms and risks of a test, treatment or procedure, or other course of action, as well as the benefits.

The need to provide better and more balanced information, including use of absolute risk rather than relative risk data (see box on page 17), formed a considerable part of the discussion at the forum, and Dr Marli Gregory of BSA made a commitment to undertake a review of the information that is provided to women having mammograms through BSA. That review commenced in late 2015.

The Cartwright Collective had an opportunity to review the BSA patient information and made a number of key points and requests, including that the resources:

- be evidence-based and that any statements that could not be supported by evidence should be altered or deleted;
- communicate to women that mammography is not a perfect tool;
- include information on factors that impact on health and may affect a women's risk of breast cancer;

- include more detailed information about topics such as *ductal carcinoma in situ**;
- include information about being 'breast aware', that is, knowing what is normal for them and knowing what to look and feel for;
- make it clear to women they may opt out of the programme at any time.

The Cartwright Collective also requested that a diagram similar to the one below used in the UK's NHS[7] materials be included.

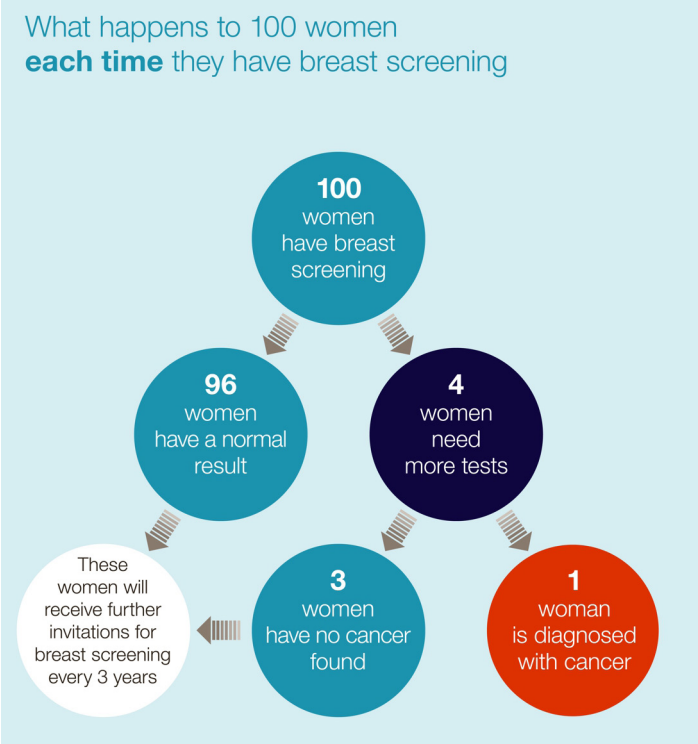

Figure 1 What happens to every 100 women each time they have breast screening from the UK NHS brochure for screening participants.[7]

Many of these key points and requests have either been left out or inadequately addressed in the new participant information.

In 2015, BSA's information only referred to the "limitations" of mammography and did not expressly discuss the harms that it may cause. BSA now provide marginally better information on their website and presumably in their hard copy brochures. They now specifically refer to the risks and harms.[8] However, it is light on detail and substantiation, and there is no information on false positives, where the mammogram picks up something that turns out not to be cancer, leading to further, ultimately unnecessary investigations, such as more mammograms and invasive biopsies.

There will always be a balance between providing enough information to enable all women to make truly informed decisions, and providing so much information or information at a level that some women won't be able to understand what they're reading, that they don't read the information at all. However, the BSA website fails to direct women to other sources of information, for those that feel they need more in order to be able to make an informed decision.

This article was prompted when Auckland Women's Health Council was contacted by a member who had received an invitation from the Auckland Breast Centre, a private clinic (not part of BSA), to have a mammogram, together with information on the "evidence" for screening, when to start, how often mammograms should be had, etc. The Auckland Breast Centre brochure claimed that women should start annual mammograms at 40 years and that there was a 39% reduction in mortality from screening annually from 40-84 years. The figures were from research published in 2011.

There are a number of issues with the information provided:

Absolute Risk Reduction and Absolute Risk Reduction

Researchers typically use relative risk reduction when talking about the benefits of a medical treatment or procedure; this is the case in discussions of mortality benefit from breast screening. However, relative risk reduction figures can give a wildly inflated impression of the benefit. Using data from Løberg et al.15 for 1,000 women aged 50 to 69 years invited every second year for 20 years:

When the risk of death is 18 in 1000 (1.8%) in a group of women without screening and 15 in 1000 (1.5%) in with screening, the absolute risk reduction is simply the subtraction of the two risks:

1.8%–1.5% = 0.3%

The benefit of screening is to reduce the risk of death by 0.3%.

