

Mammography, Biopsy and the Detection of Breast Cancer

A Special Report by Ralph W. Moss, PhD

“Unquestionably the world’s leading authority on alternative and complementary medicine, Dr. Ralph Moss has already done more than any other to bring to public attention the risks and lack of efficacy of standard cancer treatments such as chemotherapy and radiation. His works on the politics of cancer and the hazards and biases of clinical trials have made him a recognized leader in the field of cancer policy analysis.

*“Now he turns his attention to the highly contentious field of breast cancer detection. The result is a characteristically thoughtful and incisive work that not only exposes the very real dangers of breast cancer screening – over 10 years of routine mammography a premenopausal woman receives almost half as much radiation as was measurable within a mile of the epicenter of the Hiroshima atom bomb explosion - but also lays bare the astonishing lack of scientific evidence underpinning current screening recommendations. This is an **outstanding and important work** by an outstanding and important author.”*

— Professor Samuel Epstein, MD, professor emeritus of Environmental and Occupational Medicine at the University of Illinois School of Public Health, and Chairman of the Cancer Prevention Coalition.

“Ralph Moss has written a scholarly and frightening treatise that is a “must read” for both the general public and all health professionals. It has the capacity to transform our approach to breast cancer screening and diagnosis. It is a remarkable gift to the women of the world.” — Joel Evans, MD, founder and director of The Center for Women’s Health, Darien, CT, and assistant clinical professor, Albert Einstein College of Medicine and the College of Physicians and Surgeons of Columbia University, New York.

Mammography – The Hidden Downside

Breast cancer is a terrible disease, especially in its advanced stages. It is therefore perfectly understandable, in fact quite laudable, for concerned people to want to find a way to detect this disease in its earliest stages, when it has the greatest chance of being cured. So, in principle, I certainly agree with a strategy of prevention and early detection. I would be the first to endorse such a campaign if it were safe, cost-effective and likely to lead to a significant reduction in death and disease.

For more than 30 years, the strategy of choice for screening large populations for breast cancer in its early stages has been mammography. Screening mammography has the support of all the major health institutions in the US and, somewhat less enthusiastically, abroad. (It is worth noting that mammography screening for premenopausal women is not recommended in any other country except the US.)

Yet there are serious questions that need to be raised concerning the wisdom of this choice. It is a modern day mantra, endlessly repeated and unquestioningly accepted, that screening for breast cancer offers the best chance of early detection and therefore saves lives. But is this really true?

Before we begin this discussion I wish to make one thing clear. I am speaking about mammography as a screening tool, not as method of diagnosis. As a means of diagnosis, when cancer is already strongly suspected, mammography certainly does have a place, and an important place. However, screening and diagnosis are two entirely different things.

Screening is intended to pick up possible abnormalities in otherwise healthy individuals, whereas diagnosis is the method whereby an abnormality, sometimes initially detected by screening, is more closely examined in order to identify its true nature (i.e., what its origins are, and whether the abnormality is benign or malignant, etc.). The characteristics that make a good screening test are not by any means the same as those that are needed for diagnostic purposes.

The judicious and selective use of an imaging technique as a diagnostic tool in patients who have already been identified as having a suspicious lesion is not at all the same thing as the blanket application of an imaging technique in the mass screening of an entire population. With those caveats stated, and with the distinction between screening mammography and diagnostic mammography firmly in mind, let us now look more closely at screening mammography.

Mammography is the term used to describe the imaging technique used for the screening or diagnosis of breast disease – and in particular, breast cancer. There are various ways of creating a mammographic image of the breast, including ultrasound, thermography, MRI, etc., but by far the commonest form of mammography used for mass screening utilizes ionizing radiation (X-rays) to detect ‘lesions’ (i.e., areas of abnormal tissue) that are suspicious for breast cancer. The terms ‘mammography’ and ‘mammogram’ as used in this report therefore refer exclusively to the X-ray imaging technique.

There is a widespread belief that screening mammography unequivocally saves lives. The National Cancer Institute (NCI), the American Cancer Society (ACS), and the American College of Radiology (ACR) recommend annual mammography for all women over the age of 40. The statistic that is most commonly quoted is that by detecting breast cancer early, before it has become large enough to be clinically apparent as an obvious lump in the breast, mammography reduces the mortality rate from breast cancer by 20 to 30 percent. So fixed has this statistic become in the minds of women, the medical profession and the media that by repetition alone it has now attained the status of unimpeachable fact.

But how well founded is this belief? A closer examination of the data yields a somewhat less certain picture.

First of all, how much benefit can one truly expect from regular mammography? Just how effective is it in terms of saving lives?

To come to grips with that question it helps to have an understanding of the concept of absolute vs. relative risk. Absolute risk is a statistical concept that expresses the number of people who can be expected to succumb to a disease over a certain period of time. Women generally perceive that their risk of developing breast cancer is very high. But in reality the absolute risk of dying from breast cancer depends on your age and for some groups may be rather low.

For a 60-year-old woman, the chance of dying from breast cancer in the following 10 years is actually just 9 in 1,000. Mammography screening has been estimated to reduce the absolute risk of dying from breast cancer for this 60-year-old by around one third. So, instead of having an absolute risk of 9 in 1,000 over the next 10 years, her chances might be reduced to around 6 in 1,000 because of annual screening. Put another way, ten thousand annual mammograms must be performed to save these three women.

For somewhat younger women, however, the absolute risk of dying of breast cancer is lower to begin with. It is around 6 in 1,000. Therefore, the reduction in risk that might be conferred by mammography is also smaller. For 50-year-olds, for example 10 years of regular mammography might at best be expected to reduce the absolute risk of dying from 6 in 1,000 to around 4 in 1,000. So the absolute benefit after 10,000 annual mammograms is a possible saving of two lives.

However, advocates of screening rarely ever talk in terms of absolute risk. Instead, they prefer to express the benefits of screening in terms of relative risk, a statistical concept that, because it is expressed as a percentage, makes the benefits of screening appear much more dramatic.

For example, they will say that mammography reduces your chances of dying by 30 percent (the relative risk) but will neglect to add that the chance of dying of the disease (the absolute risk) is very small to start with. The relative risk, expressed as a percentage, therefore makes screening look dramatically effective, whereas when expressed in terms of absolute risk the picture is considerably less persuasive. Which of these two statements sounds more impressive: mammography saves 2 lives out of 1,000 over 10 years, or mammography reduces breast cancer deaths by 30 percent? No wonder proponents of screening are so enamored of quoting relative risk rather than absolute risk.

As Professor Samuel Epstein, MD, of the University of Illinois and colleagues have pointed out:

“Even assuming that high quality screening of a population of women between the ages of 50 and 69 would reduce breast cancer mortality by up to 25 percent, yielding a reduced relative risk of 0.75, the chances of any individual woman benefiting are remote. For women in this age group, about 4 percent are likely to develop breast cancer annually, about one in four of whom, or 1 percent overall, will die from this disease. Thus, the 0.75 relative risk applies to this 1 percent, so 99.75 percent of the women screened are unlikely to benefit” (Epstein 2001).

Finding Indolent Tumors

There are other facets of mammography that are seldom discussed by the many enthusiastic advocates of mass screening. Breast cancers vary greatly in their malignancy. For any screening technique to be worthwhile, it should be capable of picking up the most dangerous kinds of cancer rather than the most indolent. It should also be highly sensitive, giving few false positives and false negatives. Sadly, x-ray mammography does not score well on either count.

Mammography is undoubtedly good at picking up slow-growing cancers. It is also good at detecting so-called ‘in situ’ lesions, that is, the latent, precancerous lesions that have not yet developed (and might never develop) into truly invasive cancers. But these are not the kinds of breast cancer that are most likely to kill. That distinction belongs to the faster-growing tumors, and it is precisely these faster growing malignancies that mammography typically fails to catch.

