

CANCER: PREVENTION IS BETTER THAN CURE

“When meditating over a disease, I never think of finding a remedy for it, but, instead, a means of preventing it.”

Louis Pasteur (1822–1895)

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CANCER treatment “breakthroughs” have generated significant media coverage for several decades. Fuelling the fervent community desire for a “magical” cure for cancer, media articles have incessantly spoken of numerous impending discoveries in cancer treatment. Yet, sadly, no significant cure has materialized. Meanwhile, the incidence of cancer in Australia has steadily increased by 36% between 1990 and 2000 (1). Considering the aging population, the total number of new cases of cancer is projected to rise by yet another staggering 31% between 2001 and 2011 (2). This daunting picture is further complicated by the fact that Australia has a relatively small workforce to support this rising patient population (3). Dealing with this unprecedented challenge in cancer control therefore requires a new approach. Owing to the tremendous impact of modifiable factors on cancer risk, it has been estimated that at least one-third of all cancers are preventable (4). Cancer prevention is defined as the reduction of cancer mortality through a reduction in the incidence of cancer (5). This involves reducing exposure to modifiable risk factors along with population-based screening to allow early detection of precancerous lesions. The success of prevention campaigns is evident from the prevention of more than 17,000 premature deaths in 1998 due to a range of successful tobacco control measures initiated in the 1970s (6). The decline in the incidence and mortality of cervical cancer due to early detection of precancerous abnormalities by Pap smears is an additional example of an effective intervention at the population level (1). Furthermore, according to the World Health Organization, prevention offers the most cost-effective long-term strategy for the control of cancer (4). Therefore, the future of cancer control in Australia lies not in the discovery of an elusive cure but in a national commitment to prevention, with a rebalancing of the focus as well as the funding of research.

“The broad goal, of course, is to end the disease. The highest-leverage approach is prevention...and the best prevention approach we have now is getting people to avoid risky behaviour.”

- Bill Gates 2007 (7)

This essay will analyze the common modifiable risk factors for cancer and the existing as well as emerging preventative strategies in Australia and the associated population-based screening programs.

MODIFIABLE RISK FACTORS AND CANCER SCREENING

Tobacco

With regards to modifiable risk factors, the most consistent finding over decades of research is the strong association between tobacco use and cancer (5). Smoking contributes to 12% of all cancers in Australia, causing over 90% of lung cancers in addition to a large range of other malignancies (3). The cancer risk is dose-related: longer duration and heavier consumption patterns increase the likelihood of developing cancer. This has specific implications for the

Australian youth. A child who starts smoking at 14 years or less is 15 times more likely to die of lung cancer than a person who has never smoked (8). Given that 8 out of 10 people take up smoking before the age of 18 and may remain addicted for life (3, 9), reducing the prevalence of tobacco use in the young population has been one of the major targets of cancer prevention policies in Australia. The first step occurred in 1972 with a mandatory health warning on cigarette packages (3,10). More radical approaches were developed after the emergence of the passive smoking issue. Non-smokers with long term exposure to environmental tobacco smoke have a 25% higher risk of developing lung cancer than non-exposed non-smokers (11). This resulted in the announcements of *Smokefree* policies in all enclosed licensed premises including pubs and clubs (12).

In addition, there have been graphic public education campaigns such as The National Tobacco Campaign, and support services and Quit lines have been made available to assist after the decision to quit has been made (3). Other major developments have included bans on most forms of tobacco advertising (under the Tobacco Act 1987) with a rise in the price of cigarettes, restrictions on sales to minors and the use of graphic health warnings on all tobacco products (3,9,10). As a result, the smoking prevalence of adult Australians has consistently declined to a daily smoking rate of 17.4% in 2004 for smokers aged over 14 years of age (13). The incidence rate for men of cancers attributable to smoking fell by an average of 1.4% per year, while the rate for women rose by 0.7% per year between 1991 and 2001. The increase is predominantly in females aged 65 years and over, while rates in younger women have generally remained stable or fallen (4). Furthermore, in terms of cost-effectiveness, the returns have been enormous, with the \$176 million spent on antismoking campaigns over 30 years delivering \$8.6 billion in benefits (13).

