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Cancer Prevention

Overview of cancer prevention

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The lessons learnt from now over 50 years' experience in cancer prevention, particularly with tobacco and skin cancer, and more recently in cancer screening, have laid the foundation for guiding many public health interventions outside of cancer control. For this reason, this edition of *Cancer Forum* will be of interest to anyone working in public health.

The tobacco experience shows that to change people's behaviour, you need a lot more than social marketing, we need a sound policy framework to shape government thinking and action and good instruments to measure effectiveness. Unless we pull on all these levers with vigour at the same time, we are not going to get the very significant benefits that come with cancer prevention in terms of lives saved and cancer reduced.

In a period where there has been considerable public debate about the benefits and costs of mammographic screening, Roder presents convincing evidence that current efforts in mammographic and cervical screening, are indeed delivering a good return in terms of reduced cancer mortality.[1] In terms of breast cancer mortality, the benefit to screening participants could be as much as 35%. There is no doubt also that there are limitations to screening which women have a right to know. And, as with any cancer control strategy, the ongoing effectiveness of cancer screening modalities needs to be kept under review.

Miller's paper highlights the benefits of refreshing and updating health warnings to the general public, as well as the importance of using mass media on an ongoing basis to reinforce and motivate behaviour change.[2] However importantly, some health warnings on cigarette packets are better than others in terms of their ability to provide information to smokers, engage smokers and influence smokers' cognitions, feelings and behavioural intentions.

Tobacco has also lead the way in utilising the skills of public health lawyers to influence policy change. As Daveron and Antonopoulos point out, law reform has been a very significant lever in motivating sustainable positive behaviour change to reduce cancer incidence over the long term.[3] Whether that is through taxation, penalties or restricting supply and marketing. Law reform also can have very clear negative consequences in influencing cancer outcomes, as we have seen more recently with the proliferation of liquor sales outlets coinciding with the freeing up of liquor licensing laws. Given the potential impact, utilising the skills of lawyers in public health advocacy can play a very useful role in influencing regulatory reform.

No matter what the intervention in place, whether it is to promote physical activity or encourage bowel cancer screening, without appropriate surveillance, pre-testing of messages and measurement of impact, you will never know whether you are making a difference. This is why the measurement of overweight and obesity and physical activity among secondary school students, as described by Scully et al, is such an important piece of work.[4] Not only has this study, the first of its kind conducted in Australia, shown the work we have to do to improve current physical activity and diets of Australian secondary school students, but the study also paves the way for measuring future impacts of interventions relating to physical activity and nutrition into the future. This will be necessary to curb the escalating rates of obesity we are seeing in our community.

An issue that has gone largely unnoticed in public health policy and mainstream media is Hepatitis B (HBV) infection. Carville and Cowie present a very convincing case that more public health effort is required to stem the significant rise in HBV infection in Australia.[5] About 170,000 Australians live with chronic HBV infection and of those 25% will develop cirrhosis and/or liver cancer. HBV infection has the fastest growing incidence of any cancer reported. There are good treatments available, but there are many who should be treated who are not, with only 3% of the 170,000 Australians living with chronic HBV infection being adequately treated.

Another area where there is significant opportunity to improve survival is with the National Bowel Cancer Screening Program. In the paper by Courtney et al paper, it is clear that Australia is falling behind, not just because the current program is restricted to specific age groups (50, 55, 65), but also because of low population participation rates compared to other countries that have adopted similar programs.[6] Australian studies

show that a comprehensive bowel screening program would significantly improve detection and downstage the disease among participants detected with bowel cancer. The greatest opportunity for future increases in Faecal Occult Blood Test screening participation largely relies on opening the program to the entire at-risk population (all and those aged between 50-74 years) for repeated screening to enable investment in social marketing to increase awareness and participation.

Youl, Baade and Meng demonstrate that not only will the financial and human cost of cancer in our community will continue to grow at significant levels based on population growth and an ageing population,[7] but there is also a significant gain to be made if more effort is made towards primary prevention in the areas of tobacco consumption, sun protection, physical activity and screening. For example, large scale and long-term preventive strategies, if fully implemented, have the potential to prevent nearly 66,000 new cases by 2025 alone.

There is no question, despite all we know about cancer prevention and the impact that it can have on reducing cancer incidence into the future, it will take considerable time and effort on behalf of government and health agencies to reduce the preventable burden of cancer on our community. Fortunately, we do know based on experience gained thus far, that this effort will be well rewarded with significant future reductions in the human and financial costs associated with cancer in our community.

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IMPACT OF POPULATION SCREENING PROGRAMS ON CANCER OUTCOMES

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Abstract

Age-standardised breast cancer mortality fell by around 26% in Australian females in the 15 years following introduction of the BreastScreen Australia program. The relative contributions of breast screening and treatment advances to this reduction are open to debate. Three evaluations of breast screening in Australia point to reductions in breast cancer mortality in screening participants consistent with the collective trial results, estimated to be around 35% by an expert panel of the International Agency for Research on Cancer. The collective results of evaluations in other countries are similar but individual results vary widely, from little or no benefit to reductions of up to 76%. Over-diagnosis is a controversial issue, with some results indicating it to be of negligible magnitude and others indicating that it could represent 30% or more of breast cancers in populations exposed to breast screening. Meanwhile, age-standardised cervical cancer mortality reduced by over 50% in the 15 years following introduction of an organised approach to screening. This followed earlier reductions also likely to reflect cervical screening. The roll-out of bowel screening in 2006 is too recent for reporting on effects on colorectal cancer mortality, although it is expected that effects from the one-off screening offered at 50, 55 and 65 years of age would be less than in trials where annual or biennial screening was undertaken.

Twenty years after the introduction of the BreastScreen Australia program and the Organised Approach to Preventing Cancer of the Cervix in Australia, it is worthwhile to review the effects of these programs on cancer incidence and mortality trends. Bowel screening was not introduced in Australia until 2006, except for a 2002-04 pilot period, and insufficient time has elapsed to identify any effects on cancer rates, although evidence of effects on intermediary indicators such as cancer stage at diagnosis may be detectable.

BreastScreen effects

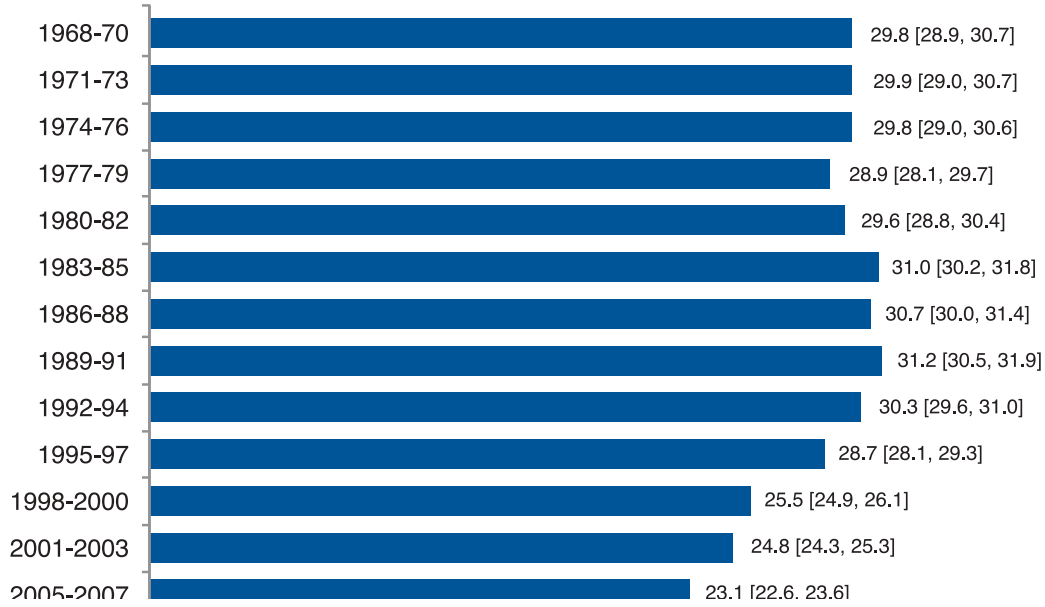
Australia has an elevated age-standardised female breast cancer mortality rate at about 18% higher than the estimated world average.[1] In the 15 years following the BreastScreen rollout in 1991, the age-standardised breast cancer mortality rate decreased by about 26% (figure 1).[2] When compared with a linear projection of mortality increases in the 1980s, the observed rate was 38% lower after 15 years.[2] The relative contribution of treatment and early detection gains to these differences and similar changes in some other countries is open to debate. Modelling funded by the National Cancer Institute produced widely different estimates of contributions to US breast cancer mortality reductions, which varied with the model design and assumptions.[3,4] Collective results pointed to about half the US mortality reduction being due to adjuvant therapies and half due to screening.[3,4]

An important screening contribution would be expected from results of 10 field trials.[5] Although trial results varied, an International Agency for Research on Cancer (IARC) expert panel indicated that the collective data were consistent with a 35% breast cancer mortality reduction in 50-69 year-old screening participants.[5] A recent meta-analysis of these trial data by Australian researchers also showed a mortality reduction in screening participants, estimating this to be 25% when including participants of all ages.[6]

An international review of evaluations of 12 screening services published in 2005 indicated a collective reduction in breast cancer mortality of 32% in screening participants, without evidence of heterogeneity of results across studies.[7] Meanwhile, eight case-control studies indicated a collective reduction of 37%,[8-15] and a review by other researchers of 13 service evaluations published in 2000-08 indicated a collective reduction of 36%.[16] Since then, service evaluations reported in 2010-11 have indicated reductions ranging from zero to 76%,[17-22] whereas a recently published follow-up of women 29 years after completion of the Swedish two county trial indicated a sustained breast cancer mortality reduction of 29% in women invited to attend breast screening whose cancers were detected during the trial period.[23]

Three service evaluations have been undertaken in Australia, which included a NSW, SA and national evaluation.[11,24,25] The reductions in breast cancer mortality found in these studies for 50-69 year-old screening participants ranged from 34% to 47%. The potential for inflation of reduction estimates from self-selection of low-risk women for screening is unclear. A number of trials and service evaluations in other countries have adjusted for self-selection.[10,16] If this adjustment for self-selection is applied to the Australian data, the reductions in breast cancer mortality in screening participants would range from about 25% to 35%. However, interview survey data in Australia have indicated an elevation in risk factors in screening participants, not a reduction as assumed in this adjustment.[11] In particular, higher proportions of women with positive histories of breast cancer among first degree relatives and higher proportions with personal histories of hormone replacement therapy have been reported among screening participants. The appropriate adjustment to make for self-selection in the Australian setting is therefore not clear.

Figure 1: *Mean annual mortality rates (95%CLs) from breast cancer per 100,000 Australian females*.[2]*



**Age-standardised to Australian population 2001.*

Whatever the reduction in breast cancer mortality from screening participation in Australia, there is considerable collective evidence from the trials, service evaluations in other countries, and the Australian evaluation studies that a reduction would be occurring. The collective estimate of the reduction observed in 50-69 year old screening participants from the Australian data was about 43%, reducing to 32% when adjusting for the scale of self-selection assumed in the trials and service evaluations in other countries.[11,24,25] This range (32% to 43%) encompasses the 35% estimated by the IARC expert panel from the trial data.[5]

The potential for mammography screening to reduce breast cancer mortality at a population level depends on screening participation levels. Present participation levels of 50-69 year-olds in Australia of around 55% would equate with an approximate 18% to 24% reduction in mortality at a population level in the screening target age range,[26] whereas the 70% national screening target would equate with a population-based reduction of about 22% to 30%, depending on assumptions made about screening selection bias.

The screening participation rate has been fairly stable in Australia since the late 1990s, despite increasing numbers of women being screened, due to offsetting population increases.[26] Re-screening participation has reduced, however, and screening promotion activity has decreased,[26] largely due to capacity constraints. Opportunities exist to increase screening throughput by digitised imaging, either by using computed radiography or digital mammography, both of which avoid the need for film processing and offer enhancements to imaging for screen reading. In addition, opportunities need to be explored to increase screening throughput through analyses of work practices. Women in special need showing lower than average screening participation rates include Aboriginal and Torres Strait Islander women, groups from non-English speaking backgrounds, women living in very remote areas and sub-groups of women from major metropolitan settings.[26]

Breast cancer incidence rates have been higher in Australia since the introduction of BreastScreen. The extent to which this reflects lead time effects of screening, over-diagnosis, changes in pathology and other diagnostic practices, and real increases in incidence due to changes in underlying risk factors (eg. body weight, reproductive behaviour, use of hormone replacement therapy and alcohol consumption) is not clear. It is evident though that increases in incidence were already underway in the 1980s prior to BreastScreen introduction,[2] but the relative contributions of increased use of private mammography and changes in risk factors during that period are not clear. The increase in breast cancer mortality rates in the 1980s suggests that real increases in underlying incidence would have contributed.[2]

There is concern that screening mammography may cause unacceptable levels of over-diagnosis, defined as detection of cancers that would not have otherwise been diagnosed in a woman's lifetime. In such instances, diagnoses would have been unnecessary and associated treatment an event with adverse effects without benefit.[27-29] There is not a consensus however on levels of over-diagnosis, with estimates from studies around the world varying from levels close to zero to 30% or more of diagnosed cancers, irrespective of whether in situ lesions were counted.[26] These estimates vary so widely that interpretation is difficult.