The relative risk reduction is the ratio of the two risks. Given the same data, the relative risk reduction is:

1.8%–1.5%/1.8% = 16.6%

Expressed as a relative risk reduction, the benefit of screening is to reduce the risk by 16.6%.

* *ductal carcinoma in situ* (DCIS) is abnormal cells inside a milk duct and is considered the earliest form of breast cancer. DCIS is non-invasive, hasn't spread out of the milk duct, and has a low risk of becoming invasive.

- Pre-menopausal women (generally regarded as under the age of 50) have denser breast tissue, which makes mammograms harder to read and less accurate.[9, 10]
- Mortality benefit in women under 50 is not statistically significant[11] and most certainly is not 39%.
- The figures used for mortality benefit – as is common in almost all discussions on the benefits of mammography – are relative not absolute (see box the left for an explanation of relative versus absolute risk reduction), which gives an inflated view of the benefit of mammography.
- The risks associated with radiation exposure are higher† the earlier regular mammography screening is started, and the risks greater for annual mammograms compared with biennial mammograms, such that in women between 20 and 40, radiation exposure actually causes more breast cancer deaths than early detection prevents.[12]
- Even for women above the age of 50 current estimates of mortality benefit are between 13 and 25% relative risk reduction (see boxed information on mortality benefit and risk caculations), again nowhere near the 39% claimed.[15]
- Older women with increased comorbidities may experience diminished benefit from continued screening, so it is hard to see the justification for screening above the age of 74; the Auckland Breast Centre brochure promotes screening up to 80.[13]
- In addition, the brochure makes no mention at all of the risks or harms of mammography screening.

New research is being published every year, and it behoves a private breast clinic to provide their patients with more up to date and accurate information to ensure that women are making informed decisions. Overselling the benefits of mammography when there are also accompanying harms does nothing to facilitate that.

The facts and figures can be difficult to understand clearly, especially for women without a medical or scientific background, but that does not mean that adequate information should not be provided. In order to facilitate all women gaining an understanding of the benefits and risks of mammography, this can be achieved pictorially, as in Figure 2 on page , which is based on data from the 2015 Løberg *et al*. review paper on the 'Benefits and harms of mammography screening' which discusses the benefits and harms "in light of findings from randomised trials and from more recent observational studies performed in the era of modern diagnostics and treatment."[15]

For those wanting a balanced review of the issues involved with population screening for breast cancer, one of the best I have ever read is the two part article written by Dr Caroline Shaw and Prof Diana Sarfati of Otago University.[16, 17] Despite the fact that it is now five years old, and there has been five more years of research, it is balanced, easy to read and well referenced; it was described by one commenter as "an excellent discussion of the complexities around the benefits/problems of breast screening".

The last word should go to Trevor Smith:

"As a breast surgeon I witness the tragic consequences of breast cancer on a daily basis. No effort should be spared to reduce the impact of this disease. But women are entitled to balanced information before proceeding with screening mammography. It is patronising to assume that this might be seen to cause confusion and discourage participation."[3]

† Preston *et al.* (2002) found that the incidence of breast cancer is increased from about 10 years after initial radiation exposure and remains elevated for at least 50–60 years after exposure.[12]

