40 years after the war on cancer:
How far have we come?

_The time has come in America when the same kind of concentrated effort that split the atom and took man to the moon should be turned toward conquering this dreaded disease. Let us make a total national commitment to achieve this goal._

- Richard Nixon, State of the Union address 1971

It was in December 1971 that cancer became the next inevitable triumph of human ingenuity, the uniting foil to re-establish Allied fortitude in the dire troughs of the Vietnam War. What we have come to know as the War on Cancer was officially christened with the signing of the *National Cancer Act of 1971 (NCA)*, which gave the American National Cancer Institute more direct avenues to seek funding, and direct communication with the President's office. In this moment, cancer was to be defeated at all costs, crystallised as one of the great universal evils of a Western world giddy and empowered in the patriotic afterglow of the 1969 moon landing.

Proposals to form a single, national response against cancer had waxed and waned in the USA since the early 1900s, eventually ratified by the 1971 Act. Two years before the *NCA*, on 9 December 1969, the “fairy godmother” of the War on Cancer, socialite Mary Lasker, took a full page advertisement in the Washington Post, stamped with large black letters: Mr Nixon: You can cure cancer:

Dr. Sidney Farber, Past President of the American Cancer Society, believes:

We are so close to a cure for cancer. We lack only the will and the kind of money and comprehensive planning that went into putting a man on the moon. — Why don't we try to conquer cancer by America's 200th birthday.
The advertisement characterises the very essence of what would become the American War on Cancer, whose 40th anniversary we now celebrate. The alliance of Lasker, an affluent networker and self-promoter dedicated to the vengeance of the disease that took her mother; and Dr Sidney Farber, the pioneer of what would become modern chemotherapy and cancer's most outspoken oppugnant, brought the War into the public conversation.

From the very beginning, the War on Cancer was a political conflict. Farber realised the campaign against cancer needed icons, mascots, images, slogans: “the strategies of advertising as much as the tools of science”. Diseases occupy no space, and in the same way that the conjuration of “reds under the bed” emboldened the demonisation of communism, cancer required a corporeal form. A disease needs to be transformed politically before it could be transformed scientifically, this in turn influenced the expected clinical outcomes.

Farber and Bill Koster (leader of the Variety Club at the time) selected a mid-Western child suffering from cancer, Einar Gustafson, and rechristened him 'Jimmy', the sympathetic avatar of cancer's wrath. Jimmy debuted on popular radio show 'Truth and Consequences' on May 22, 1948, when host Ralph Edwards interrupted the broadcast to call for donations: “Like thousands of other young fellows and girls in private homes and hospitals all over the country. Jimmy is suffering from cancer.”

The response was overwhelming. The Jimmy Fund became a household name and a household cause. The baring of this private battle in public, interrupted the daily trajectories of unaffected citizens: Baseball-shaped piggy banks placed outside hotels, billboard advertisements throughout Boston, red-and-white “Jimmy's cans” outside cinemas and Jimmy Days held in small towns across New England. They were inundated with funds large and small: $100,000 from the NCI, $5,000 from a bean supper in Boston, $111 from a lemonade stand, a few dollars from a children’s circus in New Hampshire. The strategies employed by the Jimmy Fund have become
the foundations upon which modern cancer campaigns are built.

However, as would become a trend in the War on Cancer, the $231,000 raised by the Jimmy Fund was impressive, but it was dwarfed by the outcome it promised: a cure. Once the luxury and lifespan of the early 20th century “unveiled” cancer12, annihilation was the only acceptable outcome.

The political image of cancer swelled in the late 30s into the 50s in the USA. Fortune's 'Cancer: The Great Darkness', Life's 'U.S. Science Wars against an Unknown Enemy: Cancer', Time's 'Medicine: Millions for Cancer', along with a number of New York Times articles published in 1937, introduced and implanted cancer into the collective consciousness. The tone was consistent: “The search for a way to eradicate this scourge... is left to incidental dabbling and uncoordinated research”13. They demanded the united, dedicated front the NCA promised to deliver, and the War began.

Australians shared the American cancer panic; articles appeared as early as 1904 analysing the then growing scourge of the disease14, a cancer conference was held in Canberra in 1932, pre-dating much of the organised campaign in the USA15.

However the local discourse was more subdued, more analytical than the outright rallying cries of the American War on Cancer. There was no grand pursuit of a cure, and no far-reaching, bleeding-heart campaign to stimulate donations. Instead, our constant, steady discussion of the facts of cancer generated a different approach to how we dealt with the disease. Where the American War on Cancer was and still is focused on researching increasingly aggressive treatment measures, Australia gave priority to campaigns of prevention that have paid significant dividends.