At a population level, approximately 3% of breast lesions prior to the advent of mammography screening were in situ lesions.[30] Since then, the proportion has increased to about 10%.30 If the difference was due entirely to mammography screening, as opposed to increased diagnostic sensitivity not associated with screening, then an approximate 7% increase would be attributable to screening. If half of these lesions were destined not to progress clinically to invasive cancers, then about 3-4% would constitute over-diagnosis.[27] Using this same line of reasoning for screening participants where about 14% of screen-detected and interval cancers are in situ lesions,[26,31] then 11% would be attributed to screening and 5-6% would constitute over-diagnosis. For screen-detected lesions, where about 20% are in situ lesions,[26,31] then about 17% would be attributed to screening and 8-9% would constitute over-diagnosis.

In conclusion, it is evident that mammography screening reduces breast cancer mortality in screening participants. While the extent of reduction is difficult to determine accurately, the collective evidence points to a reduction of similar scale to the 35% reduction estimated from the trial data. It is also likely that mammography screening is leading to some degree of over-diagnosis, but the scale is difficult to determine, given the wide variation in study results. Research is needed to better define levels of over-diagnosis and ideally to develop better means of determining at diagnosis the potential for screen-detected and other breast cancers to progress.

Cervical screening effects

Australia has a low age-standardised cervical cancer mortality rate, approximately 80% lower than the estimated world average, with this difference largely attributed to the protective effects of screening.[1]

In 1991 the Organised Approach to Preventing Cancer of the Cervix was established in Australia to: promote routine screening with Pap smears every two years of women from age 18 years (or from two years after first sexual intercourse, whichever is later) to 69 years; establish more reliable and accessible services for taking, interpreting and reporting Pap tests; improve management of screen-detected abnormalities; and monitor and evaluate these initiatives.[32] Cervical cytology registers were established in each state and territory to support these processes.

Since introducing the organised approach, the cervical cancer mortality rate has decreased by over 50% (figure 2), with corresponding incidence decreases of a slightly smaller magnitude.[1] Decreases already were occurring prior to introducing the organised approach (eg. a decrease in mortality of about 25% between the early 1980s and early 1990s was evident), which are most likely attributable to earlier screening activity.[1]

The reduction in cervical cancer rates occurred for most histological types. Between 1991-93 and 2006, the reduction in age-standardised incidence was about 55% for squamous cell cancers, 37% for glandular lesions and 67% for micro-invasive disease.[33]

International research has indicated the effectiveness of cervical screening in reducing incidence rates for invasive cervical cancers, with protective effects reported of at least 80%, and larger effects evident in women over 40 years of age than in younger women.[32-35] Australian data indicate a similar effect. A NSW study indicated, for example, that a single screen in a four-year period was associated with a reduction in cervical cancer incidence of around 81%, whereas two or more screens in a four-year period were associated with a higher reduction.[36] On this basis, it is estimated that the approximate 60% participation of 20-69 year-old Australian women in screening during a two year period (excluding women who have had a hysterectomy) would reduce the risk of invasive cervical cancer at a population level by about 50% or more.[33,36]

The Australian Government is planning a renewal of cervical screening policy, based on a review of evidence of age and screening interval on effectiveness, and determination of the role of screening alongside vaccination against Human Papilloma Virus (HPV).[37] Policies for management of screen-detected low-grade and high-grade abnormalities have already been reviewed, with changes to management that include for example triaging women for screening based on a HPV DNA test for cure after treatment of high-grade abnormalities.[38] A Safety Monitoring Committee is monitoring cervical cancer incidence in relation to these policy changes.

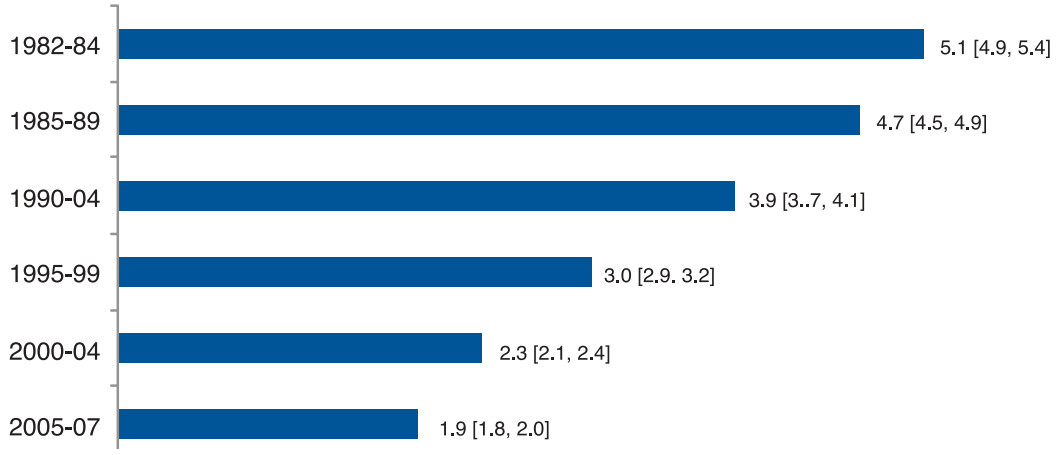
Bowel screening effects

Bowel cancer is second to lung cancer as the leading cause of cancer death in Australia.[2] The age-standardised mortality rate for this cancer is 54% higher than the estimated world average.[1] Four randomised field trials indicate that participation in biennial screening can lower the mortality rates from this cancer by around 25%, although larger reductions would have been expected in the approximate two thirds of participants who completed all screening rounds.[39-44] Larger reductions would be expected from annual as opposed to biennial screening.[39]

A pilot screening program employing faecal occult blood testing (FOBT) with follow-up endoscopy (colonoscopy and/or flexible sigmoidoscopy) was implemented in three Australian states from 2002 to 2004.[45] This was followed by the introduction of national screening from 2006. People were mailed FOBT screening kits when turning 55 and 65 years of age. In 2008, the program was extended by providing kits to people turning 50 years of age.[45] In 2008, 40% of people mailed FOBT kits participated in the screening, with this figure varying from 34% for 50 year-olds to 40% for 55 year-olds and 49% for 65 year-olds.[46] It is anticipated that the staggered introduction of bowel screening would provide time for colonoscopy and other health services to adjust to increases in demand.

Since field trials have tested annual or biennial screening, the likely effectiveness of the existing national screening program is difficult to estimate, although a benefit would be expected. Of a small number of 60 cancers detected through the national program for which degree of spread at diagnosis was known, 58% were found to be at the earliest localised stage.[46] This compares with about 32%

Figure 2: *Mean annual mortality rates (95% CLs) from cervix cancer per 100,000 Australian females*.[2]*



**Age-standardised to Australian population 2001.*

of staged cancers found to be localised in NSW in 2004-08 (note: only NSW collects population-based degree of spread data for bowel cancer in Australia).[47]

Although age-standardised incidence rates have been relatively stable in Australia since the early 1990s, reductions in mortality from this cancer of around 35% have been observed, with slightly larger percentage reductions apparent in females than males.[2] Meanwhile, there was little change in incidence rates since the early 1990s.[2] The reductions in mortality are thought to reflect treatment gains and potentially contributions from earlier detection.

Other screening tests

Australia's prostate cancer mortality rate is about twice the world average, after age adjustment.[1] Prostate-specific antigen (PSA) testing is widespread in Australia, but population-based screening is not advocated due to uncertainties whether benefits would outweigh adverse effects.[48] A randomised population-based trial in Europe indicated that inviting men to four-yearly PSA testing was associated with a 20% reduction in prostate cancer mortality,[49] although the data also pointed to high levels of over-diagnosis, indicating that 49 additional prostate cancers would need to be treated to prevent one death from this cancer. Further research using a comparison group chosen for infrequent exposure to PSA testing pointed to a larger reduction of 37%.[50] Meanwhile, a North American study found no reduction in prostate mortality from PSA testing, although it was evident that informal testing was commonplace among controls, reducing opportunities to find an effect.[51] Prostate screening has been linked to high levels of over-diagnosis and consequently of treatment side-effects, including incontinence and impotence, which need to be weighed against the benefits.[49] Men are being advised to discuss the merits of prostate cancer testing with their doctors, in order to make an informed choice, and protocols for testing have been suggested.[52]

Skin checks for cancer are also commonplace in Australia, but not advocated for population-based screening.[53] Australia has a very high skin cancer rate, with melanoma incidence about 13 times the world average and the mortality rate more than five times the world average.[1] The more common non-melanoma forms of skin cancer are rarely life-threatening and there is insufficient evidence that screening would reduce morbidity or mortality. Instead, medical surveillance is recommended for patients at high risk of skin cancer and familiarity with one's own skin and early reporting of unusual changes is recommended.

Conclusion

There is clear evidence from research studies around the world and service evaluations in Australia that mammography and cervical screening would be contributing to observed decreases in cancer mortality. Further research is needed into means of optimising cost-effectiveness in service delivery, as relating to target age ranges, screening technology, screening frequency and potential for over-diagnosis. Research studies indicate that bowel screening would be reducing mortality from colorectal cancer, but it is too early for confirmatory data of mortality effects to be available from local service evaluation in Australia. Meanwhile, more research is needed to determine the role of prostate screening in population health practice and how to limit negative effects. Education about screening benefits and adverse effects is important, irrespective of screening type, such that decisions about screening participation can be well informed.

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MARKET IMPACT OF TOBACCO PACK WARNINGS – CURRENT WARNING LABELS AND BEYOND

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Abstract

Tobacco is a unique consumer product, warranting unique regulation and controls, including clear consumer advice and restrictions on marketing. In 2006, the Australian Government followed the lead of Canada and a handful of other nations and introduced new warnings on to cigarette packets. The warnings consisted of graphic or pictorial warnings, demonstrating tobacco related pathology and promoting quitting. These warnings covered 30% of the front of the pack and 90% of the back of the pack, and featured the Quitline number prominently. This is consistent with Australian obligations under the World Health Organisation's Framework Convention on Tobacco Control, and also consistent with its more detailed recommendations for implementation. The impact on smokers of graphic health warnings on cigarette packers have been well evaluated over the past decade, both within and between selected countries. It is well established that graphic health warnings are more effective than plain text-based warnings. Furthermore, there is no doubt that health warnings on cigarette packets provide information to smokers, engage smokers, and influence smokers' cognitions, feelings and behavioural intentions. Research and evaluation has also demonstrated that some pack warnings have greater impact than others. It has demonstrated that pack warnings lose impact and need to be refreshed. This evidence has been applied and a new set of warnings is now under development by the Australian Government for release in 2012, in line with plain cigarette packaging.

Background

Tobacco is unique as a consumer product, not because it is hazardous, nor because it can be lethal. Tobacco is unique in that when used as intended by the manufacturer, it kills its long-term users – probably half of them.[1] The scale of harm tobacco causes to the people who buy and consume it, makes it unlike any other product on the market. It also justifies intervention and regulation of the product, to warn consumers of the risks associated with consumption.

Government health warnings on cigarette packets are one form of tobacco regulation. Unlike food, there is no mandatory disclosure of ingredients in tobacco products (although voluntary disclosure occurs and constituents are posted to an Australian Government website).[2] Like other consumer warning labels, warnings on tobacco packets are designed to inform consumers of its toxic constituents. Mandating health warnings on tobacco packaging is a cost-effective way to help draw consumers' attention to the harms associated with the product. Smokers can see the warnings when they handle the packet. It has been estimated that a 20-a-day smoker would be exposed to cigarette packet warnings 7000 times a year.[3]

In stark contrast to its deadly nature, tobacco is a consumer product that has been marketed heavily and with sophistication, thereby glamorising and normalising tobacco use. The tobacco industry has had a long history of failing to warn consumers and has actively denied the harmful effects of its products. Internal tobacco industry documents reveal public relations and marketing strategies to deny scientific findings about the health consequences of tobacco use, and tobacco smoke exposure, to resist regulation of tobacco and to promote and sell tobacco.[4,5] Health warnings on cigarette packets have faced a long history of opposition from the tobacco industry.[6,7]

The first warning appeared on Australian tobacco products in 1973, consisting of the benign *"Warning. Smoking is a health hazard"*, in small font at the bottom of the packet. Warnings were broadened and strengthened in 1987 but remained in small text, integrated into the colour scheme on the bottom of the packet. The next generation of cigarette packet warnings introduced in 1995 (black-text on white box) were more prominent, easier to read and communicated the harms of smoking more powerfully than the generation of warnings that had preceded them. The placement of the new warnings – in large font, high contrast, black text on a white box, taking up 25% of the top of the packet – was superior to the warnings that preceded them in their contrast to the design elements of the packets. However, research at the time found that while the warnings were prominent, they were still not as salient as the producers' trademarks and other commercially designed components of the pack. There was more work to be done in Australia to counter the glamorising brand imagery on packs.

During this time, the tobacco packet itself became of increasing significance, as opportunities for conventional paid tobacco advertising and sponsorship were eliminated in Australia and elsewhere, starting with bans on television advertising in 1976. In the context of bans on advertising in mass media, internal tobacco industry

documents have shown that tobacco companies viewed cigarette packet itself as an increasingly important component of marketing strategy, as a vehicle for communicating brand image and for creating significant in-store presence at the point of sale. Industry documents also revealed the careful balancing act that companies have employed in using pack design and colour to communicate impressions about different products and to ensure that cigarette packaging appeals to selected target groups, including young adults and women.

The cigarette pack as a communication medium changed markedly when in March 2006, Australian legislation came into force requiring new consumer health warnings on cigarette packets.[9] The look of tobacco packets changed dramatically, as 30% of the front of the packet and 90% of the back of the packet were taken up with prominent, full colour warnings, containing graphic imagery and a Quitline telephone number. The 2006 warnings reduced further the discretionary space for tobacco companies' design elements.