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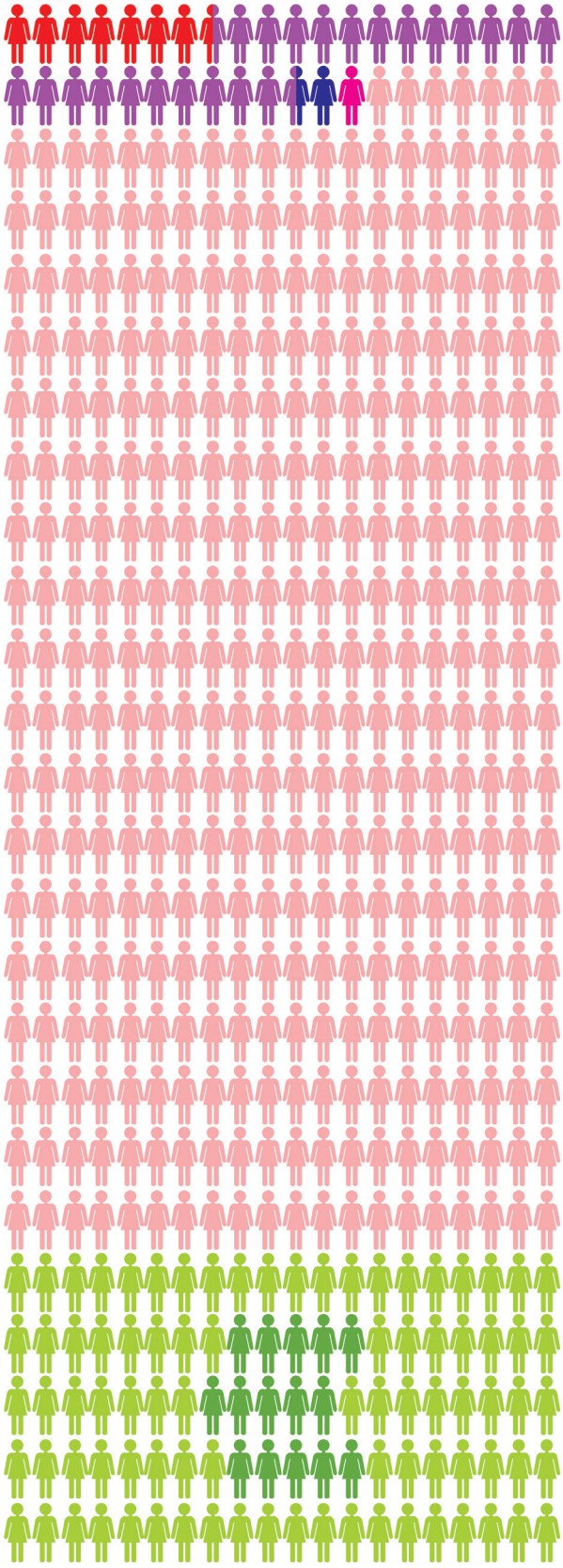

Women diagnosed with breast cancer

Women over-diagnosed

Women diagnosed with interval cancers

Breast Cancer deaths prevented through screening

Women with clear mammograms

Women who received false positives

Women who received false positives and had biopsies

Figure 2 The outcomes of mammography for every 1000 women screened every second year for 20 years from age 50 to 69††, based on figures from Løberg *et al.* (each figure represents two women).[15] Note: Interval cancers are cancers detected after a normal screening mammogram and before the next scheduled mammogram. Interval cancers were either overlooked at the last mammogram or are rapidly growing cancers that become apparent in the screening interval. Over-diagnosis is the detection and treatment of cancers that would never have gone on to cause symptoms and death. Women who are over-diagnosed receive treatment that adversely impacts on their health and quality of life, including surgery, chemotherapy, radiotherapy and subsequent hormonal therapy such as tamoxifen.

†† screening of this age group has been shown to achieve most of the benefit with less harm.

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Where is the Progress on Breast Cancer Prevention?

One in nine New Zealand women will get breast cancer in their lifetimes.

This means that eight out of nine women don't.

While only 5-10% of women diagnosed with breast cancer have a family history[1, 2] those who carry the BRCA gene mutations are at significant increased risk of developing breast cancer. Recent prospective studies* have found that the cumulative risk at age 60 is 61.8% for BRCA1 mutation carriers and 43.2% for BRCA2 mutation carriers[3]; the cumulative risk at age 80 is 72% for BRCA1 and 69% for BRCA2 carriers.[4]

Despite this very high life-time risk of breast cancer among those significantly genetically predisposed to the disease, based on these figures, 28% of BRCA1 and 31% of BRCA2 mutation carriers don't develop breast cancer.

So, what is it about these otherwise high-risk women that prevents them getting breast cancer, and what is it about the 89% of non-carriers that also don't develop breast cancer that 'protects' them from this disease?

While finding a 'cure' for breast cancer is not only laudable but necessary, given the high burden that the disease places on individuals, families, communities and governments, there is still a significant health cost involved in treating it. It would be more cost effective, and certainly better for individuals and their families, if we could prevent even some breast cancers.

What is the state of our understanding about breast cancer risk and breast cancer prevention, and what can, and should, women be doing to reduce their risk?

What should our government and policy makers be doing to address prevention and reduce risk and incidence across our population?

Is any serious research being done to investigate the women who don't get breast cancer?

This was a difficult question to frame in doing research for this article and turned up little in the way of relevant research. It is, in fact, easier to consider the research on breast cancer risk in order to ascertain how individuals and policy makers might be able to prevent some breast cancers, than it is to ask if research is being done on the specifics of why most women don't get breast cancer.

Breast Cancer Risk

There are myriad contributing factors in the development of breast cancer; there is no single factor that we can say "if this happens then a woman will get breast cancer". Some of the risks are well out of our control by the time we are old enough to do anything about it: *in utero* exposures, birth weight, exposures that our mother may have had even prior to conception, age at menarche and menopause,

* prospective studies are "forward looking" and look for outcomes, such as the development of a disease, during the study period and relate this to other factors such as suspected risk or protection factor(s). The study usually involves taking a cohort of subjects and watching them over a long period.