Thus, a woman can have a clear mammogram at one annual screening, and yet, less than a year later, can discover that she has a highly aggressive form of breast cancer. Women who develop such so-called ‘interval cancers’ (i.e., cancers that are discovered in the

interval between two screenings) are more than twice as likely to die as are women whose cancers are detected through routine mammography. Like most screening tests, therefore, mammography suffers from the drawback that it misses many of the deadliest cancers entirely, while zealously identifying slow-growing or latent cancers, a significant proportion of which might never progress or pose a threat to life. This accelerates the trend towards finding and curing ‘cancers’ of dubious malignancy, thus exaggerating the benefits of both diagnosis and treatment.

Another important aspect of breast tumor growth is what is called the ‘doubling time’ of the tumor. This is the time taken for the tumor to double in size. It has been estimated that there are approximately 40 doublings between the development of a single malignant cell and the point at which a patient dies of widely metastatic breast cancer. For a tumor to be detectable by clinical breast examination (i.e., by the human hand, feeling for a lump) the tumor needs to be at least 1 centimeter in diameter (i.e., around half an inch across). A mammogram can detect a tumor at half this size, i.e., 5 millimeters in diameter. But this is just one doubling less than the size at which a small tumor becomes detectable manually, by a doctor or by self-examination. This single doubling is probably not a sufficiently wide difference to be able to affect the overall outcome of the disease very significantly.

It is also worth remembering that simply because a tumor is detected by mammography does not mean that it will be cured. Indeed, half of all the breast cancer deaths recorded in two important Swedish studies of screening were among women whose tumors had first been discovered by mammography (Duffy 1991). An article published in the *British Medical Journal*, points out that when breast cancer is detected by screening, it may already be too late. The author writes:

“Most cases of breast cancer detected by screening fall into this category....A signal failure of screening is that most women with screen-detected cancers who would have died had they not been screened will still die from their breast cancers” (Baines, 2005).

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Mammography is also not very sensitive, particularly for younger women. In younger women the breast tissue tends to be denser than it is in postmenopausal women, making the recorded film image much more difficult to interpret. This in turn can lead to an increased likelihood of misinterpretation of the radiographic image. The same is true of a substantial proportion of postmenopausal women who are taking estrogen supplements or hormone replacement therapy (HRT). These supplements can increase breast density, making mammograms just as hard to read as those of younger women with dense breast tissue.

Furthermore, mammography has a high false positive rate – that is, an area may be labeled suspicious, and further tests, including biopsy (the removal and examination of a sample of tissue for diagnostic purposes), may be initiated. Sometimes, however, doctors

find that this was a false alarm, and there is no abnormality. Mammography, in other words, is by no means fail-safe, and over time, a very significant number of women who undergo mammography will experience at least one false positive test. It is not uncommon for older women to have already experienced three or four such scares. One study found that if 32 million American women aged 40 to 79 years old received breast cancer screening annually for 10 years, 16 million of those women would have at least one false positive mammogram – i.e., the chance of a woman receiving a false positive test over 10 years of regular mammography is around 60 percent (Elmore 1998).

If you have ever been through one or more of these ‘false alarms’ you will know the psychological harm that they can do. Your life, and often that of your entire family, is put in abeyance, as you hold your breath awaiting the verdict of the radiologists and pathologists in your case. This agony can go on for days or even weeks.

The chance of a false positive is compounded by the human factor: all mammograms must be read (i.e., interpreted) by a radiologist, and for many reasons (not least the fear of litigation) a radiologist may err on the side of over-diagnosis, thus adding to the probability of a false positive reading. Abnormal mammograms are far more common in the US than elsewhere in the world: approximately 11 percent of all mammograms are declared abnormal in the US versus only 2 to 5 percent in Europe. This is not because breast abnormalities are more common in the US than elsewhere, but because there is a marked tendency to over-diagnose breast cancer in this country. In one study, for example, almost 60 percent of American radiologists reported that their awareness of the potential for lawsuits significantly increased the number of their recommendations for further tests, including breast biopsies (Elmore 2005).

Furthermore, skill at reading mammograms varies widely depending on the particular setting in which the mammogram is performed. In the best teaching hospitals and large cancer centers radiologists may well come up to higher standards of excellence than they do in community health and screening centers. A 2002 New York Times article on this subject exposed some alarming disparities between the two settings (Moss 2002).

False Negatives

Mammograms can and do sometimes miss cancers entirely. A woman may have a normal mammogram at one screening but still develop a so-called ‘interval cancer’ before her next examination. As we have discussed above, this kind of cancer tends to be the most deadly. The ‘false negative’ rate – that is, the rate at which mammography gives a clean bill of health to those who in reality do have cancer, has been estimated to be somewhere between 10 and 15 percent (Welch 2004).

The Problem of DCIS

Meanwhile, the number of cases of pre-malignant, non-invasive lesions such as ductal carcinoma in situ (DCIS) being diagnosed by mammography has increased by an astonishing 900 percent in the US over the past 20 years. It has now reached the point where almost 20 percent of all breast cancer diagnoses involve DCIS.

Some people interpret this as a good thing, i.e., a sign that cancer is being caught in its earliest stages. But treated early or late, DCIS has a low mortality rate (around 1 percent). Precisely what percentage of these latent, precancerous lesions might eventually progress to become truly invasive tumors is unknown, although it has been estimated that almost 50 percent of all in situ cancers will never progress and would be better left undetected and therefore untreated (Handler 2003).

Perhaps one day in the future there will be a way of distinguishing between those women whose DCIS poses an imminent threat of invasiveness and those whose lesions are harmless, so that treatment can be directed only towards those who truly need it. Currently, though, such a test does not exist.

Undoubtedly mammography is having the effect of labeling a substantial number of women as having breast cancer, and channeling them towards aggressive treatment, when in fact they have what scientists call a ‘pseudo-disease’ – i.e., a benign condition that poses no threat to life or well-being.

In one large-scale Canadian study of screening mammography it was found that DCIS was diagnosed in more than double the number of women who were given mammography than in those given careful clinical breast examinations (CBE) by qualified providers (i.e., 71 such women in the mammography group compared with 29 in the breast examination group). Another large Canadian study found that another 71 mammography patients were given a diagnosis of DCIS compared with only 16 in the breast examination group. Meanwhile, a careful analysis of the outcomes of both these studies concluded that mortality rates from breast cancer were unaffected by screening mammography: the women in these studies experienced no survival benefit whatsoever from mammography even after 10 years of follow up (Miller 2000).

Radiation and Other Hazards

Another important factor that is largely ignored by the medical profession and the mainstream media is the radiation danger inherent in screening mammography, particularly to younger women (i.e., women in the pre-menopausal age range of 40-50 years). Breast tissue is highly sensitive to radiation: an annual exposure to 1 cGy, or centigray (the dosage involved in taking a standard mammogram) increases the risk of cancer by 1 percent, and over a 10-year period of annual mammography screening this could augment a woman’s cancer risk by 10 percent. The risk may be even greater – up to

a 20 percent increased risk - for those women who carry certain genetic mutations (Swift 1994).

Screening mammography exposes the breast tissue to repeated doses of low-energy X rays. Contrary to what one might expect, low-energy X rays may actually be more damaging to DNA than their high-energy counterparts, according to a study performed at Columbia University's Center for Radiological Research (Brenner 2002).

For younger women in particular, whose breasts are denser and who have a longer projected lifespan ahead of them than postmenopausal women, the additional exposure to X-rays posed by annual mammography beginning at the recommended age of 40 could pose a significantly increased risk of cancer. The Columbia University article concluded:

“There is evidence that low energy X rays as used in mammographic screening produce an increased biological risk per unit dose relative to higher energy photons. At low doses, the increased risk appears to be of a factor of 2....For older women, the benefit is still likely to outweigh the radiation risk. For women less than 50 years of age, however, this increase in the estimated radiation risk might indicate a somewhat later age than currently suggested, by about 5-10 years, at which to recommend commencement of routine breast screening” (Brenner 2002).