At the time, Australia was among the first handful of countries to introduce such warnings; Canada had led the world, introducing pictorial health warnings in 2000, closely followed by Brazil. Australia was ahead of what was required under the international obligations of the World Health Organisation's Framework Convention on Tobacco Control (FCTC). These warnings constituted a major step forward from the text-based warnings that preceded them (see box 1). The policy was introduced by the Australian Government despite heavy opposition from the tobacco industry, which argued the policy intervention would not work and the mooting of legal challenges. Since 2006, more and more countries have moved to pictorial warnings, with large and extremely potent images required in an increasing number of jurisdictions. It is expected that this trend will continue as parties adopt the recommended warnings.

Graphic health warnings influence smokers' beliefs and behaviour

There is no doubt that health warnings on cigarette packets influence smokers, and that graphic health warnings are more effective than plain text-based warnings.

Warnings are an important source of information about the health effects of smoking. Warnings have become second only to television as a source of information about the risks of smoking, in Australia and across many other countries.[12,13] Smokers have greater knowledge about particular health effects in countries where those health effects are the subject of warnings than in countries where they are not.[12,14] Introduction of stronger and more graphic health warnings has been shown to have increased knowledge of the specific diseases mentioned on warnings subject matter contained in the warnings in Canadian and Australian smokers.[12,15]

In Australia, some warnings have been shown to have greater influence than others. Consistent with the broader literature surrounding persuasive message framing used in other areas of tobacco control, serious, emotive, negative-framed messages had the greatest impact, while statistic-based, less tangible, or positively framed messages had less impact on smokers.[13] Warnings that conveyed new information demonstrated greater impact on recall and smokers' beliefs than more familiar information images. The policy-relevant implications are that fresh messaging and visceral images have the greatest impact.

Box 1: *Article 11 of the FCTC 'Packaging and labelling of tobacco products'.*[10,11]

Requirements include that Parties ensure that each package of tobacco products carries health warnings that:

- are in the country's principal language/s
- are rotating; large, clear, visible and legible
- cover 50 per cent or more of the principal display area but no less than 30 per cent
- may include pictures
- ensure packaging is not misleading or likely to create the impression that a particular product is less harmful than another.

Guidelines intended to assist Parties to meet their obligations under Article 11 were adopted by the FCTC Conference of the Parties in 2008. The Guidelines are based on international evidence and include a number of key recommendations regarding health warning design such that health warnings should:

- cover as much of the main display areas as possible
- be placed on the front and back of packaging recognising that the front is the most visible part of a package
- be placed at the top rather than the bottom of packaging to increase visibility
- include both pictures and text as evidence shows they are far more effective than text only warnings
- cover a range of topics as different warnings resonate with different people;
- and be rotated; rotation of messages and changes in layout and design are important to maintain saliency and increase effectiveness.

As well as being an important source of information, warnings influence smokers' thoughts and behaviours, predictive of quitting. Canadian and Brazilian research first documented smokers' engagement with the graphic warnings in those countries, with subsequent flow-on to quitting intentions and behaviour.[14,16-18]

An International Tobacco Control policy evaluation project has monitored the impact of many different policy interventions, including the impact of health warnings on tobacco. It's longitudinal and multi-country design allows ecological study of tobacco control policy interventions with real time controls in other countries, as well as trends over time within countries, publishing findings comparing UK, US, Canadian and Australian warnings across time.

The International Tobacco Control project demonstrated that large, comprehensive warnings, such as those on Canadian and Australian cigarette packs, were more likely to be noticed and rated as effective by smokers than warnings in other countries.[19] In 2009, they showed that pack warning style (ie. graphic warnings compared to text only warnings) increased salience (being read and noticed), cognitive responses (increased thoughts of harm from smoking and thoughts of quitting), and the behavioural responses of forgoing cigarettes and avoiding the warnings. All four of these important indicators of impact increased markedly among Australian smokers following the introduction of graphic warnings.[20] In addition, the same project published findings across the UK, US, Canada and Australia, showing that forgoing cigarettes as a result of noticing warnings and quit-related cognitive reactions to warnings were consistent prospective predictors of actually making quit attempts.[21] Consistent with this, the Australian Quitline recorded a doubling of calls in the year after the introduction of graphic warnings featuring Quitline numbers.[22]

Warnings lose impact and need to be refreshed

Specific warning labels lose impact over time. The peak levels of smokers' responses to warnings is in the period immediately after their introduction on to packs.[23] There is some decline in cognitive responses as consumers become used to seeing the images on the packs; warnings appear to lose some, but not all of their impact with time.

In 2008, the Australian Government commissioned a comprehensive evaluation of the effectiveness of the graphic health warnings introduced two years earlier.[24] It found that the graphic health warnings had achieved their intended purpose by increasing consumer knowledge of the health effects related to smoking, and encouraging smoking cessation. However, a number of areas were identified for improvement, including the importance of regularly updating and refreshing the health warnings to maintain effectiveness.

Another issue identified by the Australian Government with the Australian warnings, in their current form, was the size of the warning on the front of packaging (only 30% of packet area), noted as significant because the front of the pack was seen as the most important panel to display a health message as it was the most frequently seen part of a pack.[25] The Australian Government also reported the same issue identified with the 1995 text-based warnings – smokers reporting that the health warnings on the front of packs were 'too small' and 'too difficult to read'. Branding and use of colour on the packaging was still reported by smokers to overpower the warning on the front of packs, with some surprised that a greater amount of space was allotted to tobacco industry branding rather than the health warning. The Canadian Government has also published compelling qualitative research demonstrating that smokers believe that branding still dominates the packet.[26,27]

Plain packaging

Australia will be a world leader when it introduces plain cigarette packaging by 1 December 2012, replacing the current colourful branded components of tobacco packaging with standardised drab brown colouring and standard fonts. Extensive research shows that plain packaging will reduce misconceptions about relative harmfulness of various brands and reduce the overall appeal of smoking.[28-31] Furthermore, plain packaging will improve the effectiveness of health warnings, which are currently undermined by the other elements of tobacco packaging. Plain packaging is the new frontier in the packaging and labelling of cigarette products to protect consumers.

Future directions

The combined literature on graphic health warnings on cigarette packets now comes from a number of countries, and the case for their effectiveness is well made. There is very strong evidence that graphic warning labels have been successful in attracting the attention of smokers and in communicating to smokers, information that has influenced their beliefs about the consequences of smoking. There is also good evidence of translation into interest in quitting, which will reduce the toll from tobacco, the ultimate aim of tobacco control policy interventions.

In terms of their consolidation as a policy initiative outside of Australia, the FCTC has now published its guideline recommending graphic warnings, giving them greater status for signatories to the WHO global health treaty. By the end of 2011, over 40 countries had either introduced or announced their intention to introduce graphic health warnings on cigarette packets.

For countries like Australia that have had graphic health warnings for some time, a key issue is that these health warnings need to be updated and refreshed. In September 2011, in recognition of the need for refreshing of warnings, after review of the existing warnings and developmental market testing, the Australian Government released detailed consultation paper proposing a second round of new graphic cigarette warnings for introduction in 2012.[25] The introduction would coincide with and complement plain cigarette packaging. The plans include: 14 revised images and messages; warnings that cover 75% of the front of pack and 90% of the back of pack; with rotation of warnings every 12 months.

Graphic health warnings on cigarette packets are another example of an effective intervention in the tobacco control. They contribute to the steady decline in the glamourous

promotion of tobacco, including how it is packaged, and increased consumer comprehension of the true nature of tobacco and the consequences of smoking. Along with other potent interventions, they have been shown to increase motivation to quit and quitting behaviour, making graphic health warnings on cigarette packets another evidence-based strategy in the toolkit for successful tobacco control.

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Alcohol and food regulation in Australia – legal issues in cancer prevention

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Abstract

Unhealthy diet and misuse of alcohol present similar public health challenges. Legal interventions to reduce the impact of these lifestyle factors, including the burden of cancers associated with these risk factors, are also similar. Just as the law has gone some way to creating an unhealthy environment, for example, through a relaxation of the liquor licensing regulatory framework leading to a significant increase in the number of licensed premises, so too can it be used to alter the environment to make healthier choices easier, such as amending city planning laws to support walking or cycling over driving. Although interventions for alcohol and unhealthy diet are similar, the manner in which they are employed it's likely to be different, given the extent to which alcohol is already subject to significant regulation, compared with food.

One third of all cancer deaths in Australia are caused by avoidable risk factors, including consumption of alcoholic beverages and an unhealthy diet. This represents a significant impact on individuals, families, communities and health services, and makes behaviours such as alcohol misuse and unhealthy diet a social rather than merely an individual problem. Responding to alcohol and diet related cancer requires interventions that impact on society and population behaviours and so extend beyond individual choice.[1]

Intuitively, most people recognise that legislation and regulation can affect population health in general terms,[2] including, we contend, recognition of the impact of legal and policy measures on the burden of cancer. This paper discusses some of the ways that law and public policy, whether health-related or otherwise, can impact on a population's healthiness (or unhealthiness), by shaping the environment in which individuals behave in relation to harmful products such as alcohol and unhealthy foods. For present purposes, we define 'unhealthy foods' as those which are calorie-dense and nutrient poor.

Legal and policy interventions to address the different risk factors of alcohol use and eating an unhealthy diet are similar and based on measures successfully used in tobacco control (increase price, reduce availability and restrict advertising). However, the legal landscape for alcohol is quite different compared with that for food. While many laws already exist to control the sale, supply and price of alcohol, few exist in relation to unhealthy food products. This would suggest that while the required interventions are similar, the manner in which they are employed is different. For alcohol, existing laws need to be improved, while for unhealthy food, new laws will need to be introduced.

Role of law in reducing the burden of cancer

Alcohol is a known cause of cancer; the evidence is convincing that alcohol causes cancer of the mouth, pharynx, larynx, oesophagus, bowel (in men) and breast (in women), and probably increases the risk of bowel cancer (in women) and liver cancer.[3] In Australia, an estimated 5070 cases of cancer each year (or five per cent of all cancers) are attributable to chronic use of alcohol.[4]

Meanwhile, the World Cancer Research Fund has found convincing evidence that excess body fat is a risk factor for six types of cancer – colon, kidney, pancreas, oesophagus, endometrium and post-menopausal breast cancer.[3] Cancer Council estimated that in Victoria in 2004, 1100 cancer cases and 500 cancer deaths were attributable to overweight and obesity (based on data from the Melbourne Collaborative Cohort Study and National Health Survey 2004-05). Extrapolating these data to the whole of Australia, there would be approximately 4400 attributable cancer cases and 2000 deaths.

The World Cancer Research Fund report on food, nutrition, physical activity and body fatness makes recommendations to reduce cancer risk, including to maintain a healthy weight, be physically active and to limit alcoholic drinks.[3] Individuals may not make healthy choices because contextual legal, political or law enforcement factors may prevent them from doing so.[2] Although traditionally law has been seen as a tool to regulate the relationship between individuals or as a set of rules dictating minimum standards of behaviour,[5] increasingly it is recognised that law has an important role to play in altering the behaviour of populations. As Parmet notes, the health of populations can be seen as a function of individual choices;[5] and these choices are not made in a legal vacuum.

Laws can be designed to change the environment in which an individual makes health decisions.

In Victoria, changes to the liquor licensing regulatory framework in 1987 led to a significant increase in the number of licensed premises across the State.[6] This increase in licensed premises has been shown to correspond with an increase in alcohol-related harm,[6] including rates of alcohol-related disease.[7] For example, a Victorian study found a strong association between increases in packaged liquor

availability and chronic alcohol-related disease.[7] Licensing laws that restrict trading hours of licensed premises, or require the service of low alcohol products at events have the potential to reverse the increase in alcohol-related harm associated with an increase in alcohol outlet density.

Meanwhile, lack of pricing mechanisms and controls has contributed to a proliferation of cheap energy-dense, nutrient-poor processed foods, and there are many barriers to accessing affordable healthy foods such as fruit and vegetables (particularly in lower socio-economic and rural areas).[8] Conversely, laws that increase the price of unhealthy foods, or subsidise the production of healthier foods have the potential to change the food environment and improve access to healthier options.

Similarly, limited restrictions on unhealthy food advertising to children mean that children continue to be surrounded by unhealthy food advertising in all aspects of their lives – on television, films and the internet, in magazines, supermarkets and shops, on billboards, at school and when playing sport.[9] Despite evidence from a number of systematic reviews that food advertising influences children's food choices, there are very few restrictions on the advertising of unhealthy food to children in Australia.[10] Meaningful restrictions to reduce children's exposure to unhealthy food advertising, particularly on television, would have the potential to improve the environment in which children's food preferences are shaped and decisions around food purchasing are made.[9,11]

Law as a tool for change

The affordability, availability and promotion of alcohol are all controlled by laws and regulation to varying degrees. Meanwhile, interventions that have the effect of decreasing the affordability and restricting the availability and promotion of alcohol have been recognised as top interventions to reduce alcohol-related harm, including the prevention and control of non-communicable diseases.[12] As the 'alcopops' example in box 1 shows, even small amendments to current laws can have significant positive effects.

Similarly, in food policy, the World Health Organisation Global Strategy for Diet, Physical Activity and Health, together with the National Preventative Health Taskforce, have recommended governments address the problems of unhealthy food marketing to children and inadequate food labelling.[15] The National Preventative Health Taskforce also recommended regulation of the amount of fats, sugar and sugar in foods and a review of the taxation system to improve access to healthier foods.[8]

Compared with alcohol, food is subject to less regulation overall, with no food-specific taxation laws aimed at improving health and little legal control over the marketing and availability of foods. Food safety and related labelling is highly regulated and its focus is on excluding toxins and contaminants and providing warnings about allergens rather than preventive health. Thus, although changes are needed in alcohol and food policy alike, a legal response to the burden of disease associated with unhealthy diet is likely to require substantial legislative reform.