Although there has been an incremental reduction in smoking prevalence in Australia, 17.4% of Australians still continue to smoke and hence face a significant yet avoidable cancer risk (14). Furthermore, the prevalence of smoking in Indigenous Australians is overwhelmingly high at 54%. As a result, they are more than twice as likely to die within five years of a cancer diagnosis as non-Indigenous cancer patients, in large part because of the poor prognosis of cancers caused by smoking (3). Thus, there is still room for improvement. In fact, estimates based on recent trends indicate that if adequate resources are committed to tobacco control in Australia, the smoking prevalence can be lowered by a further 1% per annum (6). Steps are already being taken in this direction. The Victorian Government has announced an additional \$5.6 million of funding for anti-smoking marketing campaigns to further reduce adult smoking rates in Victoria to 14 per cent by 2013 (15). The Rudd Government has introduced a \$14.5 million plan to cut smoking rates in Indigenous communities (16). Some other strategies that can be implemented include a national production of health warning labels on cigarette packs in the Aboriginal language, as was done in Nhulunbuy Miwatj Health service in 1998 (17). Thus there are clearly new opportunities being developed to target smoking and

reducing smoking prevalence now would lead to significantly fewer overall cancer diagnoses in the longer-term future.

Human Papillomavirus (HPV) and cervical cancer

Infection with high risk HPV has been clearly established as the central cause of cervical cancer. Currently, early identification and treatment of precancerous abnormalities associated with persistent HPV infection is the best protection against the disease (3,4,5). Thus routine screening with Papanicolaou smears (Pap smears) has been the main focus of the National Cervical Cancer Screening Program in Australia. As a result of this screening, between 1991 and 2001, the incidence rates of cervical cancer have almost halved among women aged 20 to 69 and the mortality rates are among the lowest in the world, demoting cervical cancer to the 13th most common cancer in women in Australia (3,18,19).

Nevertheless there is tremendous potential for improvement given that the aged standardized participation rate in 2003-04 for women aged 20 to 69 years was only 60.7%. Thus recruiting unscreened women to the programme still remains a priority (20). This is especially true for the Indigenous populations with numbers never screened ranging from 20–64%. Indigenous women are more than four times more likely to die of cervical cancer than other Australian women (20). Participation may be enhanced by using strategies such as Aboriginal community involvement in planning and delivery of screening programs and gender sensitive provision of culturally appropriate services by GPs. Given that approximately 80% of Pap tests are taken by GPs, the Australian Government has introduced a cervical screening Practice Incentive Payment in 2001 to support general practices to enhance cervical cancer screening, with 91.7% of practices in Australia signed on to participate by 2006 (3). Other initiatives should address issues such as reduced access to services. For example in Queensland, a network of thirteen specially trained Mobile Women's Health Nurses has been established to provide preventive health services such as cervical cancer screening to women in rural/remote areas (21).

A major development in the prevention of cervical cancer has been the introduction of a vaccine designed to prevent two of the most common types of high-risk HPV (HPV 16 and 18), which are responsible for 70% of cervical cancers. This vaccine has been shown to be 100% effective against these HPV strains. However, as the vaccine does not protect against all types that cause cervical cancer, vaccinated women should still have regular Pap tests. Furthermore, vaccinating Aboriginal women will help lower the incidence and mortality from cervical cancer in these populations. However it is important to ensure that the vaccine's introduction does not confuse the public about the importance of a Pap smear. Successful implementation of the vaccination program therefore requires education of the general public about HPV and the need for pap smears, de-stigmatising HPV infection, and gaining acceptance for vaccinating adolescents for a sexually transmitted infection before their sexual

début (3,22,23,24). Thus, while the National Cervical Screening Program has been effective at reducing cervical cancer incidence and mortality, the vaccine offers the potential to further decrease the incidence of and mortality from this disease in a cost-effective manner.

Diet, physical activity and obesity

In Australia, more than 6,000 deaths from cancer each year are attributable to three major risk factors including inadequate intake of fruit and vegetables, inadequate physical activity and overweight or obesity. In fact, it is estimated that 11% of colon cancer and 9-11% of postmenopausal breast cancer can be attributed to overweight and obesity (3, 9). Between 1985 and 1995, the level of combined overweight/obesity in the Australian people has more than doubled (25). This rate is even higher in the Indigenous population (3). To achieve and maintain a healthy weight, the Cancer Council recommends adults to have 30 minutes of physical activity on most days of the week. Individuals who are physically active can reduce their risk of developing breast cancer by 20 to 30% and of colorectal cancer by 30 to 40%. Thus increasing physical activity levels has been a consistent approach in prevention policy in Australia. *Be active Australia: a framework for health sector action for physical activity* is the current strategic framework for population-based physical activity promotion in Australia (3).