Both Australian and American clinicians have really had only two primary strategies against treating cancer for the last half-century: excising the tumour surgically or incinerating it with radiation -- “a choice between the hot ray and the cold knife”16. With few new novel treatments in
the last decades, the approach locally and abroad to managing cancer once it was found has been parallel throughout the 20th century and into the 21st, and coloured more by the American aggression than Australia's patience.

Cancer surgeons well-understood the necessity of total extraction to minimise the possibility of cancers remission, and this became scientific basis for the intensifying aggression in treatment. Dr Haagensen (history's strongest advocate of radical mastectomies) wrote in 1956: “I have followed the fundamental principle that the disease, even in its early stage, is such a formidable enemy that it is my duty to carry out as radical an operation as the anatomy permits”. Pioneering cancer surgeons like Halsted would “rather evacuate the entire contents of the body than be faced with cancer recurrences”17. In Europe, one surgeon removed three ribs and other parts of the rib cage and amputated a shoulder and a collarbone from a woman with breast cancer18.

Chemotherapy mirrored the desperate measures acceptable in the dog days of conflict. “The allure of deploying a full armamentarium of cytotoxic drugs - of driving the body to the edge of death to rid it of its malignant innards” was the expected attitude in response to the merciless scourge of cancer19. Be it MOMP, VAMP, or any of the following, escalating iterations, each permutation became more cytotoxic and garnered its own suite of side effects. The key minds in chemotherapy, oncologists Zubrod, Frei and Freireich were described as “the daredevils of medical research... devising new drugs that nearly killed patients; these men played chicken with death”20. Side effects were rechristened collateral damage, and the patient themselves a geographical entity to be either won or lost.

The eight-in-one study of 1988, detailed occasions where children were given eight drugs in a single day, resulting in 15% needing blood transfusions, 14% suffering kidney damage, and others losing their hearing and suffering septic shock21.

Yet, the decades of antipathetic treatments did not produce the results it vowed to achieve. In their
analysis of USA cancer mortality rates in 1986, Bailar and Smith found that between 1962 and 1985, cancer-related death had increased by 8.7 percent.22

We are losing the war against cancer notwithstanding progress against several uncommon forms of the disease [such as childhood leukemia and Hodgkin’s disease], improvements in palliation and extension of productive years of life. . . Some thirty-five years of intense effort focused largely on improving treatment must be judged a qualified failure.23

This was one of the first major reviews of the War on Cancer's outcomes, and it served only to prove progress backwards despite the funding and mobilisation of the American population. Despite the “hit hard and hit early” approach that produced the early success in childhood leukemia and breast cancer, it was clearly not the one-size-fits-all solution for cancer as a whole. No significant disease had ever been eradicated by a treatment-related program alone, and yet that was exactly the mentality the American War on Cancer demanded.

In contrast, while Australia mirrored the USA in treatment methods, the real point of difference has been the promotion of screening and prevention campaigns. Where the USA chased the elixir of a single cure, Australia instead implemented and advocated a range of subtle, modest and pragmatic measured that have seen the domestic cancer survival rates rise well above the global mean, much of which can be attributed to early detection. More Australians survive the big four cancers - breast, ovarian, colorectal and lung - than people in other wealthy countries including Britain and Denmark. Many cancers have now achieved rates of survival over 90%, including testicular cancer (94 per cent), skin cancer (91 per cent), thyroid cancer (91 per cent) and Hodgkin's disease (84 per cent).

One of the most impressive examples being the national breast screening program which has been attributed to an increase in five-year survival of breast cancer from 73 percent in 1980s to 88
percent now\textsuperscript{28}, further bolstered by the addition of herceptin to the PBS in 2006. The first national report linking breast cancer survival to tumour size, based on results from more than 10,000 Australian women, found a woman's chance of being alive five years after a breast cancer diagnosis is high if the tumour is less than 10 millimetres in diameter when it is detected\textsuperscript{29}. It is abundantly clear now that early detection is crucial to cancer survival, and reactionary measures are only partial solutions. The promotion of PSA screening for prostrate cancer has achieved similar results in the male population. Also, while it is too early to collect definitive data, we can expect similar results from the national HPV vaccine campaign.

Other promising advances include potential screening methods for key cancers through genetic studies. For example, using whole genome DNA profiling methods, Brian Gloss, Dr Philippa O’Brien and Professor Susan Clark from Sydney’s Garvan Institute of Medical Research have identified a panel of 6 genes that are affected by an epigenetic process known as ‘DNA methylation’ in ovarian cancer\textsuperscript{30}, which could lead to methods of early detection and treatment.