Preventing Breast Cancer What Can You Do?

Do Now:

- If you smoke - STOP! If you don't, don't start. Ever!
- Don't drink alcohol, or if you do, drink no more than 1-2 standard drinks on any one day. Do not binge drink – "saving up" your drinks for a big night out is actually worse than having one drink a day more often.
- Increase your fruit and vegetable intake – make it more than 5+ a day. In fact, closer to 9+ is better. Eat a Mediterranean diet that is based around vegetables, fruits, whole grains, beans, nuts and seeds, and olive oil, with moderate amounts of dairy, eggs, poultry and sea-food.
- Get more exercise – aim for 30 minutes of moderate to vigorous exercise five times a week, including walking, cycling, swimming, running, dancing and gardening. Excercise doesn't have to mean going to the gym.
- Maintain a healthy body weight, especially from menopause onwards. Your BMI should be between 18.5 and 24.9. To calculate BMI:

  weight in kg / height in m x height in m
  (e.g. 70kg / 1.70m x 170m = BMI of 24.2)

Do When Appropriate:

- Avoid hormonally based pharmaceuticals such as the Pill or HRT.
- Breast feed your babies for as long as possible.
- Avoid unnecessary exposure to ionising radiation. Weigh up the medical benefits of x-rays, mammograms and CT scans and only go ahead if necessary and benefits outweigh risks. Harm from ionising radiation is cumulative.
- Avoid shift work and working at night if you can.

Reduce Your Oestrogen Load By Making Simple Changes:

- Replace plastic food and beverage containers and kitchen utensils with glass, ceramic or metal where possible.
- If you do use polycarbonate plastics for food or drink, don't expose them to heat or harsh detergents, or put them in the microwave or dishwasher.
- Don't reheat your food in plastic containers or covered in cling wrap.
- Don't buy food in plastic or resin lined tins.
- Look for phthalate-free plastic toys and containers.
- Choose natural, chemical-free or organic cosmetics and personal care products, including sunscreen.
- Use glass baby bottles or bottles and baby cups made from polyethylene plastic (1, 2 & 4 recycling symbols) or polypropylene (5).
- Don't use non-stick and coated cooking utensils, bakeware and pans. Switch to stainless steel and ceramic for the stove and oven.

our adult height, and childhood weight and diet.[2]

Other factors we do have control over, but are part of a complex milieu of decisions that we make that are influenced by other things going on in our lives; things that we may have little practical control over, such as the age at first full-term pregnancy, how many children we have, how long we breast-feed our babies.[2]

Of greatest interest are the modifiable risk factors – lifestyle and environmental – factors about which individuals can do something, or that governments and policy makers can influence.

The International Agency for Research on Cancer (IARC) and the World Health Organisation (WHO) have for many years stated that one third or more of cancers worldwide could be prevented if we addressed five modifiable lifestyle choices – body weight/BMI, diet, exercise, tobacco smoking and alcohol consumption.[5]

Based on current knowledge, as many as another 20% of cancers are attributable to other modifiable risk factors, including environmental pollution, occupational carcinogens, radiation (including medical radiation) and infections.[6, 7]

Taking an optimistic viewpoint, we have the potential to reduce breast cancer incidence in New Zealand from the current level of approximately 3300 new registrations a year to as low as 1550 cases a year with our current level of understanding about what contributes to the development of the disease.

This is not entirely unrealistic. We have known for many years that breast cancer incidence is low in developing countries compared to the most highly developed countries. Research has also shown that when people migrate

from countries with traditionally low rates of breast cancer to those with high rates, the incidence among these migrants quickly rises to match the rate in their new home,[2, 8] especially among those who migrate at a young age.[8]

Clearly, changes in lifestyle and environment influences breast cancer risk – in the case of migrants raising the risk. Therefore, it is entirely feasible to lower risk by addressing those lifestyle and environmental factors.

Modifiable Lifestyle Factors

Notwithstanding the impacts of poverty and deprivation on the ability of some families to ensure ideal nutrition and diet, the most important lifestyle factors[5] are entirely within the power of individuals and families to address:

- high body mass index;
- low fruit and vegetable intake;
- lack of physical activity;
- tobacco use; and
- alcohol use.

Most New Zealanders are probably aware that these five lifestyle factors are important in determining overall health. However, there has been little focus in this country on the impact that these have in breast cancer risk and it is vitally important that more is done to educate women about their ability to influence breast cancer risk, particularly from adolescence.

There is no "down-side" to greater education about these contributors to breast cancer, as all of these factors also influence a wide-range of other non-communicable and degenerative diseases (including diabetes, cardiovascular disease, arthritis and dementia, as well as many other cancers).