This paper is significant - and unusual - in that it both acknowledges the risks involved in repeated radiation exposure to the breast through mammography and urges a re-examination of current recommendations concerning the appropriate age to begin regular screening. Most discussions of mammography are not as frank.

Professor Samuel Epstein, MD, professor emeritus of Environmental and Occupational Medicine at the University of Illinois School of Public Health, and Chairman of the Cancer Prevention Coalition, has pointed out that sobering fact that over a period of 10 years a premenopausal woman undergoing annual mammograms receives almost half the dose of radiation that was measurable within a mile of the Hiroshima bomb epicenter.

Professor Epstein has tirelessly drawn attention to the radiation risks of screening mammography. In a Los Angeles Times editorial titled “Mammography Radiates Doubt,” Professor Epstein reveals one disturbing reason why the “cancer establishment” is seemingly so willfully blind to this risk (and other risks) of mammography:

“Significant studies on radiation risks to the breast have been well known since the late 1960s, including evidence that mammography, especially in younger women, was likely to cause more cancers than could be detected. A confidential memo by Dr. Nathaniel Berlin, a senior NCI physician in charge of large scale mammography screening, in 1973 may explain why women were not warned of this risk: “Both the [American Cancer Society] and NCI will gain a great deal of favorable publicity [from screening, and]...this will assist in obtaining more research funds for basic and clinical research which is sorely needed.”

“Thus, once again, suspect technology was applied to women on a large scale, in spite of clear warning signals and with insufficient knowledge of the likely consequences” (Epstein, 1992)

Another hidden hazard in mammography is the physical compression of the breasts that is necessary to obtain a readable radiographic image. This physical compression can be quite painful and is one reason that some women avoid mammograms altogether. Less known is the fact that such compression can result in the rupture of small blood and lymphatic vessels, which, if they are in close proximity to a tumor – even a tiny tumor – may result in the release of malignant cells into the general circulation (Rosser 2000).

The Mammography Paradox

That mammography is not as effective in saving lives as its promoters have insistently claimed is bad enough; but even more alarming is fact that in women aged 40-49, mammography is actually associated with an *increased*, rather than a decreased, risk of death – a phenomenon known to researchers (if not the general public) as the “mammography paradox” (Retsky 2004).

Yes, you read that right: in rigorous studies mammography in younger women (ages 40-49) may actually accelerate, rather than reduce, breast cancer mortality.

This increased death rate from breast cancer in younger women who undergo screening mammography has been documented consistently in screening trials across different countries, settings and populations. It is a fact known to many researchers in the field, yet it remains largely unknown to the general public – and it is certainly not a danger of which women are routinely made aware by their healthcare providers.

One doctor who criticizes exclusive reliance on screening mammography is Cornelia J. Baines, MD, of the University of Toronto. Dr. Baines is hardly an outsider to the field. She is deputy director of the prestigious Canadian National Breast Screening Study, and the author of 70 PubMed-listed journal articles, among which is an important paper that is frank in its discussion of the mammography paradox. In this paper, aptly titled “Mammography screening – Are women really giving informed consent?” Dr. Baines says: “Many women remain unaware of the extent to which efforts to achieve breast cancer control through mammography screening may be doing harm as well as good. An unacknowledged harm is that for up to 11 years after the initiation of breast cancer screening in women aged 40-49 years, screened women face a higher death rate from breast cancer than unscreened control women, although that is contrary to what one would expect” (Baines 2003).

How could this happen? How can it be that instead of saving their lives, earlier detection might actually result in a greater likelihood of death in these women?

One possible explanation of the mammography paradox, proposed by Dr. Michael Retsky and his colleagues, is that surgical removal of the primary tumor can trigger the sudden growth of tiny clusters of cancer cells (called ‘micrometastases’) that have until that point lain dormant in distant sites. Researchers have shown that the primary tumor inhibits the ability of these subsidiary distant deposits to grow, perhaps by releasing powerful biologically active substances, such as angiostatin and endostatin, which prevent tumors from stimulating the development of their own blood supply (a process known as angiogenesis).

Without the ability to generate a new and adequate blood supply, tumors, even tiny, clinically invisible ones, cannot grow, and while the primary tumor is still in place, and still secreting these angiogenesis-suppressing substances, the micrometastases remain dormant. But once the primary tumor – the “conductor of the cancer orchestra,” so to speak – has been removed, the restraints on growth are removed and the microscopic malignant deposits in distant sites suddenly acquire the power to induce their own blood supply and grow independently.

Much of the pioneering work on the role of angiogenesis in tumor growth was done in the laboratory of Judah Folkman, MD, of Harvard University. Dr. Folkman is no disgruntled outsider. He was in fact the 1996 winner of the American Society of Clinical Oncology's (ASCO) highest honor, the Karnofsky Award. Working alongside Prof. Folkman, Dr. Michael Retsky and other researchers have studied the question of the mammography paradox and have suggested that not only is the removal of the primary tumor the spur to proliferation of dormant metastases, but also that surgery itself, by creating a physical wound, independently triggers the release of growth factors that, in addition to assisting healing of the surgical wound, also promote tumor growth. This effect is particularly marked in younger women with node-positive disease.

The fact that the mammography paradox is confined to younger (as opposed to older) women undergoing mammography is a reflection of the biological differences between pre- and postmenopausal women, Dr. Retsky and his colleagues suggest. In premenopausal women, the hormonal environment may encourage the estrogen-driven proliferation of breast cancer cells, putting younger women at an extra disadvantage in terms of their susceptibility to aggressive metastatic cancer growth.

In a 2001 paper on the subject of the mammography paradox, published in the journal *Breast Cancer Research and Treatment*, Dr. Retsky and colleagues state that "Each woman should be informed of the risks and benefits [of mammography] and decide for herself whether to undergo screening mammography. Young women are, however, not routinely warned that screening and resection may accelerate breast cancer mortality" (Retsky 2001). In a recent paper, Drs. Retsky and Folkman were joined by others luminaries in the cancer field, including Giovanni Bonadonna of Milan Cancer Institute author of over 450 PubMed-listed articles and inventor of the classical CMF protocol for breast cancer, and William J. Hrushesky, MD, one of the world's leading researchers on chronobiology.

Their sentiment is echoed by the University of Toronto's Dr. Baines, who asks, "Shouldn't women aged 40-49 years know that, 3 years after screening starts, their chance of death from breast cancer is more than double that for unscreened control women? Shouldn't they be informed that it will take 16 years after they start screening to reduce their chance of death from breast cancer by a mere 9 percent?"

Dr. Baines also points out that there is an almost willful silence both within and outside the medical profession on the subject of the dangers and ineffectiveness of screening mammography. Although the mammography paradox was originally identified in an article published in 1997 in the *Journal of the National Cancer Institute*, this important news was cited only 8 times in the ensuing 6 years – and four of these citations were by one group of researchers (Cox 1997).

On the other hand, there are some commentators, such as Robert A. Smith, PhD, director of cancer screening for the American Cancer Society, who are outspokenly dismissive of the work of Retsky and his colleagues. Perhaps not surprisingly, in view of his job, Dr. Smith is a strong supporter of screening mammography. He discounts Retsky's conclusions – indeed, he discounts the mammography paradox itself – and explains away the observation that younger women fare worse after surgery by suggesting that they typically have more aggressive cancers and therefore have an intrinsically poorer prognosis to start with.

The fact remains that a substantial body of research corroborates the existence of the mammography paradox. It would therefore seem to be prudent for the scientific community to address the issue with urgency and to revisit current screening mammography recommendations. Yet by and large there is a peculiar absence of debate on the subject. Contrast this with the deafening clamor from all sides in favor of mammography screening – and with the mounting chorus in support of the recommendation that women should begin annual mammography at the age of 40 - the very group of women most likely to be harmed, rather than helped, by mammography.