The flip side to this approach – that is, legislative reform for better laws – is using the law to encourage compliance with and enforcement of existing laws. Law and policy in relation to alcohol and food is administered by a number of agencies – some which are statutory bodies exemplified by the Australian Competition and Consumer Commission, while others are self-regulatory organisations such as the Advertising Standards Board.

The primary form of regulation of both food and alcohol marketing is industry self-regulation, which predominantly relies on complaints from members of the public to identify breaches of marketing codes. For a complaints-based regulatory system to be effective, consumers and public agencies must be motivated and resourced to monitor the conduct of advertisers and submit complaints about the content and placement of advertisements, whether in relation to unhealthy food or alcohol, when such advertisements appear to breach various codes of practice. Yet the current regulatory systems relating to alcohol and food advertising can be confusing, making it difficult for members of the public to lodge complaints. For example, each of the codes that cover food advertising apply in different ways to food advertising to children – to different advertisers and products, different types of advertising and media and different age groups of children.

As the example of Coca Cola's 'Myth Busting' campaign shows (box 2), complaints to regulatory agencies can have a significant impact on the behaviour and practices of

Box 1: *Alcopops.*

In 2008 the Australian Government increased the tax on ready-to-drink spirits-based alcohol beverages (alcopops) in response to their harmful use by young Australians.[13]

Prior to this increase, a loophole in the excise regime meant alcopops were taxed less than spirits, with the reduced price effectively acting as an incentive to consume these products.[14]

The tax increase was strongly opposed by the alcohol industry and other critics, who argued the tax would encourage young drinkers to substitute alcopops with more hazardous forms of alcohol, such as spirits.[13]

Australian Bureau of Statistics estimates of alcohol consumption per head between 2004 and 2009 showed that following the introduction of the tax, consumption of alcopops fell.[13] And although consumption of spirits did increase, it was not enough to offset the reduction in alcopops consumption; the result was a 2% reduction in alcohol consumption per head, the first in Australia in four years.[13]

Box 2: *Coca-Cola's 'myth busting' campaign.*

In 2009, the Obesity Policy Coalition, together with other public health groups, complained to the Australian Competition and Consumer Commission (ACCC) that Coca-Cola's 'myth busting' campaign – that it is a myth that Coca-Cola 'makes you fat', 'rots your teeth' and is 'packed with caffeine' – was false and misleading and breached the Trade Practices Act 1978. The complaint presented evidence that sugary soft drinks, including Coca-Cola, are associated with increased energy intake, weight gain, and a risk of medical problems, and that black cola drinks, such as Coke, contribute to tooth decay.

The ACCC took action in response to the complaint and the Commission's own view that Coca-Cola's claims created the impression that Coca-Cola could not contribute to weight gain or tooth decay, and that a responsible parent could include Coca-Cola in the family diet without regard to these health issues.

The ACCC accepted court enforceable undertakings from Coca-Cola that it would not continue to claim that its product could not contribute to weight gain or tooth decay, or that Coca-Cola contained only half the amount of caffeine as a cup of tea, and that it would publish corrective advertising in all media in which the campaign appeared (which included all major Australian newspapers). Coca-Cola also gave an undertaking that it would review its trade practices compliance procedures.

some marketers. However, even unsuccessful complaints offer some benefit, insofar as they highlight the limits of current regulatory or self-regulatory approaches and where regulatory reform is required. For example, in 2009 the Alcohol Policy Coalition complained that the labelling and promotion of a beer product contravened the provisions of the Alcohol Beverages Advertising Code (ABAC) by failing to present a responsible approach to the consumption of alcohol beverages, and that the marketing (including the labelling of the product) constituted 'offensive behaviour' within the meaning of the ABAC Code. Although the ABAC Panel upheld the complaint in relation to the marketing of the beer (in particular, website material), it dismissed the complaint in relation to the labelling of the product on the basis that the ABAC scheme did not at that time cover product labels and packaging – even though the content of the label was identical to the website content deemed immature, irresponsible and offensive under the ABAC Code. This determination highlighted the narrow focus and inconsistency characteristic of industry self-regulatory codes.

Conclusion

The law can be responsible for creating an environment that encourages the misuse of alcohol and unhealthy diet. For example, the laws governing alcohol tax are inconsistent, and give little recognition to the increasing affordability of alcohol and potential for harm.[16] Equally, they can be used to provide the legal framework in which to empower people and reverse trends which gear our environment towards unhealthy behaviours.[17]

As a tool to foster healthy choices, the law can be used to alter the environment in which choices are made – for example, by restricting exposure of children and young people to alcohol and unhealthy food advertising, or to ensure that existing laws and policies are enforced, to the benefit of public health.

Legislation is sovereign, and as such, the best legal interventions for public health are to be found in reform of existing laws, or the introduction of new laws that will be effective at altering the environment to discourage unhealthy or harmful choices, and make healthy choices easier choices.

However, in lieu of large scale legislative reform, important changes can also be achieved by working within the existing legal and regulatory framework, and by ensuring that laws and policies that do exist are wielded with a view to protecting public health.

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Overweight/obesity, physical activity and diet among Australian secondary students – first national dataset 2009-10

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Abstract

There is an increasing prevalence of overweight and obesity among young people, placing them at higher risk of chronic diseases, including some cancers, later in life. Previously in Australia, there has been no standardised monitoring of adolescents' body weight, and dietary and physical activity behaviours across all states and territories and at a national level. To address this gap, Cancer Council Australia and the National Heart Foundation of Australia established the National Secondary Students' Diet and Activity survey. Based on the successful Australian Secondary Students' Alcohol and Drug survey implementation model, the National Secondary Students' Diet and Activity survey was first conducted in 2009-10 with a national representative sample of 12,188 secondary school students from year levels 8 to 11 (ages 12 to 17 years). The main findings from this survey were that, in general, students' patterns of consumption of vegetables and fruit and time spent in physical activity and small screen recreation were less than optimal. Further, just under one in four students were classified as overweight or obese, according to objective height and weight measurements. With government funding support, the National Secondary Students' Diet and Activity survey can become a regular monitoring system and allow Australian adolescents' dietary and physical activity habits and their prevalence of overweight and obesity to be tracked over time.

Obesity is a significant public health challenge facing Australia, as evidenced by the National Preventative Health Taskforce identifying it as one of its three key targets for preventative action, along with tobacco and alcohol, to reduce the burden of chronic disease in the community.[1] Of particular concern is the increasing prevalence of overweight and obesity among young Australians,[2] placing them at greater risk of developing a number of chronic conditions, most notably some cancers, diabetes and cardiovascular disease.[3] Excess weight essentially occurs as a result of energy imbalance, with both dietary behaviour and physical activity important influences.[4]

To effectively tackle the issue of childhood obesity, it is important to first gain a population-based picture of young people's body weight, and dietary and physical activity behaviours. Previous efforts to monitor these health risk factors within the Australian youth population have largely been either state-based (eg. NSW *Schools Physical Activity and Nutrition Survey,*[5] WA *Children and Adolescent Physical Activity and Nutrition Survey*[6]) or sporadic national surveys with limited sample sizes that do not allow for individual state/territory reporting (eg. 2007 Australian National Children's Nutrition and Physical Activity Survey).[7] To address this gap in existing data, Cancer Council Australia and the National Heart Foundation of Australia established the National Secondary Students' Diet and Activity (NaSSDA) survey.

The NaSSDA survey was specifically designed to provide a coordinated state/territory and national approach to the collection and reporting of the prevalence of overweight/obesity, as well as eating and physical activity patterns, among Australian adolescents. This model is based on the Australian Secondary Students' Alcohol and Drug (ASSAD) survey, which has been conducted on a triennial basis since 1984.[8] The success of the ASSAD implementation model in providing state and national trend data regarding adolescent use of tobacco, alcohol and illicit substances has contributed to a strong evidence-base for the advocacy and evaluation of tobacco control policy initiatives at both levels of government. For example, analysis of the ASSAD survey data from 1990-2005 has demonstrated that policies such as clean indoor air laws and increased prices of cigarettes are associated with lower adolescent smoking.[9]

Internationally, there are many examples of ongoing monitoring systems with a focus on youth weight status and related health behaviours. The Health Behaviour in School-aged Children study, conducted every four years in a growing number of countries across Europe and North America, collects data on physical activity and eating behaviours among students aged 11, 13 and 15 years.[10] In the United States, the biennial Youth Risk Behaviour Surveillance System (YRBSS) assesses trends in unhealthy dietary behaviours and physical inactivity among high school students.[11] Both surveys also monitor

the prevalence of obesity using self-reported height and weight measurements.[10,11] The establishment of a similar regular monitoring system in Australia, but which additionally includes anthropometric measures, would be an invaluable resource for future obesity prevention endeavours in this country.

Overview of NaSSDA survey methods

The inaugural NaSSDA survey was conducted in 2009-10 with a nationally representative sample of 12,188 secondary school students from year levels eight to 11 (ages 12 to 17 years). As per the ASSAD model, the sampling procedure was a stratified two-stage probability design, with schools randomly selected at the first stage of sampling and classes selected within schools at the second stage. Within each state and territory, schools were stratified by the three education sectors (government, Catholic and independent) and randomly selected from each sector. Where possible, at least one class group comprising a relatively random group of students (ie. not formed on the basis of selective criteria) was selected from each of the year levels eight to 11. Additional classes were selected where class sizes were small.

Data on students' eating, physical activity and sedentary behaviours were collected via a web-based self-report questionnaire completed in the classroom. Online administration of surveys has significant advantages over the more traditional paper modality, including improved data quality due to greatly reduced missing data and minimisation of invalid responses.[12] It also provides the portability required for a large national survey, and represents a cost-effective and sustainable approach to data collection that is well-accepted by schools and students.

The NaSSDA survey methods and measures were developed with input from a Technical Advisory Group comprising eight Australian researchers with specific expertise in conducting surveys on diet and activity in young people, particularly in school settings. Where possible, the student survey used existing and validated measures. For example, usual daily vegetable and fruit consumption was assessed using short dietary questions adapted from the 1995 National Nutrition Survey, which have reasonable validity when compared with 24-hour recall of vegetable and fruit intake for adults.[13] Physical activity was assessed using the 60-minute *Moderate-Vigorous Physical Activity* screening measure, which provides a reliable and valid estimate of adolescents' overall physical activity behaviour and correlates well with an objective measure of physical activity.[14] A subscale of the *Adolescent Sedentary Activity Questionnaire,* which has high reliability, was used to assess students' time spent in small screen recreation on both school days and the weekend.[15]

In addition to these behavioural measures, the student survey examined potential influences on adolescent eating habits and physical activity patterns such as perceived social and environmental barriers and facilitators, as well as exposure to media and marketing. Such questions have not been included in previous national nutrition and physical activity surveys, yet provide important insights into the range of factors which may be affecting young people's food and activity choices. A further key aspect of the NaSSDA survey was the inclusion of a school questionnaire to assess features of the school food and activity environment, such as the availability of sports facilities and the presence of vending machines.

An anthropometric component was incorporated in the NaSSDA survey, with students' height, weight and waist circumference taken in accordance with standardised protocols.[16] Despite the collection of this data adding increased complexity to the survey model, using actual measurements produces more reliable overweight/obesity prevalence estimates than self-report measurements which are subject to reporting bias.[17] Height and weight measurements were used to calculate body mass index (weight/height^2), which was classified into weight categories using age and sex specific cut-off points based on definitions of child overweight and obesity and grade one thinness (referred to as underweight).[18,19]

Active parent/carer and student consent was required for participation in each component of the study, enabling students to opt-out of being measured while still completing the online questionnaire. Although the use of an active consent procedure had implications for the student response rate – 54% for the questionnaire component and 47% for anthropometric measurements – this limitation is common to most school-based surveys given the strict requirements of ethics committees and education authorities. The response rate achieved was comparable to similar state-based surveys recently undertaken in Australia.[5,6]

Data were analysed using Stata SE 11.1 (StataCorp, Texas), and weighted by state, education sector, year level and sex to the population of students enrolled in Australia.[20] All analyses also adjusted for school level clustering.