A New Zealand study[9] of Māori, Pasifika and non-Māori/non-Pasifika women has largely confirmed international literature on the influence of these modifiable lifestyle factors on breast cancer risk, confirming that:

- Smoking raises the risk of breast cancer, particularly among Māori women who have the highest rates of smoking in the world.
- Higher risk of breast cancer in overweight non-Māori/non-Pasifika women and in obese Māori women.
- Increased risk among women who 'binge-drink' which disproportionately affected Māori and Pasifika women.
- In women of all ethnicities, exercise was associated with a lower risk of breast cancer.

The study did not consider diet.

There is an astounding volume of research published in the medical literature on the influence of the five lifestyle factors on breast cancer risk. To adequately review this would take more space than this publication allows. However, for readers wanting a good overview of the evidence for these risk factors, consider reading *Diet, Nutrition, Physical Activity and Breast Cancer*[10] a Continuous Update Project report from the World Cancer Research fund. For a review of the impact of tobacco smoking, refer to 'State of the evidence 2017: an update on the connection between breast cancer and the environment' in the journal *Environmental Health*.[11]

Other personal factors that influence breast cancer risk and are within the ability of women to change include:[2, 6, 9]

- Use of pharmaceutical hormones, including the contraceptive pill, but particularly menopausal hormone replacement therapy.
- Age at first full-term pregnancy† and number of children.
- Length of time breastfeeding.

Environmental Risk Factors

The recognition that our environment – especially that in developed countries – has a significant impact on increasing the risk of many cancers has gained momentum over the last 20 years. The idea that environmental exposures contribute to breast cancer is nothing new. Breast Cancer Prevention Partners (formerly the Breast Cancer Fund) was founded in 1992 and their mission is to work "to prevent breast cancer by eliminating our exposure to toxic chemicals and radiation linked to the disease."[12]

Gray *et al*., write that "there was a significant and progressive rise in the incidence of breast cancer in the decades following World War II, the same decades that saw exponential increases in the use of chemicals for production of pesticides, herbicides, plastics, cosmetics and other commonly used materials and products."[11]

In 2010, in their report *Reducing Environmental Cancer Risk: What can we do now*, the President's Cancer Panel wrote that it "was particularly concerned to find that the true burden of environmentally induced cancer has been grossly underestimated. With nearly 80,000 chemicals on the market in the United States, many of which are used by millions of Americans in their daily lives and are un- or understudied and largely unregulated, exposure to potential environmental carcinogens is widespread."[13]

While most of the research on environmental influence in breast cancer development is international, there has been some work here, including that by Prof Ian Shaw[14], Dr Meriel Watts,[15]

† It is acknowledged that the age at which women have their first full-term pregnancy is influenced by a wide range of psychosocial, economic and fertility factors, and many women may have little choice about this.

Emeritus Professor Charlotte Paul[16] and Prof Murray Mitchell.[17]

One of the most significant and regularly updated pieces of research investigating the impact of environmental influences and exposure on the development of breast cancer is *State of The Evidence*.[11] *State of The Evidence* was first published in 2002, and the 2017 edition this report reviews hundreds of new papers on the link between chemical and radiation exposures and breast cancer that have been published since the last edition in 2009.

The authors describe the new evidence on environmental contributors to breast cancer as "more extensive and of better quality than that previously available". In undertaking the review of the medical and scientific literature they "emphasized work from the past 10 years" although they included "earlier results when they were needed as background or to provide a fuller picture of the evidence." They also "took care to include studies that had negative results, that is, those that reported no significant relationship between exposures and risk for developing breast cancer."

The current report is 61 pages; the previous report on which they build, was 132 pages. It is impossible to adequately review the report in the space available in this Newsletter, and what we offer below is a précis of the conclusions in *State of the Evidence*. We advise interested readers to access** the full reports themselves (the 2017 and earlier reports) to obtain a full picture of the relevant research on the various environmental contributors to breast cancer development.

Overall, the authors state that a "substantial body of scientific evidence indicates that exposures to common chemicals and radiation, singly and in combination, … contribute to the increasingly high incidence of breast cancer observed over the past several decades."

Of importance is the timing of exposure. Breast cells are "more susceptible to the carcinogenic effects of hormones, chemicals and radiation during early stages of development, from the prenatal period through puberty and adolescence, and on until the first full-term pregnancy."