It is often fear that drives women to seek screening mammography, a fear that is fostered, actively and tacitly, by a medical profession (and a highly profitable screening industry) that is doing little to inform women of their real risks, nor what gain, if any, they can really expect from mammography. As Prof. Baines has stated in an article in the *British Medical Journal*:

"I remain convinced that the current enthusiasm for screening is based more on fear, false hope and "greed"...than on evidence" (Baines, 2005)

Over a woman's lifetime, her risk of developing breast cancer is 11 percent (1 in 9). While women tend to believe that almost 40 percent of all deaths among women are due to breast cancer, in reality the actual percentage is just 4 percent. Women are similarly misinformed about the benefits of mammography. In a survey of 1000 American women, 71 percent expressed the belief that screening reduces breast cancer deaths by 50 to 100

percent (Domenighetti 2003). But, as we have shown, the benefit for postmenopausal women is very small, while several rigorous clinical trials have shown that mammography not only does not confer a clear survival benefit, but may in fact have the opposite effect, contributing to an increased, rather than a reduced, risk of dying in premenopausal women. Despite these stark facts, raising questions about the value of mammography has come to be seen as “un-American,” one epidemiologist reportedly remarked (Baines 2005).

As journalist and medical writer Gina Maranto pointed out succinctly in a Scientific American article on the subject:

“Physicians, radiologists, statisticians and public health officials have made claims and counterclaims and with sometimes startling emotion have accused one another of misreading or misrepresenting data, of performing faulty analysis and of perpetuating myths that have dire consequences for women. Some specialists, as well as cancer societies, women's health advocates and manufacturers of mammography machines, have argued that mass screening saves lives; others on the clinical front lines and in policy-setting roles have contended that evidence from a number of randomized controlled trials does not support such a claim” (Maranto 1996).

The National Institutes of Health (NIH), the National Cancer Institute (NCI) and most of the other public agencies charged with formulating recommendations for screening based on scientific evidence routinely go out of their way to discredit studies that cast doubt on the usefulness of mass mammography screening. Mammography has become a cornerstone of the American “war on cancer.” That these national policy makers cannot even bring themselves to publicly acknowledge the existence of misgivings about the procedure, much less to re-examine their recommendations in the light of the alarming mammography paradox, is little short of staggering.

Over-diagnosis is an acknowledged problem with screening mammography, leading to treatment that for some people may be both unnecessary and intrinsically damaging in its own right. The danger of a false positive reading, with all the attendant anxiety and ensuing interventions, is also always a risk in current screening mammography programs. Similarly, the real possibility of a false negative – a clean bill of health that turns out to be illusory – is inherent in screening mammography. Moreover, there is no guarantee whatever that a breast cancer identified by screening mammography will be curable.

For older (postmenopausal) women, the benefits of mammography may be marginally greater, at least over time, although here again, there is a danger of over-diagnosis, and of high false positive (and negative) results.

Meanwhile, the debate over screening mammography continues. The US “cancer establishment” continues to stand unwaveringly behind its recommendation that women

aged 40 and up should undergo annual mammography. Not long ago, for example, the *New England Journal of Medicine (NEJM)* published a paper that made headlines all over the world. It claimed that mammography had been proven responsible for saving lives from breast cancer. It is therefore worth examining this report a bit more closely.

It should be borne in mind that this was not actually a new clinical trial. Instead, this study was based on what are called “computer modeling techniques” - that is, statistical inferences and predictions used to model screening outcomes. The data on which the study was based were not drawn from direct observations of patients but were computer simulations using various population registries as raw material to predict probable screening outcomes. In addition, no modifications or allowances were made in order to achieve consistency between the seven studies. Five out of the seven studies showed that mammography had contributed less to the decline in death rates than had improvements in treatment.

The most vocal proponents of screening mammography tend to claim that screening reduces the death rate by anywhere from 45 percent to 64 percent. However, in this study screening mammography was only found to have contributed approximately 15 percent to the decline in death rates from breast cancer, while improvements in treatment were found to have contributed approximately 19 percent (Berry 2005).

The usefulness of this study, and the validity of its conclusions, were further undermined by the fact that the sample population spanned the entire age range, from 30 to 79 years. No attempt was made to separate women into different age groups. As Prof. Baines pointed out, however, this was a particularly important omission since the natural history of the disease varies widely in different age groups. It is precisely about those women in their 30s and especially their 40s around whom the debate rages. Although it is in women aged 30-49 that mammography’s benefits are the most questionable of all, this fact was entirely ignored by this study (Baines, personal communication).

Yet despite this favorable NEJM article, and despite the incessant repetition of the “mammography saves lives” mantra, there is, astonishingly, still no consistent, substantial scientific evidence that regular mammography results in a significant reduction in mortality from breast cancer. In an important paper published in 2000 in the prestigious British journal *Lancet*, Swedish researchers, working on behalf of the international Cochrane Review organization, reviewed the quality of the major mammography trials to date and came to the following conclusions:

“Screening for breast cancer with mammography is unjustified. If the trials are judged to be unbiased, the data show that for every 1000 women screened biennially throughout 12 years, one breast cancer death is avoided whereas the total number of deaths is increased by 6” (Gotzsche 2000).

In another paper examining the contradictory evidence concerning mammography screening, Steven Goodman, MD, a biostatistician at the Johns Hopkins Sidney Kimmel Cancer Center, Baltimore, MD, has written:

“If we take a step back, this controversy looks almost Swiftian when we consider that even under the most optimistic assumptions, mammography still cannot prevent the vast majority of breast cancer deaths.... There will come a time when all the study patients have been followed up, all the analyses have been done, all the expert groups have met, and all the editorials have been written, and we still won’t be sure how much benefit and how much harm are caused by mammography. We must find good ways to help women deal with this uncertainty, for that time is imminent” (Goodman 2003).

The Role of Breast Self-Examination and Clinical Breast Examination

The advent of digital mammography, in which the traditional x-ray film is replaced by a digitized, computer-enhanced image of the breast, may make the imaging of denser breast tissue more accurate, and according to a study published in the *New England Journal of Medicine* in September 2005 this technique has already shown itself to be better than traditional film mammography at identifying suspicious lesions in women with radiographically dense breast tissue (Pisano 2005).

But what other ways are there for a woman prudently and effectively to improve her chances of detecting breast cancer? What alternatives or adjuncts are there to annual mammography? What new developments are in the pipeline?

First, the value of a really thorough clinical breast examination (CBE) and/or breast self-examination (BSE) has been routinely downplayed and underestimated by the cancer establishment. Yet a surprisingly high proportion of breast cancers are actually discovered by women themselves, without the aid of anything more high-tech than their own familiarity with the way their breasts feel, month by month. The American Cancer Society admitted some twenty years ago that almost 90 percent of all breast cancers were actually initially detected by women themselves (Ross 1987). And many of them still are.

But aren’t such physical examinations prone to subjective error? Aren’t mammograms technologically superior? Actually, although false positives do occur with clinical breast examinations, they are, perhaps surprisingly, less than half as common as they are with mammography. One study has shown that CBE is more sensitive (i.e., better able to detect abnormalities) than mammography in younger women with denser breast tissue. The same study found that CBE is also better than mammography at detecting dangerous ‘interval’ cancers.

Another study has compared two-modality screening – that is, screening using both mammography and CBE – to single-modality screening using CBE alone. The authors of this study wrote:

“Consistently, two-modality screening achieved higher cancer detection rates and program sensitivity estimates than either modality alone; mammography alone

achieved higher rates than clinical examination alone; interval cancer detection rates between screening examinations were higher following clinical examination alone than mammography alone; single-modality screening with mammography failed to detect breast cancers identified by clinical examination alone; the sensitivity of mammography was lower in younger than older women, while the reverse was true for clinical examination; and mammography identified a higher proportion of node-negative breast cancer than clinical examination. We conclude that combining clinical breast examination with mammography is desirable for women age 40-49 because mammography is less sensitive in younger than older women” (Baines CJ, Miller AB, 1997)

While this and other studies have shown that the combined use of CBE with mammography detected more abnormalities than either modality used alone (Elmore 1998), the Canadian National Breast Cancer Screening study concluded that in women aged 50-59 years, “the addition of annual mammography screening to physical examination has no impact on breast cancer mortality.” That is, even though mammography was able to detect cancers at a smaller size, before they became large enough to be detected by CBE or BSE, this still did not improve survival rates, because “the majority of the small cancers detected by mammography represent pseudo-disease or overdiagnosis” (Miller, 2000).