Main findings

Body weight

While the majority of students were a healthy weight (72%), just under one in four students was classified as overweight (18%) or obese (5%). Five per cent of all students were underweight. Among males, 19% were categorised as overweight with a further 5% obese. Seventeen per cent of females were overweight and 5% were obese. These results are comparable with recent national surveys that utilised smaller samples and different methods.[7,21]

Vegetable and fruit consumption

Students' daily patterns of vegetable and fruit consumption are highlighted in figure 1. *The Australian Guide to Healthy Eating* recommends that adolescents eat at least four serves of vegetables and at least three serves of fruit each day.[22] Overall, only 24% of students reported eating recommended daily quantities of vegetables, while 41% reported meeting the recommended daily serves of fruit. However, the proximity of many students to achieving these targets was encouraging. For example, around one-quarter of students need to increase their daily vegetable

Figure 1: *Usual number of daily serves of vegetables and fruit.*

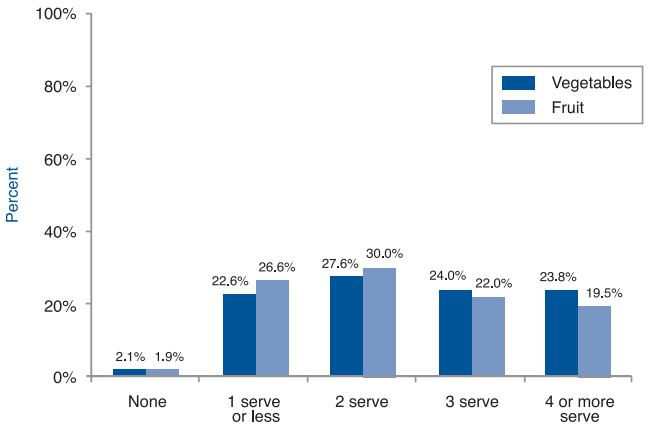


Figure 2: *Number of days that students were physically active for at least 60 minutes over the previous week.*

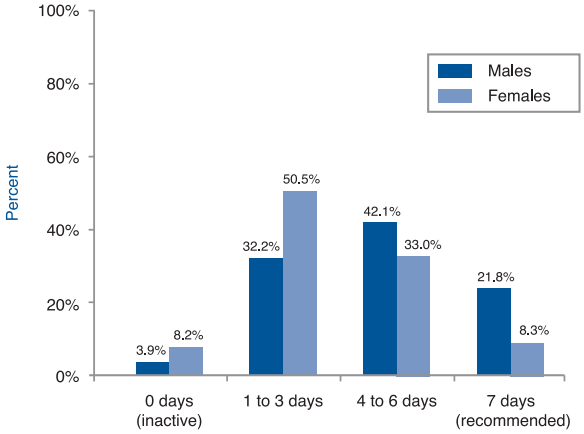
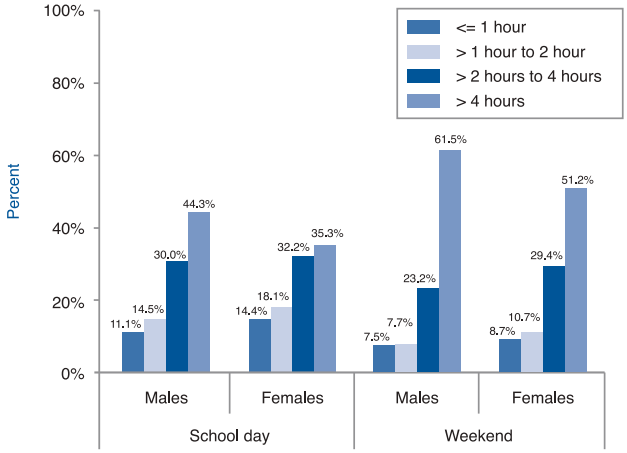


Figure 3: *Usual number of hours of electronic media use for entertainment on school days and on the weekend.*



intake by just one serve, while a similar one serve increase would see a further 30% of students eating sufficient daily amounts of fruit.

Nonetheless, there is a notable proportion of Australian adolescents falling well short of these dietary recommendations. Specifically, 25% of students reported eating none or one serve or less of vegetables each day, and 29% reported eating none or one serve or less of fruit each day.

Physical activity levels

Australia's Physical Activity Recommendations for 12-18 year-olds are that adolescents engage in at least 60 minutes of moderate to vigorous physical activity every day.[23] Overall, 15% of students reported meeting this physical activity recommendation over the previous week. Thirty-eight per cent of students were sufficiently active on four to six days, while 41% were sufficiently active on one to three days. Six per cent were not active for at least 60 minutes on any of the previous seven days.

Figure 2 shows patterns of physical activity over the previous week for males and females separately. Nearly two-thirds of male students were either engaging in recommended levels of physical activity (22%) or sufficiently active for four to six days in the week (42%). In contrast, more than half of all female students were sufficiently active for only one to three days (51%) or were deemed to be inactive (8%).

Small screen recreation

Recommendations suggest adolescents spend no more than two hours per day using electronic media for entertainment.[23] This includes time spent watching television, videos and DVDs, playing video games and using the computer for fun. Overall, 71% of all students reported spending, on average, more than two hours in small screen recreation on a usual weekday, while 83% of all students reported exceeding the daily recommendation on the weekend. However, of greater concern were the proportions of students spending more than four hours using electronic media for entertainment on an average school day (40%) and weekend day (57%). Few students were found to be limiting their daily time spent in small screen recreation to one hour or less on school days (13%) or the weekend (8%). As indicated in figure 3, male students reported spending higher amounts of time in small screen recreation compared with female students on both school days and the weekend.

Importance of the NaSSDA survey data

The results from the 2009-10 NaSSDA survey highlight that the eating and activity patterns of Australian adolescents are less than optimal. Specifically, they are not consuming adequate amounts of vegetables and fruit, and are spending too much time in front of the television and computer and not enough time being physically active. Further, while the majority of students are within a healthy weight range, the proportion that fall outside of this is of concern, given that obesity in adolescence predicts obesity in adulthood,[24] and the potential implications of excess weight for health.

With the increased focus on obesity prevention at a government level, the NaSSDA survey data is an important source of information for policy makers and program evaluators. A strength of the study is the intention for it to be an ongoing monitoring system of Australian adolescents' body weight, and dietary and physical activity behaviours using a standardised approach. This will enable the prevalence estimates from the 2009-10 NaSSDA survey to act as a baseline through which to track these health behaviours over time.

Although the first NaSSDA survey was funded entirely by Cancer Council Australia and the National Heart Foundation of Australia, the rising costs associated with running a large national survey are such that a funding model wholly dependent on non-government organisation resources is not sustainable. Thus, the long-term viability of the NaSSDA survey will be contingent on the ability to secure additional funding support from government. For example, funding partnerships have been formed with state and territory government health departments to ensure the continuation of the survey in 2012-13. This is a mutually beneficial arrangement which will provide governments with access to a rich amount of data on child obesity issues (ie. diet, physical activity, sedentary behaviour). It also represents a more efficient approach to the collection of these data by reducing potential survey overlap.

As the NaSSDA survey becomes more established and the national obesity prevention agenda progresses, there will likely be opportunities to include supplementary questions in future survey rounds to both inform policy debate and evaluate implemented policy initiatives. Indeed, a notable feature of the ASSAD survey has been its capacity to address topical tobacco control policy issues that have arisen overtime such as the introduction of graphic health warnings on cigarette packs.[25] However, it will be necessary to make sure that any secondary aims do not compromise the core aim of the survey which is to monitor trends.

Finally, while the NaSSDA survey is an important platform from which to improve the evidence base regarding obesity prevention in adolescence, it is just one part of what needs to be a comprehensive approach to obesity prevention in Australia. To maximise the survey's utility and ultimately reduce the burden of disease attributable to high body mass for current and future generations, other key action areas identified by the National Preventative Health Taskforce should also be prioritised.

NaSSDA Study Team

The NaSSDA Study Team comprises Cancer Council Victoria: Belinda Morley, Maree Scully, Melanie Wakefield; Technical Advisory Group: Louise Baur (Chair), Anthony Okely, Iain S Pratt, Jane Bowen, Jo Salmon, Victoria Flood, David Crawford, Anthony Worsley.

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RECOGNISING THE ROLE OF INFECTION: PREVENTING LIVER CANCER IN SPECIAL POPULATIONS

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Abstract

Hepatitis B virus is the second most important known human carcinogen after tobacco. Increasing prevalence of chronic viral hepatitis in Australia has resulted in rapidly rising liver cancer incidence. Prevalence of Hepatitis B virus, and consequently incidence of liver cancer, is highest in migrants born in Hepatitis B virus endemic areas, and in Aboriginal and Torres Strait Islander people. Often Hepatitis B virus is acquired at birth or in early childhood, when the likelihood of developing chronic infection is high. Globally the best preventative strategy for Hepatitis B virus associated liver cancer is universal infant vaccination, but vaccination in Australia will prevent a very small proportion of future liver cancer. Approximately 170,000 Australians live with chronic Hepatitis B virus infection. A comprehensive program of Hepatitis B virus management, including liver cancer surveillance and appropriate antiviral therapy, is very likely to be cost-effective as a cancer prevention program. Under-treatment of chronic Hepatitis B virus infection in Australia partly relates to the high proportion of affected people who are from culturally and linguistically diverse backgrounds, or are Aboriginal or Torres Strait Islander people. Health inequities and reduced access to appropriate diagnosis, treatment and care must be addressed as a matter of priority to address one of the fastest increasing causes of cancer death in Australians.

A number of chronic infections contribute to the burden of cancer in humans. Viruses including human papilloma virus (cervical cancer), Epstein Barr virus (nasopharyngeal carcinoma and some lymphomas), and bacteria including *Helicobacter pylori* (gastric cancer) cause human malignancy through a variety of mechanisms. It is estimated that approximately 8% of all cancers in Australia are caused by chronic infections.[1]

However, the hepatitis B (HBV) and hepatitis C (HCV) viruses, which cause chronic viral hepatitis, are responsible for more human cancer deaths than any other infectious disease. Primary liver cancer is the third most common cause of cancer death globally, with chronic viral hepatitis responsible for more than three quarters of these cancers.[2,3] Chronic HBV infection alone has been estimated by the World Health Organisation (WHO) to be the tenth leading cause of death globally,[4] and HBV as the second most important known human carcinogen, after tobacco.[5]

HCV causes liver cancer through chronic liver damage leading to progressive scarring and ultimately cirrhosis. However, HBV infection can cause liver cancer in a number of ways in addition to causing cirrhotic liver disease.[6] HBV can be integrated into the host genome and lead to genetic instability; viral proteins such as HBx have been implicated in carcinogenesis; and some viral mutations have been associated with development of liver cancer.[6,7] Finally, chronic HBV infection acts synergistically with exposure to dietary aflatoxin (a fungal toxin produced by *aspergillus* species, particularly in grains stored in warm humid conditions) to significantly increase the risk of liver cancer.[7,8] Approximately 25% of people living with chronic HBV infection will develop cirrhosis and/or liver cancer.[4]

Australian context

Although primary liver cancer remains relatively uncommon in Australia, the increasing prevalence of chronic viral hepatitis in Australia over the last four decades has resulted in a rapidly rising incidence of liver cancer.[1] There are now estimated to be 170,000 Australians living with chronic HBV infection, and 221,000 with chronic HCV infection,[9] for a combined prevalence of approximately 2% of the population. As a consequence, liver cancer demonstrates the fastest increasing incidence, and (with melanoma) joint fastest increasing mortality of any cancer reported to Australian cancer registries.[1] The increasing mortality is also related to the very low relative survival of people diagnosed with liver cancer,[10] and to a significant problem with late diagnosis of chronic viral hepatitis, often only being made once the patient presents with decompensated cirrhosis or liver cancer, with limited ability for therapeutic intervention.[11]

The prevalence of chronic HBV infection in Australia is highly variable, with much higher prevalence noted in migrants born overseas in endemic areas (particularly in the Asia-Pacific and Sub-Saharan Africa), and also in Aboriginal and Torres Strait Islander people.[12,13] These two groups constitute the majority of Australians living with chronic hepatitis B.[14] This increased prevalence of HBV

infection translates into far higher liver cancer incidence and mortality in people born overseas in high prevalence regions, and in Aboriginal and Torres Strait Islander people, when compared to the rest of the Australian population.[15,16]

As a result, both prevalence of chronic HBV,[13,17] and incidence of liver cancer,[8,10,18] demonstrate significant geographic clustering, related to the proportion of the population either born in high prevalence countries, or who are Aboriginal or Torres Strait Islander people (with a greater burden among rural and remote Indigenous people relative to those living in urban environments).[12]

Prevention of HBV-associated liver cancer related mortality

Vaccination against HBV

Most people living with chronic HBV infection worldwide were infected at the time of birth through mother to child transmission, or through transmission from other close contacts with chronic HBV infection in the first years of life. This is because the risk of developing chronic infection is related to age at infection, ranging from 90% among newborn infants to approximately 5% among adolescents and adults.[19] From a global perspective, the most effective method of preventing chronic HBV infection, and resultant liver cancer, is to vaccinate all infants against HBV infection, including the provision of a birth dose of vaccine (which is key to preventing transmission from mother to child at birth).[20,21] This has been WHO policy since 2009,[20] and although substantial progress has been made in improving coverage of infant hepatitis B vaccination in the last decade, the proportion of infants receiving timely birth dose vaccination remains suboptimal. The Western Pacific Region of the World Health Organisation, within which approximately half of all global HBV related deaths occur, adopted a regional target of reducing the prevalence of chronic HBV infection among 5 year-old children to less than 2% by 2012.[22] Twenty-seven countries, representing 87% of the population of the region, are estimated to have achieved this target.[22]

The time lag between infant vaccination and impact on liver cancer incidence will take decades to be fully realised, but early indications are available.[21] The best example is Taiwan, previously a high HBV prevalence country. Universal infant vaccination commenced in Taiwan in July 1984, with significant reductions in liver cancer incidence in vaccinated age groups reported since. Up to June 2004, there was a three-fold drop in liver cancer risk in vaccine-eligible age groups, and where liver cancer was diagnosed in those born after universal vaccination was implemented, incomplete vaccination was associated with a 4.3-fold increase in risk of liver cancer.[23] Similar direct evidence for the prevention of liver cancer through infant vaccination is expected from large field trials conducted in Qidong Province, China and in The Gambia in the next few years.[21]

In low HBV prevalence countries like Australia, universal infant vaccination remains not only cost-effective, but cost saving to society.[4,24] However, it must be recognised that more than 90% of new cases of chronic HBV infection entering the population do so through migration, and not through incident infections acquired here progressing to chronicity.[25] Thus universal infant hepatitis B infection in Australia will have minimal impact on future HCC incidence, with the exception of Aboriginal and Torres Strait Islander people, given the higher prevalence of chronic HBV infection contributing to high liver cancer mortality.[16] Even though universal infant vaccination against HBV is cost saving in Australia, it may be even more cost-effective for Australia to support vaccination programs in high HBV prevalence countries contributing significant migrant flows into the population.[25]

Liver cancer surveillance for people living with chronic HBV infection

Regular surveillance for liver cancer with six monthly ultrasound +/- serum alpha-foetoprotein measurement is another proven method for preventing liver cancer mortality in people living with chronic hepatitis B. The rationale for this surveillance is the early detection of liver cancer when intervention (such as surgical resection or liver transplant) may result in cure. International guidelines have established criteria for such surveillance among people living with HBV, based on cost-effectiveness considerations and risk of liver cancer.[26] The indications for surveillance in these guidelines are shown in box 1.