Research has also found that combinations of exposures are important in determining risk. However, the sheer numbers of different chemicals make untangling the impact of various combined exposures almost impossible. "One estimate predicts that it would require 166 million experiments to test all combinations of three out of the 1000 most common synthetic chemicals currently in use." Other research found that mixtures of common chemicals found in the environment made breast tissue more susceptible to exposures to dietary oestrogens (phytoestrogens such as found in soy), while low dose radiation after exposure to a known chemical carcinogen also increased risk.

The authors reviewed the evidence in seven major areas and found the following environmental contributors to breast cancer risk:

1. Hormones: Pharmaceutical agents & personal care products

Including diethylstilbestrol (no longer used); menopausal hormone replacement therapy; bioidentical oestrogen (no apparent risk from bioidentical progesterone and possibly some protective effect); oral contraceptives; and high doses of clomiphene citrate, a fertility treatment drug.

2. Endocrine disrupting compounds (EDCs)

EDCs are compounds that mimic the activity of natural hormones, and include: bisphenol A (BPA) found in polycarbonate plastics, and resins in food cans; phthalates found in in personal care products, plastics and pharmaceuticals; parabens used as antimicrobial preservatives in food and pharmaceuticals; alkylpenols; triclosan & triclocarban – antimicrobials used in personal care products; UV filters found in sunscreens; Perfluorooctanoic Acid (PFOA) & Perfluorooctanoic Sulfate (PFOS) found in non-stick and stain resistant coatings; Polycyclic Aromatic Hydrocarbons (PAHs), which are by-products of combustion including fossil fuels and cigarettes; various herbicides and pesticides; organochlorines; aromatic amines including those found in hair dyes and textiles, and cooked meat; various naturally occurring metals found in cosmetics, toys and other products (copper, cobalt, nickel, lead, mercury, tin, cadmium, zinc and iron).

3. Hormones in food: natural and additives

Mycoestrogens found in fungi and which can contaminate meat and agricultural products; natural, synthetic and genetically engineered hormones including zeranol and bovine growth hormone/ Recombinant Bovine Somatotropin.*

4. Non-EDC industrial chemicals

Benzene from inhaling gasoline fumes, automobile exhaust, or cigarette smoke (primary and secondary); polyvinyl chloride (PVC) plastic; 1,3-Butadiene, a by-product of combustion, particularly from petroleum combustion; ethylene oxide a steriliser for surgical instruments and by-product contaminant in some cosmetics.

5. Tobacco smoking: Active and passive

Tobacco smoke contains PAHs, as well as hundreds of other chem-

** https://www.bcpp.org/resource/state-evidence-2017/

* The use of hormone growth promotants (HPGs) is strictly controlled in New Zealand and may only be administered/implanted by a vet and may only be used in beef cattle; records of every animal using HPGs must be kept.

icals, including three known human carcinogens (polonium-210, a radioactive element; benzene; and vinyl chloride) as well as 1,3-butadiene and nicotine-derived nitrosamine ketone, all of which are known to cause mammary tumours in animals. There is now a substantial volume of literature indicating that past and current active cigarette smoking is associated with a higher risk for developing breast cancer.

1. Shift work, light-at-night and melatonin

A number of studies have found that women who consistently work night-shift have an increased risk of breast cancer, particularly for those working overnight shifts rather than just evening shifts, and for those that had alternating 12-hour night and day shifts. The effect was greatest for those in such work for at least four years prior to their first pregnancy. It is believed that light-at-night decreases melatonin production with the effect of raising endogenous oestrogen production, changing metabolic profiles and increasing body weight.

2. Radiation

Ionising radiation is the longest established environmental cause of breast cancer and includes military sources (e.g. atomic/nuclear weapons) and medical sources (x-rays, CT scans and mammography, fluoroscopy and radiotherapy. Exposure in childhood and adolescence is particularly important. No safe dose of radiation has been identified and the damage to DNA is cumulative, with repeated low-dose exposures (e.g. x-rays) over time having the same harmful effects as a single high-dose exposure.

Of particular importance is that women with BRCA gene mutations are especially susceptible to the cancer-inducing effects ionising radiation, and that there is evidence that the risk of breast cancer caused by exposure to mammography radiation may be greatly underestimated.

The evidence for risk from non-ionising radiation, such as electromagnetic field (EMF) radiation (microwaves, radio waves, computers, cell phones, etc.) is contradictory with some research finding an association and other research finding no link. IARC and the National Institute of Environmental Health Sciences (NIEHS) EMF Working Group have classified EMF exposures as a possible human carcinogen but consensus on the relationship between EMF and breast cancer has not been reached.

The figure below summarises the findings of the review of the literature presented in *State of the Evidence*.