In the headlong rush towards mass mammography, the value of really thorough clinical and self breast examination has been almost entirely eclipsed. As we have seen, there are serious questions about mass screening with mammography, and the standard recommendation of annual mammography for all women over 40 in my opinion is in need of revision. Particularly in these younger women, in whom mammography is both more dangerous and less able to detect abnormalities, regular CBE and BSE are of great importance (Baines 1997; Epstein 2001).

Alternatives and Adjuncts to Mammography

In addition to CBE and BSE, there are a number of other more technologically advanced methods that show great promise as screening tools. For example, thermography, or digital infrared imaging (DII), is a technique that uses infrared technology to identify abnormalities. It is able to detect subtle differences in the heat emitted by different areas within the breast tissue. Because malignant tissue has a higher metabolic rate than normal tissue, thermography picks up these areas even when they are extremely tiny – long before they are detectable on mammography, in fact.

As a screening method, thermography is not a replacement for mammography, but a potentially useful adjunct to it.

The major advantages of thermography are that it is intrinsically safer and gentler, in that it does not involve compressing the breasts and does not use ionizing radiation. The result

of a four year, multi-center clinical trial of thermography, led by researchers at the University of Southern California (USC), was unambiguous: “Infrared imaging offers a safe, noninvasive procedure that would be valuable as an adjunct to mammography in determining whether a lesion is benign or malignant” (Perisky 2003).

As noted above, thermography can also detect abnormalities at an earlier stage than mammography. However, one problem is that heat changes in breast tissue can result from a number of different processes, not just from malignancy, and so a positive thermogram is not specific for cancer. False positives, in other words, are an inherent problem with thermography, just as they are with mammography. Another problem is that thermography cannot locate the precise anatomical position of a lesion with accuracy; once a suspicious area has been discovered, it still takes a mammogram or some other diagnostic technique to pinpoint the exact site of an abnormal area within the breast.

The best use of thermography is therefore as a technique that can be used in conjunction with mammography and/or CBE/BSE. Because it can detect abnormalities earlier than mammography, it is particularly useful in identifying the need for further investigations (including mammography), and since it is so non-invasive and so safe, it is an ideal method for routinely monitoring women who are at a heightened risk for breast cancer. It is particularly useful, too, for younger women and those with dense breast tissue. For such women mammography is not only an inadequate imaging technique but also carries added risks, including lifetime cumulative radiation exposure, and the danger of an increased, rather than a decreased, risk of death from breast cancer (the aforementioned ‘mammography paradox’).

It is important to point out, though, that just as commercial considerations may drive the over-enthusiastic promotion of screening mammography, so, also, can entrepreneurial forces influence the way in which thermography is presented to women. Thermography is certainly a useful and safe imaging technique, but it, too, has its limitations, and cannot be used as a straight substitute for mammography in screening for breast cancer.

Another possible screening tool is the use of sound to detect tumors. Ultrasound, also known as sonography, which uses sound waves to create an image of the internal structure of the breast, is more frequently used a diagnostic rather than a screening tool, although clinical trials are currently in progress by the American College of Radiology Imaging Network and the National Cancer Institute (NCI) to assess its value in screening as well. One of the drawbacks of older ultrasound techniques was that the hallmark ‘microcalcifications’ that accompany early breast cancer were not typically visible. However, newer techniques such as Doppler ultrasound have largely overcome this problem. In addition, ultrasound can be very useful not only in imaging dense breast tissue (something mammography does not do well) but also in distinguishing between benign and potentially malignant lesions, thus reducing the need for a biopsy. It seems very likely that this non-invasive technique will eventually come to occupy a prominent place in early detection of breast cancer, perhaps even some day supplanting mammography.

MRI (magnetic resonance imaging) is another technique whose value in breast cancer screening has still not been fully harnessed. In clinical trials, MRI has proved to be more sensitive than mammography, ultrasound or CBE in detecting early cancers. However, because of this ultra-sensitivity, it has also proved to be even more susceptible to false positives than mammography. So while MRI, like thermography, has advantages in that it does not involve breast compression or exposure to radiation, it is not yet a replacement for mammography either. It does, however, have a definite role to play in screening, as an adjunct to CBE and mammography, particularly for younger women with denser breast tissue, and for those whose family history suggests an increased risk of developing breast cancer.

PET (positron emission tomography) scanning is based on the extreme avidity of cancer for glucose. A cancer cell's inefficient method of energy production yields only 2 parts of adenosine triphosphate (ATP) energy per molecule of glucose, compared to 38 in the normally complete aerobic oxidation of glucose. Put another way, the cancer cell is 19 times more avid for glucose (sugar) than the normal cell. By tying glucose to a radioactive tracer, in a drug called FDG, doctors can see which tissues are metabolizing sugar most voraciously. This shows up as a 'hot' area on a PET scan and this usually (but not always) indicates cancer.

PET has not yet found a definitive place in breast cancer screening, although it is indeed a very sensitive method of detecting aggressive cancers and does not give rise to as many false positives as most of the other imaging methods. In the detection of recurrences in women who have been previously treated for breast cancer it has been shown to be superior to other techniques. However it is still not particularly useful for identifying marginally invasive lesions. In addition, PET involves the use of an injected radioactive contrast medium, and while the half-life of this material is extremely short – and thus the exposure to radioactivity is relatively small – it is certainly not a procedure to be undertaken on a regular basis for screening purposes. Nor is PET by any means universally available or affordable.

An Ounce of Prevention

While mammography screening is universally portrayed as essentially a preventive practice, it is in fact nothing of the sort. It is a means of detecting lesions that are already present and growing. Before a lesion becomes detectable on a mammogram it has typically been present for an average of 8 years. The best that can be said for the role of mammography is that it is a modestly effective tool in the service of damage control in older women.

Every cancer avoided is a triumph, and every cancer death a tragedy. While mammography may indeed be a useful (though far from perfect) screening tool, it cannot stop women developing breast cancer, and neither can it reliably prevent the majority of

deaths from the disease. Yet the American Cancer Society, the National Cancer Institute and the medical profession at large (all of which have strong ties to the multi-billion dollar mammography industry) continue to focus their education efforts exclusively on the detection of existing breast cancer via screening mammography (Epstein 2001). If instead of doing this, they were to throw their considerable political and financial weight wholeheartedly into the effort to find and control the environmental triggers that contribute heavily to the incidence of this dread disease, we might see more substantial progress.

Women need to look critically at the information that is presented to them on the merits of screening mammography. While regular annual screening mammography is now routinely recommended for all women aged 40 and above, the scientific evidence shows that such across-the-board screening may (a) not be nearly as effective at saving lives as we are insistently led to believe, and (b) may actually be counterproductive for younger (premenopausal) women.

In view of the known shortcomings of mammography, it makes sense for women of all ages not to rely solely on screening mammography as a means of breast cancer detection, but to employ other approaches also. Younger women, especially, should question the standard recommendation for annual mammography. Depending on family history and individual risk factors, premenopausal women may lose little by increasing the intervals between screening mammograms and using other means such as thermography, ultrasound, MRI and/or BSE as their primary prevention approach on an annual basis.

The advent of digital mammography has made it easier to get very accurate baseline readings against which subsequent mammograms may be compared, significantly reducing the subjectivity of radiographic interpretation. This technique also makes it easier for younger women and those with dense breast tissue to get very clear breast imaging.