Box 1: *Recommendations for liver cancer surveillance in people living with chronic hepatitis B infection (adapted from reference 26).*

- All patients with cirrhosis
- Asian males over 40 years age
- Asian females over 50 years age
- Africans over 20 years age
- Patients with a first degree family history of liver cancer

The survival benefit of liver cancer surveillance has been demonstrated in observational studies,[27] and in a large Chinese randomised trial.[28] However, this survival benefit comes at significant cost, and a recent Australian cost-effectiveness analysis suggested that liver cancer surveillance in isolation was not a cost-effective cancer prevention strategy.[29]

Antiviral treatment for chronic hepatitis B

Another approach to preventing liver cancer in people living with chronic HBV infection is through treatment of HBV infection with specific antiviral agents. The central importance of HBV viral load in determining risk of progressive liver disease and incidence of liver cancer was demonstrated in the Risk Evaluation of Viral Load Elevation and Associated Liver Disease/Cancer-Hepatitis B Virus (REVEAL-HBV) study from Taiwan,[30] with more recent analysis of this cohort demonstrating that reduction in viral loads over time led to reduced cancer incidence.[31] However the REVEAL study was a natural history study, and extrapolation of the natural history of HBV infection

was not able to directly answer the question of whether treatment-induced reductions in HBV viral replication would lead to the same reduction in risk of liver cancer.

More direct evidence of the impact of HBV antiviral therapy on liver cancer incidence has recently become available. There is increasing evidence for the ability of treatment for chronic HBV infection to prevent liver cancer, with the most compelling evidence to date published in 2010.[32] This systematic review of 21 studies demonstrated that, over a median four year follow-up, the risk of liver cancer in patients treated with antiviral therapy was less than half that of untreated patients (2.8% v 6.4%, p=0.003). Furthermore, these results were achieved with less potent, more resistance prone antivirals than those which are standard of care currently.

The cost effectiveness of antiviral therapy for HBV as a cancer prevention intervention was assessed in the Australian context in the study mentioned previously.[29] This study found that a comprehensive program of HBV management, including liver cancer surveillance where indicated, but also incorporating appropriate antiviral therapy for eligible patients, was very likely to be cost-effective in Australia. The estimated incremental cost-effectiveness ratio per quality adjusted life year was comparable with other, established pillars of cancer prevention policy in this country, such as breast, colon and cervical cancer screening. This reflects similar international evidence of the cost effectiveness of HBV screening alone, and screening with appropriate antiviral treatment.[33-36]

Given this evidence of clinical and public health effectiveness of cancer prevention through treatment and care of people living with HBV infection, what is the current uptake of this population health intervention?

Uptake of antiviral therapy

Of the estimated 170,000 Australians living with chronic HBV infection, less than 3% are estimated to be receiving antiviral therapy.[14] Although it is difficult to establish the proportion of all those with chronic infection who are eligible for antiviral therapy and who could benefit, it is likely that approximately five times the number currently receiving treatment could benefit.[37,38] Part of the reason for the marked under-treatment of people living with chronic HBV infection relates to the high proportion of these people who are migrants from culturally and linguistically diverse backgrounds, or Aboriginal or Torres Strait Islander people, both groups being subject to broader health inequities and reduced access to appropriate diagnosis, treatment and care.[39]

Clearly, strategies are needed to enhance access to comprehensive and appropriate health care for people living with HBV infection in Australia. A strategic approach to this question was outlined in 2010, in the National Hepatitis B Strategy 2010-2013.[14] This strategy, endorsed by the Commonwealth and State/Territory health ministers, contains priorities for action and specific indicators to assess progress in addressing a primary determinant of the joint fastest increasing cause of cancer deaths among Australians.[1] The five priority action areas outlined in the strategy are; building partnerships and strengthening community action; preventing hepatitis B transmission; optimising diagnosis and screening; clinical management of people with chronic hepatitis B; and developing health maintenance, care and support for people with hepatitis B.[14]

Without substantial involvement in education of, and partnership with affected communities, including Australians born overseas in HBV endemic areas, and Aboriginal and Torres Strait Islander people, together with clinical workforce development to address access to testing and antiviral treatment, the steadily rising burden of liver cancer mortality attributable to HBV infection will continue.[14]

Acknowledgements

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COMMUNITY APPROACHES TO INCREASING COLORECTAL SCREENING UPTAKE: A REVIEW OF THE METHODOLOGICAL QUALITY AND STRENGTH OF CURRENT EVIDENCE

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Abstract

In Australia, colorectal cancer screening rates are sub-optimal and considerably lower than those of other countries. The purpose of the current review was to identify in relation to colorectal cancer screening; (i) the number of Australian and international community-based intervention studies published between 2002-2011; (ii) the proportion of intervention studies that had adopted a community-based approach and met the Cochrane Effective Practice and Organisation of Care study design criteria; and (iii) the effectiveness of community-based interventions with at least a moderate level of methodological rigour at increasing colorectal cancer screening rates. Electronic database searches identified 86 intervention studies, of which 21 used a community-based approach and 15 met Cochrane Effective Practice and Organisation of Care study design criteria. Overall, the methodological rigour of community-based intervention studies using Cochrane Effective Practice and Organisation of Care -accepted study designs was moderate. Only one methodologically robust Australian community-based study was identified. Based on findings from studies with moderate methodological rigour, a number of potential options which the National Bowel Cancer Screening Program might consider to increase screening rates are discussed. The current review highlights the urgent need for further methodologically rigourous, community-based colorectal cancer screening intervention research in the Australian setting.

Addressing colorectal cancer is essential to Australia's health

Worldwide, colorectal cancer (CRC) accounts for 9.4% of all cancer diagnoses and ranks as the fourth leading cause of cancer-related deaths.[1] Australia has one of the highest age-standardised rates for CRC in the world, with the crude incidence set to increase as a consequence of an ageing population.[2] In Australia, as in other countries, fewer than 40% of cases are diagnosed at an early localised stage.[3-5] CRC screening has demonstrated effectiveness in reducing the incidence of CRC through the identification and removal of precancerous adenomatous polyps,[6,7] and increasing the rate of detection of early-stage disease.[8,9]

In Australia, the National Bowel Cancer Screening Program (NBCSP) takes a community-based approach by offering a mailed one-off Faecal Occult Blood Test (FOBT) to people turning 50, 55 and 65 years of age.[10] Participation rates in Australia's NBCSP have remained at a consistent rate of approximately 40 per cent.[10-13] These rates, however, are only reflective of participation among the selected age brackets incorporated in the program. Australian community- and population-based assessments of people aged over 50 have consistently demonstrated low levels of CRC screening participation.[14-18] Two population-based studies among at-risk persons (aged 50 and over) prior to the NBCSP indicated that less than 20% of the at-risk population undertook FOBT screening in the previous five years.[15,18] A recent evaluation following the inception of NBCSP found that 20% of people aged above 55 years of age had undertaken FOBT screening within the guideline-recommended two-year period.[19] The Australian CRC screening rate compares poorly with that of other countries. For example, FOBT screening rates in the UK and Finnish screening programs are currently 52% and 71% respectively.[20,21]

It is too early to identify the likely impact of the NBCSP program on mortality and incidence reduction in Australia. Nonetheless, the most recent data on a small number of histologically confirmed NBCSP cases suggests a high rate of early-staged CRC detection (58.3%).[10] Further, an earlier review of CRC detection methods (ie. NBCSP-screened versus symptomatic presentation) across 19 Australian hospitals highlighted a significant downgrading in staging of disease among NBCSP-detected CRCs.[22] While these results show promise, there is a need for expansion of this program (ie. extending the offer of FOBT screening to all people aged between 50 and 75 years biennially) if the high rate of mortality reduction (15-33%) reported in screening randomised control trials (RCT) is to be achieved.[6,9,23,24]

Effective interventions to increase CRC screening

The most comprehensive review of intervention studies aimed at increasing CRC screening was confined to studies conducted in the United States during 1998-2009.[25] In Australia, relatively little is known about the effectiveness of methodologically robust community-based interventions, although the NBCSP has adopted a community-based approach. It is crucial to identify robust evidence of effective strategies for increasing screening rates at a community level in order to maximise the effectiveness of the program. The Cochrane Effective Practice and Organisation of Care Group (EPOC) checklist, which provides valuable criteria against which to judge the methodological rigour of intervention studies, has been used in this review.[26] The purpose of this review was to identify, in relation to increasing CRC screening uptake: (i) the number of Australian and international community-based intervention studies published between 2002-2011; (ii) the proportion of intervention studies that had adopted a community-based approach and met EPOC study design criteria; and (iii) the effectiveness of community-based interventions with at least a moderate level of methodological rigour.

Method

Inclusion criteria

Intervention studies published in English aimed at increasing rates of CRC screening (eg. by FOBT, colonoscopy or sigmoidoscopy) were included in this review. Studies that examined solely knowledge or intention to screen, or compared compliance rates across CRC testing modalities were excluded. Studies that evaluated CRC testing solely among the following population groups were excluded: CRC patients; people with advanced adenoma or bowel-related disease; and those at high risk due to familial predisposition to CRC.

Literature searches

An electronic database search of Medline was conducted to identify relevant intervention studies published between 1 January 2002 and 11 October, 2011. This time period was considered appropriate, given that the National Health and Medical Research Council CRC screening guidelines were established in 1999 and that the wider adoption of supporting programs and interventions would take time to evolve. The Medline search included three search themes (colorectal cancer, screening and interventions) combined using the Boolean operator, "AND". For a complete list of MeSH headings and search

Table 1: *Search terms used for MEDLINE search.*

Type of Search Term	Mesh headings/ keywords		
Colorectal cancer terms	colorectal neoplasms colorectal cancer bowel cancer colonic neoplasms colon cancer rectal cancer	OR	AND
Screening terms	mass screening faecal occult blood test fecal immunochemical testing stool test fobt occult blood DNA stool colonoscopy sigmoidoscopy sigmoidoscopes	OR	AND
Intervention terms	intervention studies evaluation studies randomized control trial as Topic / randomised control trial controlled clinical trial clinical trial random$ intervention$	OR	AND

** Limited to English language, humans, period 2002-2011.*

terms see Table 1. The cochrane clinical trial database was also searched for relevant intervention studies using the following search terms, "colorectal neoplasms AND mass screening".

Data extraction and coding for design and methodological rigour

All abstracts were reviewed by authors RJC and CLP to determine whether studies met the eligibility criteria. All relevant intervention studies were categorised based on the setting for recruitment or sampling: (i) primary care; (ii) community; or (iii) other. Intervention studies conducted in the primary care setting or recruiting persons directly from general practice registers were coded as "primary care". Intervention studies sampling participants from an electoral roll/ population register, using a broad sampling technique, eg. state Driver's licence databases, or directly recruiting participants from a community-setting, eg. seniors' centres, were coded as "community". Each intervention study coded as "community" was assessed against basic EPOC study design criteria: randomised control trial (RCT); controlled clinical trial (CCT); controlled before and after study (CBA); and interrupted time series (ITS). Intervention studies not meeting the above study designs were excluded.

Intervention studies coded as "community" and meeting EPOC-specified study design criteria (ie. RCT, CCT, CBA or ITS) were evaluated for methodological strength using the following EPOC criteria.[27] For each criterion, a score of "yes" was assigned if the study met the criterion, "no" if it did not and "unclear" if there was insufficient information in the paper. For RCT, CCT, and CBA, these criteria included the following: 1) whether the allocation sequence was adequately generated (ie. the random component in the sequence generation process was described); 2) whether there was concealment of allocation (eg. unit of allocation by institution or team, a centralised randomisation scheme, an on-site computer system or sealed opaque envelopes); 3) whether baseline outcome measurements were similar in intervention and control groups (ie. the study reported whether baseline measurement was similar and, if not, whether appropriate adjusted analysis was performed); 4) whether baseline characteristics of study participants were reported and did not differ between experimental groups; 5) whether incomplete outcome data were adequately addressed (ie. missing data was unlikely to bias the results and the proportion of missing data was less than the effect size); 6) whether there was blinded allocation of intervention and control groups (ie. the primary outcome assessed blindly or by using an objective outcome); 7) whether the study was adequately protected against contamination (ie. it randomised by practice or institution, or it was unlikely for the control group to receive the intervention); 8) whether the study was free from selective reporting (ie. all relevant outcomes were reported); 9) whether the study was free from other risks of bias (ie. no evidence of other risk of bias). As a quality assurance measure, independent coding of intervention studies was conducted by two reviewers (RJC and SY). All differences were resolved by mutual discussion between coders and with a third-party (CLP), where necessary.