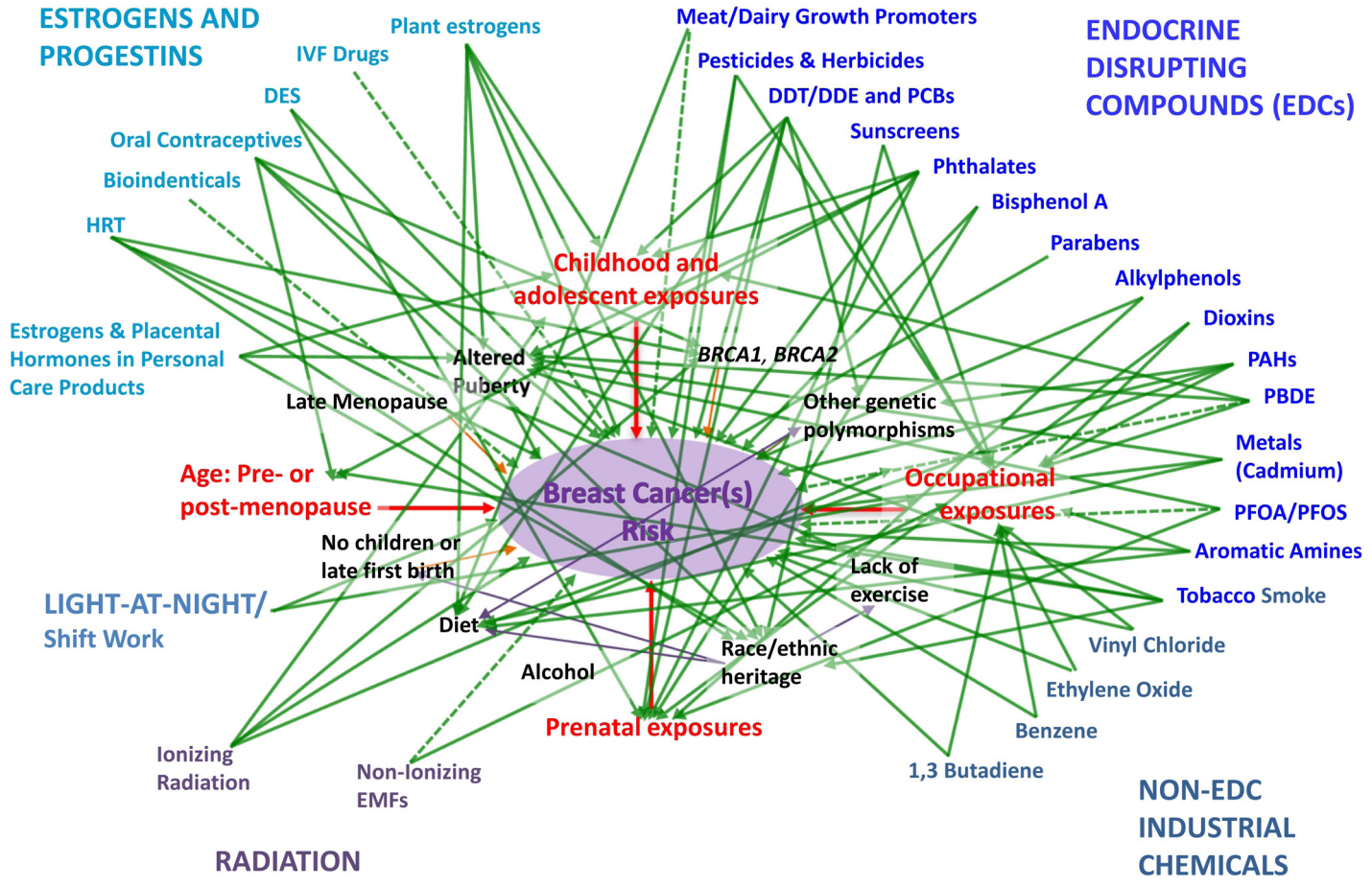

Figure 1 The complexity of factors affecting risk for developing breast cancer. This synopsis of much of the evidence described in State of the Evidence demonstrates the complexities of the potential connections between exposures to environmental toxicants and development of breast cancer, all embedded in a web-like framework of interconnected factors.[11]

What Can Individuals Do?

It can be confusing and exhausting coming to grips with the plethora of information and research on breast cancer risk. It can be difficult to work out what you as an individual can do to reduce your risk. There is no single prevention strategy that you can adopt that will ensure you don't develop breast cancer; some women will do everything "right" and still get breast cancer, while some women will do many things "wrong" and not get it.

The best approach is to first address the modifiable risk factors set out on page 22. Not only will you reduce your risk of breast cancer, but you will improve your overall health and reduce your risk of cardiovascular disease, diabetes and dementia, and lessen the impact of other diseases such as arthritis. While getting these five factors right won't be easy for everyone, they are all doable. Addressing one issue at a time makes these more manageable, especially if you need to work on more than one area. Don't beat yourself up if you slip back into bad habits; refocus and get back on track. Every small thing you can do may make a difference.