But even so, Australia's War on Cancer has had its own unique challenges. The launch of the 'Slip, Slop, Slap' campaign in the 1980s initiated an eminently Australian struggle against skin cancer\textsuperscript{31}. Despite the majority of Australians being able to recite the key message, rates of melanoma continue to rise, highlighting the biggest obstacle for the Australian medical community to overcome. Melanoma cases have almost tripled in the past two decades, making the potentially fatal skin tumour more common than lung cancer, according to a government report\textsuperscript{32}. The incidence rate was 47 new cases per 100,000 people in 2003, 67 percent more than two decades earlier\textsuperscript{33}. With no sign of the rate slowing, and the traditional approach failing, this battle in the War on Cancer requires renewed attention and population mobilisation.

Worse still, recent discussion of a link between sunscreen use and vitamin D deficiency has undermined the decades-long campaign against skin cancer, provoking unwarranted confusion in
the minds of the public. For example, several prominent endocrinologists, orthopedic specialists and other experts have said that the message to cover up has led to vitamin D deficiencies in between 30% and 70% of the population\textsuperscript{a}. This increased publicity about the link between vitamin D deficiency and a range of health problems has caused some Australians to scale back their sun protection. A survey of 2100 people by the Queensland Cancer Council finding about one-third of people aged 20 to 75 years believed fair-skinned adults and children needed at least 30 minutes a day in the summer sun to maintain adequate vitamin D levels\textsuperscript{b}, which in most parts of Australia are considered hazardous levels. A further challenge to overcoming skin cancer is the disparity in incidence between metropolitan and rural populations. Rural men are up to a third more likely than city people to contract deadly skin cancer\textsuperscript{d}. Without a single, unified message for skin cancer (such as those espoused by Lasker and Farber), we cannot hope to make the necessary progress in decreasing preventable skin cancers, the only type that is continuing to increase year on year.

Another uniquely Australian challenge is the risk of over-screening and over-diagnosis of cancer. The admirable vigilance and prevention that has fueled Australia's success against the disease, has become too successful. A study into prostate screening found that screened men are two to four times more likely to be diagnosed with prostate cancer than unscreened men, but death rates from prostate cancer and from all causes are not significantly different. This implies that many men whose cancer is detected by PSA screening may be undergoing treatment for clinically insignificant cancers. Similarly, one in three breast cancers detected in a population offered organized screening is overdiagnosed, causing “significant harm” by making women cancer patients without good reason\textsuperscript{c}. This issue is a luxury of the success of Australia's screening program, and will require equal research into specificity as there has been in selectivity.

These are the dilemmas and challenges of the War on Cancer that current medical students will soon inherit. Australian students are fortunate to have programs in place that strive to find cancer at its
earliest stages, giving the best possible chance of treatment. However, advances in treatment need to catch-up, which is contingent on the promise of the changing mindset of those involved in the global War on Cancer.

For too long, the desperation to eradicate cancer at all costs has justified intensification of a narrow range of scatter-gun treatments, neglecting research into targeted therapies through an understanding of the pathology of the disease. Although overdue, the current efforts to define the genetics of cancer are already delivering new treatments that forego much of the collateral damage patients suffer during surgery and chemotherapy, such as Imantinib for CML.

The key genetic changes leading to cancers were collected in Weinberg and Hanahan's article “The Hallmarks of Cancer” in 2000. For the first time, a unified identification of the enemy was available, more than 40 years after the War began. In response, an effort to sequence the genomes of several human cancer cells is currently being undertaken. The Cancer Genome Atlas will outstrip the Human Genome Project, with the initial list of cancers including brain, lung, pancreatic, and ovarian cancer.

The result: hopefully a map to the geography of cancer, and with it a selective approach, rather than the previous taste for carpet bombing and napalm. 430 genes have been discovered over the last few years, which can lead to molecular mess-ups, including DNA shredding, re-arrangements, deletions, additions and breaks, all of which can lead to cancer.

In reality, the War on Cancer is only now beginning. In the last 40 years (and even earlier), cancer was a random, chaotic event without motive or mission. The War on Cancer was driven by blind retaliation, and the real progress of the campaign has only come with efforts to understand and characterise the nature of cancer. Whether it be a screening program to chart the progression of neoplastic changes or a genetic portrait of each cancer type, when the current cohort of students graduate, they will be empowered with an unprecedented understanding of the disease.

In the future, we may not be able to destroy cancer (as the forebears promised) but we will
be able to control cancer through a informed approach of prevention and tailored treatment, of which Australia has been a pioneer.
1 ENDNOTES


7 Siddhartha Mukherjee, 2010. The Emperor of All Maladies: A Biography of Cancer.

8 Siddhartha Mukherjee, 2010. The Emperor of All Maladies: A Biography of Cancer.


11 Foley, Children’s Cancer Research Foundation.


14 A.G.P., 1904. CANCER IN AUSTRALIA. The Age, 20 August.


20 Ronald Piana, “ONI Sits Down with Dr. Vincent DeVita,” Oncology News International 17, no. 2


23 Bailar and Smith, “Progress against Cancer?”


40 “Mapping the Cancer Genome,” Scientific American, March 2007