For postmenopausal women, the recommendation for annual screening mammography could also be re-evaluated. Many authorities already accept that mammography can be performed every 2 years in women over 50 rather than annually. Adjunctive techniques (MRI, ultrasound, thermography, BSE, CBE) may also be used to supplement screening mammography.

What I am advocating here is not the wholesale abandonment of screening mammography, but its more rational application: it is one tool among several that can be used in the detection of breast cancer. However, it is a tool that has several very real drawbacks, including repeated exposure to ionizing radiation, and a high false positive (and false negative) rate. It makes sense, therefore, to incorporate other, less potentially damaging, detection techniques into one's prevention program, reducing one's reliance on frequent mammography.

Mammography is acknowledged to be the best screening tool currently available for breast cancer. However, it is far from perfect. While I do not wish to discourage women

from being screened for breast cancer – to the contrary, I believe that vigilance and early detection are extremely important – I do feel that it is vital for women to have a full understanding of the procedure and realistic expectations as to what it can, and cannot, do. This is the true basis of informed consent. As one group of researchers, writing in the *British Medical Journal*, put it:

“Scientists continue to argue about the benefits of breast screening, but ultimately decisions about screening should be made by women themselves. To make this decision, however, women need to fully understand both the benefits and the potential harms” (Thornton 2003).

The Hidden Danger of Biopsies

The needle biopsy has become an essential part of cancer diagnosis. Tens of thousands of such biopsies are performed each year in the US alone, and the procedure is almost universally assumed to be safe and reliable. Yet there is evidence to suggest that needle biopsy may not be as harmless or uncomplicated a procedure as once thought. In fact, it may in some cases inadvertently cause cancer cells to break away from a tumor, thus enabling spread beyond the immediate tumor area.

It has been known since antiquity that surgical procedures performed in the vicinity of a tumor are capable of causing the dissemination of cancer. Procedures as seemingly routine as needle biopsy or fine needle aspiration, as well as more invasive surgical procedures aimed at the control or excision of tumors, were long thought to be capable of inadvertently spreading the disease. There are many studies and case histories in the medical literature documenting instances of surgically-triggered (so-called “iatrogenic”) tumor spread and warning of the intrinsic dangers of certain surgical procedures in the presence of cancer.

As long ago as 1930 the great American cancer pathologist James Ewing, MD, explicitly advised against the surgical sampling of tumor tissue. “It is especially to be avoided with...tumors of the breast, and all growths in which incisions of the skin involve also incisions through the tumor capsule,” wrote Ewing (after whom Ewing’s sarcoma is named). His concern was that the mechanical disturbance of the tumor – and in particular the disruption of its exterior wall or capsule – would result in the spillage of tumor cells into nearby blood and lymphatic vessels, thereby encouraging spread.

When tumors are perforated, sliced into or penetrated by surgical instruments so-called tumor spillage or seeding can occur. That is, tumor cells or clumps of cells can be accidentally spilled into the body's cavities, sucked into the withdrawal track of a needle or catheter, or introduced directly into the bloodstream or lymphatic system. Even rough handling during surgery can cause clusters of tumor cells to break away from the primary tumor. And since the physical insult of surgery itself is well known to be immunosuppressive (i.e., to hinder the normal functioning of the immune system) any accidentally released tumor cells would have a head start over the body's natural defenses in the days and weeks following surgery.

A study performed not long ago in California set out to examine whether needle biopsy, widely used to obtain specimens in cases of suspected cancer, might itself allow malignant cells to spread from an isolated tumor to nearby lymph nodes. The authors reluctantly conclude that this procedure may indeed increase the spread of the disease by 50 percent compared to patients who receive the more traditional excisional biopsies (or “lumpectomies”).

This was a rigorous study, and it came with an excellent pedigree. The lead author, Nora M. Hansen, MD, was chief surgical resident at the University of Chicago (1994-1995)

before coming to the John Wayne Cancer Institute in Santa Monica, Calif., in 1997. She is currently Assistant Director of the Joyce Eisenberg Keefer Breast Center, Saint John's Hospital and Health Center, Santa Monica.

John Wayne Cancer Institute, a division of Saint John's Hospital, is an innovative institution, which pioneered the procedure known as sentinel node biopsy. This is a technique for identifying the first lymph node to which a tumor is likely to spread (the so-called "sentinel" node). By removing that node and examining it at the time of surgery, it is possible to predict with considerable accuracy whether the cancer has indeed spread. This enables the surgeon to remove only those lymph nodes that have become involved with cancer, instead of resorting to wholesale lymph node dissection, a procedure which can leave a patient with long-term pain, edema, disfigurement and impairment of limb mobility.

The report was published in a prestigious journal, the American Medical Association's *Archives of Surgery*, which has been published continuously since 1885. A team of John Wayne scientists that, in addition to Dr. Hansen, included Armando G. Giuliano, MD, chairman of the American College of Surgeons Breast Oncology Committee and the author of over 200 scientific articles on breast cancer conducted the study. I emphasize the credentials of the study's authors in order to make the point that this is a group of well-respected clinicians and assuredly not a group of mavericks.

Hansen and her colleagues wanted to discover whether the common method used to obtain specimens from a breast tumor influenced the subsequent spread of disease to the sentinel node (SN). She and her colleagues therefore studied 663 women who were known to have breast cancer. Of these, about half had been biopsied with a needle — either a fine needle aspiration (FNA) or a large-gauge needle core biopsy. The other half had undergone the physical removal of their tumor (i.e., an excisional biopsy or lumpectomy).

The study found that women who had had either kind of needle biopsy were fifty percent more likely to have cancer in their sentinel nodes than women who underwent the surgical excision biopsy. "Manipulation of an intact tumor by FNA or large-gauge needle core biopsy is associated with an increase in the incidence of SN metastases, perhaps due in part to the mechanical disruption of the tumor by the needle." This is a diplomatic way of saying that needle biopsy, an increasingly common procedure, was itself responsible for spreading the cancer, although the authors take pains to qualify this disturbing conclusion by suggesting that not every cluster of cancer cells found in the regional lymph nodes will inevitably end up developing into clinically apparent cancer.

The implications of this study are vast, since patients who are found to have cancer in their lymph nodes are automatically classified at a higher stage and therefore face much more extensive treatment than those who have small tumors that are limited to the breast. A patient with a tumor smaller than two centimeters in its greatest dimension but no involved lymph nodes is classified as in stage I. But with the same size tumor, when there

is lymph node involvement that patient would be classified stage IIA, according to the American Joint Committee on Cancer (AJCC) stage groupings.

So, instead of being told that they have stage I cancer and that surgery “got it all,” they are now delivered the frightening news that the cancer has spread outside the immediate area and gotten into the lymphatic system. They then face the possible dissection of the affected chain of lymph nodes, followed by aggressive chemotherapy, radiation and/or hormonal therapy to wipe out the stray cancer cells (Chu 1999).*

Over the last few decades the needle biopsy has become an essential element in the detection not only of breast cancer, but of many other kinds of cancer as well. The advantages of the technique are that needle biopsies are nearly painless and bloodless in-office procedures, and much less expensive and time-consuming than surgical biopsies. The procedure consists of a hollow needle being inserted into a suspected tumor in order to retrieve samples for microscopic examination. In certain cases the tumor may have to be punctured four to six separate times in the process of obtaining adequate tissue for diagnostic purposes.

Is it really safe to puncture a tumor in this way, especially when the tumor is anatomically walled off or encapsulated from the rest of the body? Isn't this running the risk of spreading the disease, either into the track formed by the needle, or, worse, by spilling cells directly into the lymphatic system or bloodstream? Has this procedure really been carefully thought out and researched before being implemented on such a massive scale?