With the environmental exposures, it is easy to be overwhelmed by the sheer number and scale of these risk factors, and much of it can feel out of your control. Work out what you can address, and make considered and intelligent decisions. For example, e.g. do the medical benefits of an x-ray outweigh the risks, how much exposure have you already had, is there an alternative, such as ultrasound, or MRI? Look at the plastics and personal care products you use – make changes where you can. Go organic in your garden and if you can afford it, buy organic fruit and vegetables where you can. Use a natural sunscreen and avoid hormonal pharmaceuticals.

Something as simple as changing from a teflon coated fry-pan to a good quality and cared for cast iron or ceramic non-stick pan will reduce your exposure to EDCs. Tackle one small area of your life at a time, make it a habit, then move on to the next thing that you can achieve.

Make the Personal Political

Internationally renowned breast surgeon, Dr Susan Love, told the 2004 Breast Cancer Network Australia conference in Melbourne that back in the 1990s women "made the personal political" in order to improve outcomes for women with breast cancer.[18] She believes "political action, not surgery, is the only real hope for stemming the increase in breast cancer."[19]

She also says "research is the only way we are going to solve this thing, and I don't mean research into new chemo formulas, I mean research into the cause of breast cancer."[19]

Make the personal political!

Once you've made the changes you can to reduce your risk, lobby our government and policy makers to do what they can. Currently they are not doing enough. For a start, we need better education for young women during adolescence about the risks of some of their lifestyle choices, particularly drinking and smoking.

The government needs to recognise the environmental factors, be cognisant of the burgeoning research on environment and breast cancer and TAKE ACTION!

Encouragingly, the New Zealand Cancer Action Plan 2019-2029,[20] released by the Labour Government on the 1st of September, has prevention of cancer as one of its four main outcome goals. It has devoted 12 pages of the plan to prevention, including the lifestyle factors outlined on page 22 and occupational risks, and it specifically mentions breast cancer. It remains to be seen how they will actually implement this plan and how much time and effort the new Cancer Control Agency will put into prevention.†

In *State of the Evidence,*[11] Gray *et al*. conclude with:

"As concluded by the reports of the Presidential Cancer Panel and the Interagency Breast Cancer and Environmental Research Co-ordinating Committee, it is critical to recognise the growing literature demonstrating connections between exposures to environmental toxicants and later development of disease, including breast cancer, and to prioritise prevention both at the research and the public health levels."

Our government must do the same!

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UP AND COMING EVENTS

District Health Board

meetings for November and December 2019:

Waitematā DHB Board meetings 13 November and 18 Decemeber at 9:45am; **Hospital Advisory Committee** meetings 4 December at 1:30pm; Meetings held in the DHB Boardroom, Level 1, 15 Shea Terrace, Takapuna.

Auckland DHB Board meetings 218 December at 10am; **Hospital Advisory Committee** meetings 27 November at 1:30pm. Meetings are held in the A+ Trust Room, Clinical Education Centre, Level 5, Auckland City Hospital.

Counties Manukau DHB Board meetings 11 December at 9:45am in room 101 at Ko Awatea, Middlemore Hospital; **Hospital Advisory Committee** 20 November at 1pm in room 101 at Ko Awatea, Middlemore Hospital. **Community & Public Health Advisory Committee** meetings 18 December at 9am in the CM Health Board Office, 19 Lambie Drive, Manukau**.**

www.waitematadhb.govt.nz | www.adhb.govt.nz
www.cmdhb.org.nz

Ethics Committee Meetings

Northern A and Northern B
(Ministry of Health, Level 3, Rangitoto Room, Unisys Building, 650 Great South Road, Penrose, Auckland)

Northern A: Tuesdays | 19 November | 17 December | all at 1:00pm – open to public at 1:30pm

Northern B: Tuesdays | 3 December | at 1:00pm – open to public at 12:30pm

https://ethics.health.govt.nz/about-committees/meeting-dates-venues-minutes

7th International Preventing Overdiagnosis Conference

5th to the 7th of December 2019 | Sydney, Australia
More information at http://www.preventingoverdiagnosis.net/

Maternity Natural Health Symposium
The expo on Perinatal Integrative Medicine

Sunday, 22nd of March 2020 - 7:30 am – 5:30 pm

Novotel Auckland Ellerslie, 72-112 Green Lane East, Auckland

for more information go to https://www.eventbrite.co.nz/e/maternity-natural-health-symposium-registration-68973057271