In addition to obesity, diet also influences the cancer risk (26). Inadequate vegetable and fruit intake has been estimated to cause 11% of the total cancer burden, including colorectal and breast cancer (3). It has been estimated that combined changes in diet and physical activity could reduce the incidence of colorectal cancer by 66% to 75% (27) and randomised trials have shown that breast cancer rates are lower in women who are on low fat diets (28). In Australia, there have been several state-wide campaigns aimed at promoting increased consumption of vegetables and fruit (3). These campaigns have been successful in improving public attitudes towards fruits and vegetables and some programs, such as the 'Go for 2&5' campaign in Western Australia, have also increased consumption (3). Furthermore, the Cancer Council of Australia has recently developed a public health campaign called "*Avoid the Cure*" which links these three elements with colorectal cancer prevention (29).

Despite these changes in diet and physical activity, colorectal cancer incidence rates for both males and females have increased since 1990 (30). Because of its high prevalence, its long asymptomatic phase, and the presence of a treatable precancerous lesion, colorectal cancer ideally meets the criteria for screening (31). Faecal occult-blood testing (FOBT) has been assessed for population screening in the Bowel Cancer Screening Pilot Program. Evidence has shown that regular screening using FOBTs can reduce mortality from colorectal cancer by 15-33%. FOBTs are also cheap, safe, and acceptable to the population (32). The Australian Government has allocated \$13.4 million over three years from 2006-08 to phase in a nationally coordinated, population based, bowel cancer screening program using FOBTs

(33). Combination of prevention measures, such as diet and physical activity with the National Bowel Cancer Screening Program may help reduce the impact of bowel cancer in Australia.

Ultraviolet radiation

Skin cancer (non-melanoma and melanoma) is the most common and the most expensive cancer in Australia. Unprotected exposure to ultraviolet radiation is the single most important modifiable risk factor for skin cancer. Australia is recognised as having the most extensive, comprehensive and longest-lasting skin cancer prevention programs in the world including the Slip! Slop! Slap! Program in the early eighties and the SunSmart program since 1988 (3,34,35). These programs have resulted in changes in the attitudes, knowledge as well as behavior of the Australian people. Over 90% of Australian people recognize that skin cancer is dangerous and that they themselves are at risk of skin cancer (34, 35). Since SunSmart was launched, the proportion of Victorians who like to get a sun tan has decreased from 61% in 1988 to 35% in 1998. There has been a 50% reduction in people getting sunburnt in the decade from 1988. Finally, clear evidence is now emerging that skin cancer incidence rates are beginning to plateau after decades of increase (3, 35). The average thickness of all melanomas being diagnosed has reduced substantially so that the case fatality rate for melanoma is now less than 20%. Since 1990 the rate of death from melanoma in Australia has been relatively stable but remains twice as high for men compared to women (generally older men). Similar trends have been observed for NMSC mortality, primarily involving older Australians (34,35). This indicates that it is the younger population who were influenced by the primary prevention programmes in Australia. To improve these rates to include the entire population, continuing public and professional education is required with specific focus on the elderly. Also, Australia has no formal screening programme for skin cancer on a population basis. Pilot programs for regular screening and research are needed to determine the cost-effectiveness of such a screening program.

STRATEGIES TO OPTIMISE CANCER PREVENTION IN AUSTRALIA

Evaluation of the literature above indicates that Australia has pioneered in the development of effective cancer prevention programs. In addition to the emerging strategies mentioned above, some strategies that I recommend are:

1. Preventing the uptake of smoking in teenage years by introducing a compulsory long term educational unit on smoking and its effects in primary school, and continuing this unit until the end of high school. This may help induce an anti-smoking behaviour in children from a young age
2. Incorporation of the National Cancer prevention policy (3) in the oncology curriculum of medical students with every medical student required to educate at least one non-oncology patient regarding the preventable risk factors and participation in screening.

3. Medical curriculum change whereby medical students who complete the 5th year in the rural clinical school should communicate with a certain number of Indigenous women and other rural women regarding cancer prevention participation in screening.

FUTURE OF CANCER PREVENTION IN AUSTRALIA

The greatest potential gains for reducing cancer incidence and mortality are in primary prevention and early detection. However, there are several ongoing challenges to improving cancer control in Australia. These include the rising incidence of smoking-related cancers in older women and skin cancers in older men, along with poor cancer control in the Indigenous population. Despite these challenges Australia has been very successful so far in reducing the incidence and mortality rates for several preventable cancers such as cervical cancer. With the introduction of population-based screening for bowel cancer as well as the new HPV vaccine, Australia has the potential to further optimize the cancer prevention potential and hopefully lead to a future free of preventable cancers.

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