Get A Band Aid And Go Home

To read the mainstream media, you would think that the medical profession is uniformly in favor of this procedure. For example:

- A 1999 report in the *Journal of American Medical Association* enthusiastically endorsed the use of needle biopsies.
- “A painful surgical biopsy of breast tissue may no longer be necessary,” a CNN website enthused, in interpreting the study. Needle biopsies are “just as reliable, less expensive, and more comfortable than the surgical alternative for diagnosing breast cancer” (Salvatore 1999).
- Jack E. Meyer and colleagues at Boston’s Brigham and Women's Hospital reviewed 1,836 cases of breast cancer diagnosed with the aid of a needle. They

* At the present time, most premenopausal women with stage I breast cancer are being recommended chemotherapy. However, with the development of gene expression marker panels, such as Oncotype DX, it is becoming possible to spare most of these women from the difficulties of chemotherapy. This benefit is unlikely to extend to those with stage II cancer, however.

found large-core needle biopsies “accurate, safe and well accepted by patients and referring physicians.” Instead of an operation, with local or general anesthesia, and possible deformation of the breast, patients experienced a one-hour in-office procedure. “When the procedure's over you get a Band-Aid and you go home,” said Dr. Meyer (Salvatore 1999).

This is in fact the general opinion among most doctors and writers on the subject.

To summarize: in principle the needle biopsy seems like a win-win situation. It is a simple office procedure, convenient and virtually pain-free for patients. One would certainly not dispense with a test like this for trivial reasons. Currently, 1.2 million US women a year undergo breast biopsies. Between 20 and 25 percent of these tests show cancer, according to Dr. Neil Gorrin, assistant chief of surgery at Kaiser Permanente Medical Center in South San Francisco (Vidya 2001). That means that virtually all the women in the US who were diagnosed with breast cancer (211,240 in 2005) went through this procedure.

Yet concerns have several times been raised about the safety of invasive biopsies since they were first introduced more than a century ago.

The surgical biopsy first came to prominence in the 1870s, through the work of Profs. Carl Ruge and Johan Veit of the University of Berlin, who showed that only 10 out of 23 women who had undergone surgery for cervical cancer actually turned out to have the disease. At that time, many surgeons rather arrogantly assumed that they could recognize cancer when they saw it: they viewed the suggestion that tumors should be biopsied before excision as a direct challenge to their diagnostic and clinical acumen. But the work of Ruge and Veit effectively turned the prevailing tide of opinion. By the time of World War I biopsy became routine practice in the US, endorsed by both the American Cancer Society and the American Medical Association.

We think of the fine needle biopsy as a modern technique. But remarkably, such biopsies – described as “a new instrument for the diagnosis of tumors” - were first reported for head-and-neck cancer by M. Kun in 1847! This innovation was soon forgotten, but was subsequently revived by Hayes E. Martin, MD, and Edward B. Ellis, MD, of Memorial Sloan-Kettering, in the 1920s (Martin 1930). Needle biopsies were performed on a large scale at Memorial in the 1930s; however, the technique did not gain many adherents in the US during that time. Such biopsies later underwent a resurgence in Scandinavia during the 1950s and 1960s, and it was from there that the trend spread to the rest of the world, including back to the United States (Das 2003).

However, by no means everyone in the medical establishment was convinced that biopsy – needle or otherwise – was an unqualified boon. James Ewing, MD, the dean of American cancer pathologists, explicitly condemned puncturing unbroken skin for the purpose of sampling deeper lesions. He wrote: “It is especially to be avoided with...tumors of the breast, and all growths in which incisions of the skin involve also

incisions through the tumor capsule” (Pack 1940: 43). That would of course preclude most of the situations in which needle biopsies are currently done.

Ewing was not alone. The editor of the influential New York *Medical Record* had this to say on the subject:

“[O]ne who harpoons or excises a piece of tissue from a tumor with unbroken cutaneous or mucous surface, especially an encapsulated tumor, and then waits a day or two while the specimen is being examined, will almost inevitably destroy his patient's chance of recovery by operation....To resort to indiscriminate digging into all tumors on the chance of thereby reaching a diagnosis, which can usually be made by safer measures, and which moreover is not absolutely necessary, is positively wicked....” (Pack 1940).

Strong words! The author ends on a peculiarly modern note: “[A] physician acting on this advice would have no defense whatever if the heirs of his patient should bring a malpractice suit” (cited in Pack 1940:44).

In 1940, the first American textbook on cancer treatment also contained warnings on the dangers of biopsies. “The medical literature is full of pleas for and against biopsy of all types of tumors,” wrote Cushman D. Haagensen, MD, of Columbia University, NY, in 1940. Some doctors are “inquisitive but afraid of doing harm with biopsy” (Haagensen 1940). Bradley Coley, MD, a bone surgeon at Memorial Sloan-Kettering Cancer Center (and son of the famous immunotherapy pioneer, William B. Coley, MD), wrote: “There is some doubt as to the harmlessness of needling such tumors. It may not be a wholly innocuous procedure” (Pack 1940). A survey taken at the time showed that most surgeons agreed that the excision of suspect tissue was to be condemned and avoided.

Yet so widely and unquestioningly accepted has needle biopsy now become that anyone who raises a criticism of the technique runs the risk of incurring the wrath of his or her professional colleagues. For example, in July 2004 the prestigious *British Medical Journal* ran an article by a group of Australian surgeons, cautioning against the use of needle biopsies of the liver explicitly on grounds of the serious risk of needle track seeding of the tumor (Metcalf 2004). The researchers stated that there were “certainly... medico-legal implications for people who perform fine needle aspiration of any malignant lesion.” In a letter to the editor of the same journal a radiologist responded indignantly over the publication of this article, accusing the editor of the BMJ of practicing “tabloid journalism” (Joseph 2004).

Have needle biopsies become standard practice because they have been proved safe through a rigorous series of studies, culminating in the yardstick of scientific measurement, randomized controlled trials (RCTs)? Or have the safety issues raised long ago by such luminaries as James Ewing, Cushman D. Haagensen and Bradley Coley simply been swept under the rug?

Longstanding Controversy

It may surprise readers, especially those who have undergone this procedure, to know that this old controversy over the safety of needle biopsies has quietly persisted into the modern period. Despite the unshakable assurance with which a standard textbook states that “the available evidence indicates that no increased risk of dissemination can be demonstrated in patients treated by needle biopsy” (Pilch p. 501), doubts remain. Apart from anything else, this sort of statement rests on two papers, one dating from the 1950s and the other from 1962, both written by the same Memorial Sloan-Kettering doctor, Guy F. Robbins, MD. But neither of these papers was based on a proper clinical trial (Kaae 1952; Robbins 1954).

Dr. David Kinne, a Memorial Sloan-Kettering breast surgeon, supported needle biopsy and cited as proof of the technique’s safety the claim that there was no difference in survival between patients who received needle biopsies and those who received excisional biopsies. He then authoritatively averred, “This establishes that no dispersal of tumor cells is caused by aspiration biopsy.” But that seems like an awfully big conceptual leap based on limited data, especially since the data he quoted in support of his assertion was already three decades old by the time that he cited them. Even if the statement were true, could not needle biopsies have resulted in other kinds of harm, such as requiring women to receive more aggressive treatments and have a heightened sense of anxiety for the rest of their lives?

Even Dr. Kinne had to admit: “The extent to which needle aspiration biopsy may contribute – to a greater or lesser extent than surgical biopsy – to the hematogenous [blood-borne, ed.] dispersal of tumor cells has not specifically been determined” (Harris 1991:107).

One can follow the fate of needle biopsies through various editions the American Cancer Society’s textbook on cancer. In the 4th edition (1974), the editor, Philip Rubin, MD, of the University of Rochester, wrote with refreshing bluntness that surgical biopsies “may contribute to the spread of cancer in some cases.”

He elaborated: “Needle biopsy is occasionally used, [but]...a needle track may harbor nests of cells which may form the basis for a later recurrent spread.... Incisional biopsy of certain highly malignant tumors through an open operative field may be contraindicated because of risk of spread of the tumor throughout the operative field” (ibid.).