Table 2: *Methodological rigour assessment of community- and population-based intervention studies using accepted EPOC study designs.*

First author Year	Allocation sequence adequately generated	Concealment of allocation	Baseline outcome measurements similar*	Baseline characteristics similar	Incomplete data addressed	Knowledge of interventions prevented	Selective outcome reporting	Protection against contamination	Other risk of bias	Total
Church, 2004	?	?	?	✓	?	?	✓	×	×	2/9
Powe, 2004	?	✓	×	×	✓	✓	✓	✓	✓	6/9
Braun, 2005	✓	✓	✓	✓	✓	✓	✓	✓	×	8/9
Lipkus, 2005	?	?	✓	✓	?	✓	✓	?	×	4/9
Marcus, 2005	?	✓	?	✓	✓	?	✓	✓	×	5/9
Basch, 2006	✓	✓	✓	✓	?	✓	✓	?	×	6/9
Cole, 2007	?	?	?	?	✓	✓	✓	?	✓	4/9
Ruffin, 2007	?	✓	✓	✓	✓	✓	✓	✓	✓	8/9
Gimeno-Garcia, 2009	✓	✓	✓	✓	✓	✓	✓	?	×	6/9
Maxwell, 2010	✓	?	✓	✓	✓	?	✓	?	×	4/9
Morgan, 2010	?	✓	×	×	?	?	✓	✓	×	3/9
Simon, 2010	✓	✓	✓	✓	?	×	✓	✓	×	6/9
Smith, 2010	✓	✓	✓	✓	✓	✓	✓	×	✓	8/9
Libby, 2011	✓	✓	?	✓	✓	✓	✓	?	✓	7/9
Van roon, 2011	✓	✓	?	✓	✓	✓	✓	?	✓	7/9

Key: ✓= Yes; ? = Unclear; × = No.
** Studies specifying strict CRC screening eligibility criteria for participation scored ✓.*

Table 3: *Characteristics of mail-based interventions with at least moderate methodological rigour.*

First Author, Year, County	Design and Intervention description	Participants (sample size (n), sex and age)	Primary outcome	Results for primary outcome	Differences among population sub-groups
Marcus, 2005 United States	RCT Control: Single untailored (SU) print material Interventions: (i) Single tailored mail-out (ST) (ii) Four multiple tailored (MT) mail-outs (tailored based on baseline) (iii) Four re-tailored multiple mail-outs (MRT) (tailored based on updated information at 6-month follow-up)	4014 callers to the Cancer Information Service (CIS) over 50 years of age, eligible for CRC screening and not calling the CIS about CRC or CRC screening. No significant differences across demographic variables in experimental groups reported (results not shown). Grouped baseline data Males: 17% Age: 50-59 = 54%, 60-69 = 29%, 70+ = 17%.	Self reported FOBT, sigmoidoscopy or colonoscopy at 6- (short-term) and 14-month (long-term) follow-up.	6-month follow-up: SU = 22% compared to combined intervention groups (ST, MT, MRT) = 26%. No statistically significant difference. 14 month follow-up: SU group doubled CRC screening rate (20% baseline to 42% at 14-month follow-up). Overall, significant* trend across groups, suggesting higher rates of CRC screening associated with tailoring. Nested comparison: SU (42%) v MT (51%) significant**; SU (42%) v MRM (48%) not significant	Test for moderator variables at 14-month follow-up Age: Among participants aged 50-59 years, all three tailored interventions showed significant improvement compared with SU (SU v ST*, SU v MT and SU v MRT***). Gender: Female participants. Significant trend in prediction for females***. (SU v MT **, SU v MRT **). No statistically significant difference between (SU v MT and MT v MRT
Libby, 2011 Scotland	RCT Control: Usual invitation Two intervention groups: (i) pre-notification only (ii) pre-notification + information booklet Intervention groups received pre-notification two weeks prior to invitation date	n=59,953, aged 50-74 years, randomly selected from population register. Randomisation produced comparable baseline characteristics and equivalent n across groups. Intervention (i) = 19,975, (ii) = 19,991, (iii) = 19,987. Males: (i) = 49.2%, (ii) = 49%, (iii) = 48.6%.	Return of FOBT kit.	Uptake significantly higher in both pre-notification (59%) and letter + booklet (58.5%) interventions, compared with usual method of invitation (53.9%)***	Significant trend found across all ages, gender, and deprivation categories.***
Van roon, 2011 Netherlands	RCT Control: Standard invitation Intervention: Standard invitation + advanced notification letter sent two weeks beforehand	n=4784, aged 50-74 years, randomly selected from population registers; (i) = 2507 (ii) = 2493. Males: (i) = 40%, (ii) = 49% Age (mean): (i) and (ii) = 60 years.	Return of FIT kit.	Advanced notification letter (58%) was significantly associated with higher adherence compared to invitation letter (52%) ***	Age (less than 60 years) and gender (male), SES (low) independent predictors of non-adherence. No significant interactions between groups.

**p<0.05; **p<0.01; ***p<0.001*

Table 4: *Characteristics of non-mail based interventions with at least moderate methodological rigour.*

First Author, Year, County	Design and Intervention description	Participants (sample size (n), sex and age)	Primary outcome	Results for primary outcome	Differences among population sub-groups
Basch, 2006 United States	RCT (i) Intervention: telephone outreach approach (tailored telephone education based on several behavioural and educational theories) (ii) Control: mailed printed materials	Members of a health benefit fund; Persons aged over 52 years, no recent CRC screening (n=456). (i) = 226, (ii)= 230. Males: (i) = 30%, (ii) = 28% Age: (i) 52-54 =19.5%, 55-59 = 47.8%, ≥60 =32.7% (ii) 52-54=25.7%, 55-59=43.5%, ≥60 = 30.9%	Receipt of CRC screening within 6 months of randomisation (FOBT, sigmoidoscopy, colonoscopy or barium enema). Medical claims and records reviewed	Percentage screened for CRC at 6-month follow-up: Intervention = 27% vs control 6% Screening rates were 4.4 times higher for the intervention group	Intervention effect found within each of the following characteristics: gender, age, race, education, marital status and income.
Ruffin, 2007 United States	RCT (i) Intervention: interactive electronic tool (Colorectal Web) (ii) Control: standard website	n = 174 (equal groups control and intervention) aged between 50-70 years Male: (i) = 48%, (ii) = 43% Age (mean): 57 years (equal across groups)	Self reported CRC screening (FOBT/ endoscopy) Participants contacted 2, 8 and 24 weeks post-intervention.	89/174 (51%) of participants received CRC screening; 56/89 (63%) intervention group v 33/89 (37%) control group. Participants in intervention group significantly more likely to be screened than control group*	No significant result for age, gender, race or geographical residence in logistic model
Gimeno-Garcia, 2009 Spain	RCT (i) Intervention: brief educational video (3.5 mins) providing overview of CRC prevention (ii) Control: non-medical documentary. Following video participants in each group met with gastroenterologist and were given FOBT kit with explanatory flyer requesting return.	n = 158 (control and intervention equal), aged 50-79 years Male: (i) = 23% (ii) = 27% Age (mean): 63 years (equal across groups)	Return of FOBT.	Significantly higher rate of FOBT return (within 2 weeks) in the intervention group (70%) compared with control group (54%)*	Participants returning FOBT were older than non-compliant individuals.* Elderly age independent factor significantly associated with FOBT return*
Simon, 2010 United States	RCT (i) Intervention: automated telephone outreach with speech recognition (ATO-SR), including targeting knowledge deficits, addressing attitudes and self-efficacy, and emphasising importance of screening; Control: (ii) usual care.	N = 20, 938, aged 50-64 years, randomly selected from the Harvard Pilgrim Health Care (i) = 10, 432, (ii) = 10, 506 Males: (i) 46.7% (ii) = 67.6% Age (mean): 57 years equal across both groups.	Self reported CRC screening in the year following intervention (FOBT, double-contrast barium enema, flexible sigmoidoscopy, colonoscopy).	No significant difference in CRC screening (intervention = 30.6%; control = 30.4%) No intervention effect after adjustment for covariates Time to colonoscopy in the intervention group slightly less*	Not assessed

**p<0.05; **p<0.01; ***p<0.001*

Table 5: *Characteristics of multi- component based interventions with at least moderate methodological rigour.*

First Author, Year, County	Design and Intervention description	Participants (sample size (n), sex and age)	Primary outcome	Results for primary outcome	Differences among population sub-groups
Powe, 2004 United States	RCT Intervention: (i) Cultural and self-empowerment group (video, calendar, poster, brochure and flier) (ii) Modified cultural group (video) Control: (iii) Traditional group (usual care).	n = 134, aged 50 and over recruited from 15 senior centres (i) n = 54, (ii) n = 39, (iii) n = 41 Males: (i) = 18%, (ii) = 8%, (iii) = 7% Age (mean): (i-ii) = 75, (iii) = 73	Return of FOBT kit.	Return of FOBT kit: (i) = 61%, (ii) 46% (iii) 15% Significant differences not reported	Group membership and knowledge of CRC** reported as significant predictors of FOBT return N.B. *p*-value for group membership higher than arbitrary .05 cut-point (*p* = .13)
Braun, 2005 United States	RCT (i) Control group: Culturally targeted educational presentation, free FOBT kit, and reminder call (ii) Intervention group: receiving above in line with social learning theory + education delivered by Native Hawaiian physician and CRC survivor, FOBT demostration, and multiple telephone calls to address change- related emotions and barriers	121 persons aged 50 and over recruited via 16 Hawaiian Clubs (i) = 52, (ii) = 69 Males: (i) = 25%, (ii) = 30% Age (mean): 66 years across both groups	Return of FOBT kit.	Return of FOBT: (i) = 40%, (ii) = 33% No significant difference between groups.	Not assessed
Smith, 2010 Australia	RCT (i) Intervention 1: patient decision aid comprising paper based interactive booklet and DVD, presenting risk information on outcomes of FOBT screening, and a question prompt list (ii) Intervention 2: patient decision aid comprising paper based interactive booklet and DVD, presenting risk information on outcomes of FOBT screening, without a question prompt list (iii) Control: standard NBCSP consumer information booklet. FOBT kits mailed to each group.	572 participants aged 55-64 randomly selected from the NSW electoral register using the Australian Bureau of Statistics codes to target socio-economically disadvantaged persons. (i) = 196, (ii) = 188, (iii) = 188. Male: (i) = 51%, (ii) = 51%, (iii) = 50% Age: 55-64 = 100%	Return of FOBT (up to 3 months post intervention)	Significant difference in return of FOBT between interventions (59%) and control (75%)***	Not assessed

**p<0.05); **p<0.01; ***p<0.001*

Results

The Medline search found 1436 separate articles. Of these, 1350 articles were excluded as they were either descriptive studies or not relevant to increasing CRC screening. Of the remaining articles, 86 were intervention studies aimed at increasing CRC screening rates. A search of the Cochrane Clinical Trial database (n = 195) between 2002 and October 20, 2011 found no further intervention studies. The majority of intervention studies were conducted in the US (79%, 68/86). Few studies (9%, 8/86) had been undertaken in Australia, with the remainder of interventions (12%, 10/86) from the UK, Canada, Europe or Asia. Most studies (70%, 60/86) had sampled participants from either general practice registers or directly through primary care sites. Of the remaining interventions, participants were either recruited using a community or population-based sampling technique (24%, 21/86) or "other" sampling method (6%, 5/86). Of the eight studies conducted in Australia, only four had adopted a community or population-based sampling approach.

Of the 21 community-based intervention studies,[28-48] only 15 (71%) met EPOC criteria relating to research design; all of these studies were RCT.[29,31-35,37,39-42,44, 45,47,48] The remaining six articles did not use an accepted EPOC study design.[28,30,36,38,43,46] Overall, 10 out of 15 (66%) RCT scored at least five points or higher on methodological rigour (see Table 2). These studies were deemed to be of at least moderate methodological rigour and were evaluated for effectiveness at increasing CRC screening.

Effectiveness of strategies trialled in methodologically rigourus studies (n = 10)

An overview of the intervention studies scoring five or more on the EPOC criteria for methodological rigour were grouped by intervention type: mail, non-mail (e.g. telephone, audiovisual, computer); and multiple component strategies. Findings are presented in tables 3, 4, and 5, respectively. As shown in Table 3, mail-based strategies with FOBT invitation can achieve participation rates of 51 to 59%,[34,47,48] with increased participation evident in two studies that had adopted pre-notification prior to the screening invitation.[47,48] Tailoring of the screening invitations appeared to have a modest effect on screening participation.[34] As described in Table 4, non-mail-based strategies, including the use of an interactive electronic tool or video education, appeared to increase the rate of CRC screening significantly, compared to the usual care or standard condition.[39,40] Studies of telephone-based outreach had mixed findings with samples drawn from private healthcare funds.[35,44] Multiple-component interventions (see Table 5) that involved education or self-empowerment of cultural groups showed modest improvements in CRC screening.[31,32] An Australian study among lower socio-economically disadvantaged persons, contrary to expectation, indicated that the adoption of a decision making aid (ie. booklet and DVD) significantly decreased FOBT completion, compared to controls who received a standard NBCSP information package.[45] Study findings from Powe et al.'s intervention should be considered with caution, given substantial limitations related to sample size and an under-representation of males. Further, the authors report the primary outcome (return of FOBT) as significant across group membership, despite not meeting the widely accepted statistically significant cut-point of $p < .05$.

Discussion

The review indicated that most CRC screening intervention studies occurred in the US. Given the Australian setting differs from the US in terms of health system and population sub-groups, US findings may not generalise to the Australian setting. Only eight intervention studies were conducted in Australia, four of which adopted a community-based approach.[28,30,37,45] Of these studies, only two used an EPOC-accepted study design.[37,45] The lack of robust research with relevance to the community-based approach taken by the NBCSP is surprising.

The degree to which study findings are indicative of a high level of evidence is dependent on methodological rigour.[49,50] Of the 21 intervention studies in this review adopting a community-based approach, 15 had used EPOC-accepted study designs, and 10 had at least moderate methodological rigour. However, only one methodologically robust community-based study was undertaken in Australia,[45] providing scant evidence to base decisions on how to approach the crucial issue of maximising screening rates for CRC in Australia.

The NBCSP adopts a pre-notification strategy shown to be effective at increasing FOBT participation rates.[37,47,48] Based on the studies with at least moderate experimental rigour, it would appear that there are a number of additional potential options which the NBCSP might consider to increase screening rates for the age groups included in the program. First, the relative value of co-ordinated advocacy from other respected organisations, including Cancer Council and other public health organisations, should be further examined.[46] In addition, it should be noted that Australian studies, although not using an EPOC-accepted study design, have indicated that FOBT participation is improved one-off and over time if a letter of invitation includes general practitioner endorsement.[28,46] Further, in the UK, for non-responders to CRC screening invitations, a final letter is sent to non-responders' general practitioners.[51] Given that direct linkage of the patient to his or her general practitioner is not easily attainable in Australia for community-based recruitment approaches, it is important to consider how the active endorsement of the NBCSP by general practitioners may be co-ordinated with NBCSP initiatives. In addition, the timing of reminder letters following non-response in the Australian screening program is at eight weeks, much longer than that adopted in the UK screening program, which is achieving higher rates of participation.[20] Therefore, it is worthwhile to explore whether a shorter follow-up interval may increase participation rates.