Yet by the 7th Edition (1991), this concern was less apparent. The only caveat in this edition is a whittled down version of the earlier statement, conceding that one of the disadvantages of the larger core needle biopsy is “seeding of the needle track with tumor cells.” But now Dr. Rubin and his colleagues were quick to reassure the reader that “with the advent of FNA [fine needle aspiration, ed.], this [core needle biopsy] technique is now used infrequently for palpable lesions...” (p. 43). As if FNA had been conclusively proven free of the risk of needle track seeding.

Finally, the most recent ACS version of the textbook, *Clinical Oncology* (2001), no longer offers any cautionary words whatsoever on the danger of biopsies. In fact, it states flat out, “biopsy of the breast under local anesthesia has virtually no disadvantages,” an amazing statement in a field that is filled with complicated trade-offs of benefit and risk. There is no longer one word about the possibility of spreading cancer through biopsy. This in my opinion is a change in attitude that is simply not supported by hard data.

Many sources that at the very least should discuss the possible downside of needle biopsy act as if there were no controversy whatsoever. Yet, if you examine the medical literature you do find studies similar to that of the John Wayne Institute authors, throwing doubt on the propriety of puncturing tumors in order to recover tissue for sampling.

Earlier in 2004, for example, the four Australian surgeons mentioned above (Metcalf 2004), published their study in the *British Medical Journal* on the risks of fine needle biopsy of metastatic tumors in the liver. The title of the article succinctly summarizes their view: “Useless and dangerous—fine needle aspiration of hepatic colorectal metastases” (Metcalf 2004).

Why dangerous? Aside from the acknowledged small risk of hemorrhage, there is the question of seeding the tumor in the track of the needle. Opinion is divided on how frequently this occurs. Some authors believe the incidence is very small, i.e., between 0.003% to 0.07%. But more recently, the authors report, higher rates (0.4% to as much as 5.1%) of needle track metastases have been reported when fine needle aspiration cytology (FNAC) is used in liver lesions, usually for primary liver tumors (Takamori 2000; Chapoutot 1999; Kim 2000; Durand 2001; Herszenyi 1995). Thus, it is possible that one in twenty needle biopsies of the liver results in a new tumor spread by this medical procedure.

The latest reports on needle biopsies certainly reopen a concern that has troubled many observers for a long time. I myself raised these concerns in my first book, *The Cancer Industry* (1980), quoting the 1974 ACS textbook cited above. Dr. Hansen has not made public statements warning of an increased danger through needle biopsies. I certainly respect Dr. Hansen’s cautious and scientific approach. It is true that the full clinical significance of these lymph node metastases is not known (that is, how many of them would go on to develop into full-blown metastatic cancers, and how many would remain dormant in the local lymph nodes). But that possibility should not be swept under the rug, either.

What cannot be denied is the disturbing effect that the development of metastatic disease has on the patients involved. First, instead of being told that they have a tumor that is likely to be cured by localized treatment (oftentimes surgery with or without adjuvant radiation), they learn instead that the cancer has now escaped out of a confined area and has been seeded into another part of their body. Second, they will almost certainly now be strongly urged to take highly toxic combinations of chemotherapy with all its unpleasant and dangerous side effects, a treatment that might not have been necessary

had the tumor remained confined to its site of origin. (Chemotherapy is often urged on women with stage I tumors as well, but its benefit is statistically small.)

Imagine the outrage these patients would feel when they learn that many of these sentinel node metastases were caused not by the natural progression of their disease but directly by the actions of well-intentioned (but ill informed) doctors. Imagine, further, what will happen when patients find out that questions have been raised about the safety and advisability of needle biopsies for a number of years by some of the finest minds in oncology. Imagine the disruption of the smooth functioning of the “cancer industry” when patients start demanding less invasive ways of diagnosing tumors. And imagine the potential for class action lawsuits.

I think it is because of nightmare scenarios like this that no one in the medical community has yet come forward to draw the obvious conclusions from this provocative Hansen study for the general public. Doctors are silent. Politicians are unaware. And mainstream journalists, whom we look to as a “fourth estate” in issues of public policy, are silent on this, as on many of the really controversial developments in the cancer field.

How else do we explain the fact that despite the impeccable credentials of the John Wayne Cancer Institute team, and prominence of the journal in question, this report has generally been ignored, as has the equally disturbing report on liver metastases in the *British Medical Journal*. Although Reuters did cover the John Wayne study at the time it was first published (June, 2004), few others picked up on this story.

Needle-core biopsy continues to be viewed as the gold standard of diagnostic aids (Crabtree 2004). The whole notion that biopsies may themselves spread cancer may be too hot to handle for most of the mainstream media and the medical profession. It is one of those medical secrets that, it seems, is regarded as best left unexplored.

But as we have seen earlier, in our discussion of the “mammography paradox,” direct spread of tumor cells as a result of instrumentation or mishandling (so-called “mechanical” spread) may not be the only way in which surgery can induce the dissemination of cancer. As we have shown above, several researchers have raised the possibility that cancer surgery aimed at removing the primary tumor may have the unfortunate and unanticipated result of awakening dormant micrometastases (tiny nests of cancer cells that have spread to distant sites). These researchers include Drs. Michael Retsky of Children’s Hospital and Harvard Medical School, Romano Demicheli of the Department of Medical Oncology, National Cancer Institute, Milan, Italy, Professor Michael Baum, Professor emeritus of surgery at University College, London, and William Hrushesky, MD, of the University of South Carolina School of Medicine, Columbia, SC.

In their paper published in the *European Journal of Cancer*, and titled “Does surgery unfavourably perturb the “natural history” of early breast cancer by accelerating the appearance of distant metastases?” Drs. Baum, Demicheli, Hrushesky and Retsky address the paradox that the tumor itself may act as a brake on distant metastases. They point out

that from antiquity until relatively recently, surgery was routinely avoided for women with breast cancer precisely because of fear that surgical interference might spread the disease (Baum 2005).

The authors put forward evidence to suggest that surgery may indeed be the trigger for the accelerated growth of metastases. They write: “there is previously unreported... clinical data that suggests the act of surgery might accelerate the appearance of distant metastases. The explanation we propose that agrees with these results, as well as with the physicians of antiquity, is that surgery can induce angiogenesis and proliferation of distant dormant micrometastases, especially in young patients with positive nodes.”

Please note: Neither Prof. Retsky nor I by any means intend to suggest that one should not have surgery for early-stage cancer. There are certainly times when it is both necessary and unavoidable. However, exactly what effect such surgery has on the formation and growth rate of distant metastases remains an intellectually valid question.

The proper methods of screening and diagnosing breast cancer remains a difficult one. As with any procedures, it is important for informed patients to understand the pluses and the minuses of whatever is being proposed. Mammography and needle biopsy are cases in point. The important thing is to keep an open mind and to keep questioning. The great Memorial Sloan-Kettering chemotherapist David Karnofsky, MD, once noted:

“The relevant matter in examining any form of treatment is not the reputation of its proponent, the persuasiveness of his theory, the eminence of its lay supporters, the testimony of patients, or the existence of public controversy, but simply...does the treatment work?”

He was speaking about alternative medicine, but the same caveat applies to the consideration of such orthodox procedures as mammography and biopsies.

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Dr. Moss has appeared on over 400 radio and television programs, including "60 Minutes" and "Larry King," and has been an invited speaker at Memorial Sloan-Kettering Cancer Center (Surgery Grand Rounds), Howard University (Family Practice Grand Rounds), the US Department of Energy, American Cancer Society, and many universities, medical schools, and medical society meetings in the US and abroad. He has lectured extensively in Toronto, Vancouver, and Calgary, in Canada, and many cities in Europe. He has addressed the Baden-Baden Cancer Congress five times, and has been an invited speaker at the Santa Famiglia Hospital in Rome.

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