It is important to consider the unexpected study findings found among an Australian cohort of lower socio-economic people aged between 55-64 years of age sent FOBT kits, where a particularly high rate of FOBT test return was identified among the control group (75% of

those receiving standard NBCSP booklets), a rate higher than that in the intervention group (59% of those receiving a decision aid and accompanying DVD).[45] It is noteworthy that two weeks following mail-out, participants received a follow-up telephone interview assessing other primary outcomes, ie. knowledge, attitudes and informed choice. It is possible that this follow-up call lifted participation rates across both groups. The incorporation of a telephone-based reminder system may be worth consideration in the NBCSP. Additionally, for the control group the FOBT return rate of 75% among a wide age-bracket (55-64 years) was achieved, much higher than the consistent return rate of approximately 40% achieved in the NBCSP. Overall, in addition to the above opportunities for increasing screening rates among those invited into the NBCSP, it should also be noted that a dominant rate-limiting factor for population-based screening uptake in Australia appears to be the limited age-brackets invited to screen in the NBCSP. The greatest opportunity for future increases in FOBT screening participation largely relies on opening the program to the entire at-risk population (all those aged between 50-74 years) for repeated screening.

With the exception of age and gender, there were relatively little data in this review about responses to interventions among population groups known to experience lower rates of CRC screening participation eg. Indigenous people from non-English speaking backgrounds and those from lower socio-economic backgrounds. Some studies indicated that younger people in the at-risk group had a considerably lower rate of screening participation compared to older age groups.[35,40] A few studies used targeted approaches for certain cultural groups, eg. African Americans.[31] However, findings for socio-cultural groups in the US may not generalise to the Australian context. In Australia, relatively little robust research has been directed towards population sub-groups less likely to participate in CRC screening, although the NBCSP has focused efforts towards reaching these groups, particularly through state-based initiatives. The present review identified only one Australian intervention that targeted CRC screening among lower socio-economic groups.[45] It is important that future interventions pay close attention to population groups experiencing lower rates of CRC screening, to maximise broad participation and avoid increasing screening inequality.

Searching grey literature and non-English language studies was beyond the scope of the current review. Therefore, it is possible that some studies were missed. The ability to generalise international study findings to the Australian-setting should be considered with caution, given differing health care systems and CRC screening provisions across countries. The NBCSP currently offers one-off FOBT screening to just three selected age groups. This is in contrast to the evidence base for the benefits and cost-effectiveness of CRC screening, based on biennial screening from 50-74 years.[52] In addition, it is important to monitor CRC screening rates across the entire at-risk population, as NBCSP monitoring reports are only reflective of participation among the selected age brackets. Unfortunately, given the low number of Australian community-based intervention studies identified in this review, few data are available to indicate the most effective approach for improving population-level CRC screening participation rates to an optimal level. The current review highlights the urgent need for more methodologically rigorous community-based CRC screening intervention research in the Australian-setting.

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Impact of prevention on future cancer incidence in Australia

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Abstract

Cancer, along with other chronic diseases such as cardiovascular disease, is recognised as one of the most common public health threats in Australia. This burden and associated financial cost to the community will continue to increase given Australia's increasing and aging population. Projections based on population growth and aging have estimated that there will be about 170,000 new cancers diagnosed in 2025. However, there is some potential for optimism given that only about 5-10% of cancers are caused by genetic or inherited disorders. The World Health Organisation suggests that at least one third of all cancer cases are preventable with a reduction in the prevalence of risk factors such as tobacco smoking, poor nutrition and diet, physical inactivity, alcohol consumption, occupational exposure and sun exposure, offers the most cost-effective long-term strategy for the control of cancer. While we have witnessed significant declines in the prevalence of tobacco smoking, there is little evidence that there have been any significant reductions in the prevalence of other known behavioural risk factors. Clearly, large-scale and long-term preventive strategies are required and if fully implemented, can have the potential to prevent nearly 57,000 new cancers in 2025 alone.

Cancer, along with other chronic diseases such as cardiovascular disease, is recognised as one of the major public health threats in Australia. About one-fifth of the total disease burden in Australia is caused by cancer,[1] costing the Australian community about $3.8 billion in direct health system costs annually.[2] Since 1982 the number of Australians diagnosed with cancer has almost doubled, from 47,350 to 108,368 in 2007, and the incidence rate has increased by 27% over the same period.[3]

This burden and financial cost to the community will further increase given Australia's increasing and aging population. Projections based on population growth and aging have estimated that there will be nearly 170,000 new cancers diagnosed in 2025.[4] Most of the growth is expected to be in prostate cancer, colorectal cancer, lung cancer and breast cancer.[4] Combined with improving survival outcomes for people diagnosed with cancer,[5] the future direct and indirect costs in support and ongoing services are also important considerations.

While these observations are daunting, there is some potential for optimism given these chronic diseases are also the most preventable.[6] Most cancers are caused by external factors, whether environmental or related to human behaviour, leaving only about 5-10% of cancers caused by genetic or inherited disorders.[7] Migrant studies provide the best evidence of this, with cohorts of people migrating from low-incidence countries to high-incidence countries experiencing cancer rates equivalent to their adopted country within two or three generations.[8,9] There is much work to be done to identify, understand and quantify the impact of these external factors.

What is known about risk factors for cancer?

There is, however, much we do know about the risk factors for cancer, and this has important implications for our potential to reduce the burden of cancer in the future. The World Health Organisation suggests that at least one third of all cancer cases are preventable, and that prevention offers the most cost-effective long-term strategy for the control of cancer.[10,11]

Tobacco smoking

Tobacco smoking has long been recognised as the single largest preventable cause of cancer; tobacco smoking alone causes about 71% of lung cancer worldwide.[12] Aside from lung cancer, there is now sufficient evidence for a causal association between cigarette smoking and cancers of the oral cavity, oropharynx, hypopharynx, nasal cavity and paranasal sinuses, larynx, oesophagus, stomach, pancreas, liver, kidney (body and pelvis), ureter, urinary bladder, uterine cervix and bone marrow (myeloid leukaemia).[13] Additionally, exposure to second-hand or 'environmental' tobacco smoke has also been proven to be a cause lung cancer in non-smoking adults.[13]

Diet, physical activity and nutrition

In 2004 The World Cancer Research Fund and the American Institute for Cancer Research assembled an international group of experts in cancer epidemiology, nutrition, public health and cancer biology to systematically examine the association between food, nutrition and physical activity (including body fatness) and the prevention of cancer. They calculated that overall, at least 25% of cancers could be prevented

if the exposures of poor nutrition and diet, physical inactivity and obesity were eliminated, while leaving other risk factors unchanged.[6] Based on the average of percentages for US and UK, they estimated that at least 40% of cancers of the mouth, oesophagus, stomach, pancreas, colon and rectum, breast and uterus were preventable by changes in these risk factors.

Alcohol

Drinking alcohol is a known risk factor for cancer and there is sufficient evidence that alcohol consumption causes cancers of oral cavity, pharynx, larynx, oesophagus, liver, female breast cancer and colorectal cancer.[14] It is estimated that 5% of all cancers diagnosed in Australia are attributable to chronic use of alcohol.[15]

Occupation

The proportion of cancer attributable to occupational exposures has been estimated to range from 2% to 11%.[16] The known occupational carcinogens include certain chemicals (eg. benzene and vinyl chloride), dusts (eg. asbestos and wood dusts), radiation (eg. sunlight and radon) and industrial processes (eg. underground mining with exposure to uranium and/or radon).[1] Certain occupational exposures cause particular types of cancer, for example, asbestos causes mesothelioma.[1]

Sun exposure

The association of early life sun exposure and a prolonged latency period for the development of melanoma is well established.[17] It is estimated that more than 90% of melanoma can be attributed to sun exposure, with a similar population attributable fraction for squamous cell and basal cell carcinoma.[18] There have been ongoing primary prevention campaigns designed to reduce sun exposure and promote sun protection in Australia since the early 1980s.[19] The observed reduction in melanoma incidence in younger age groups and a similar stabilising of rates of non-melanoma skin cancer provides cautious support for the success of these programs.[20-22] These public health campaigns have been shown to have a positive influence on sun-related attitudes, along with some evidence that they have led to improved sun protection behaviours.[23,24]

However recently, issues surrounding the impact of sun protection programs and possible vitamin D deficiency have arisen.[25,26] The majority of vitamin D intake is provided by exposure of the skin to the sun, with only a small proportion obtained through the diet. Vitamin D deficiency has been found to be associated with some diseases such as osteoporosis, multiple sclerosis,[27] and more recently it has been suggested that vitamin D deficiency may be implicated in increasing the risk of some cancers,[28] as well as reduced survival.[29] Aiming to clarify the risks and benefits of sun exposure, professional health bodies released a joint statement in 2005.[30] However, despite this there continues to be increasing media attention,[31] and an increase in the general public's uncertainty about the role of sun protection in particular.[32,33]

Trends in known risk factors

The impact of primary cancer prevention efforts to reduce exposure to known risk factors is reflected in the direction of current trends. Unfortunately, with the exception of smoking prevalence, the picture is not very promising.

The proportion of daily smokers has declined by 40% from 1991 to 2010.[34] In 2010, 15.1% of those aged 14 years or older reported smoking daily.[34] With the time lag between smoking and onset of disease often more than 20-30 years, the full impact of the reduction in smoking prevalence will take considerable time to show in observed trends. However, lung cancer incidence rates have been decreasing for many years,[1] and it has been suggested that the current increasing trends among females will soon plateau and then start to decrease, consistent with the reduction in smoking prevalence.[35]

Other trends are not so encouraging. For example there has been little change in levels of physical activity since 1995,[36] if anything, more of the Australian population is sedentary than ever before, with percentages increasing from 31.5% in 2001,[37] to 35.2% in 2007-08.[36] To a large extent, this is due to changes in methods of transportation, increased television viewing time, increasing use of technologies such as computers and video games, and work practices that are more sedentary. Similarly, the prevalence of overweight and obesity in adults (aged 18 years and over) increased from 56.3% in 1995 to 61.4% in 2007-08 (not including those with unknown height and weight).[36] While the percentage of Australians aged 14 years or older who consumed alcohol daily declined slightly from 8.1% in 2007 to 7.2% in 2010,[36,38] harmful alcohol consumption has increased, from 8.3% in 1995 to 12.6% in 2007-08, although the latest estimate does represent a slight decrease from a peak in 2004-05.[36] There is also substantial scope for improvement in diet, with only 8.8% of Australians having the recommended amount of vegetable intake (five serves per day) and only 6.1% having adequate fruit and vegetable consumption in the 2007-08 survey.[36]

Impact of screening

When considering the possible influence of prevention efforts on cancer incidence, we also need to acknowledge that some incidence trends can reflect the impact of population screening programs and ad hoc testing of asymptomatic people rather than representing an underlying change in incidence. The most obvious example is prostate cancer, the most common cancer among males. While there is no population-based screening for prostate cancer in Australia, the introduction of PSA testing in the early 1990s, and subsequent increasing use, has directly impacted on trends in prostate cancer incidence.[39]

Currently, Australia has two established population health screening programs for breast cancer and cervical cancer, both introduced in 1991. Both influence incidence trends for the respective tumour types in different ways. Population-based mammography screening is designed to detect smaller, less invasive cancers.[40] It has been accompanied by some debate about possible over-diagnosis and overtreatment of breast cancers.[41-43] However, since its

introduction, while the breast cancer incidence rate for women aged 50-69 has increased by 18% in 2007 in Australia, breast cancer mortality has decreased by 32%.[3]

In contrast, the cervical cancer screening program using Pap smears is designed to detect and subsequently treat precancerous lesions, rather than detect cancerous lesions.[44] As such, its impact has been to significantly reduce both incidence and mortality of cervical cancer since 1991 by 45% and 49% respectively in women aged 20-69 years.[3] In addition, the introduction of a vaccine against the human papilloma virus, the most important risk factor for cervical cancer, has the potential to eradicate some variants of cervical cancer in the future.[45]

There has been a limited implementation of the National Bowel Cancer Screening Program, introduced in Australia in 2002,[46,47] incorporating a one-time immunochemical faecal occult blood test (FOBT) for people aged 50, 55 and 65 years. The current timing and breadth of the program is unlikely to have influenced current incidence trends. However, particularly with a full population-based screening program, it has the potential to reduce future colorectal cancer incidence through the detection and removal of colorectal adenomas.[48-50] It has been suggested that annual or biennial FOBT could reduce colorectal cancer mortality by 15-21%.[48,51,52]

In addition to the currently ad hoc Prostate Specific Antigen testing in Australia, there has also been a widespread increase in the number of ad hoc skin examinations conducted in general practice and dedicated skin cancer clinics.[53-55] This may have resulted in the documented increase in in situ and thin melanomas, and possible over-diagnosis.[56,57] A similar possibility has been suggested for thyroid cancer, with asymptomatic cancers identified by neck ultrasound and subsequent fine-needle aspiration biopsy.[58,59]

Combined, these formal screening and ad hoc asymptomatic testing programs have and are likely to continue to influence cancer incidence trends in Australia, and need to be kept in mind when considering any impact, or potential impact, that primary prevention efforts have on observed cancer trends.

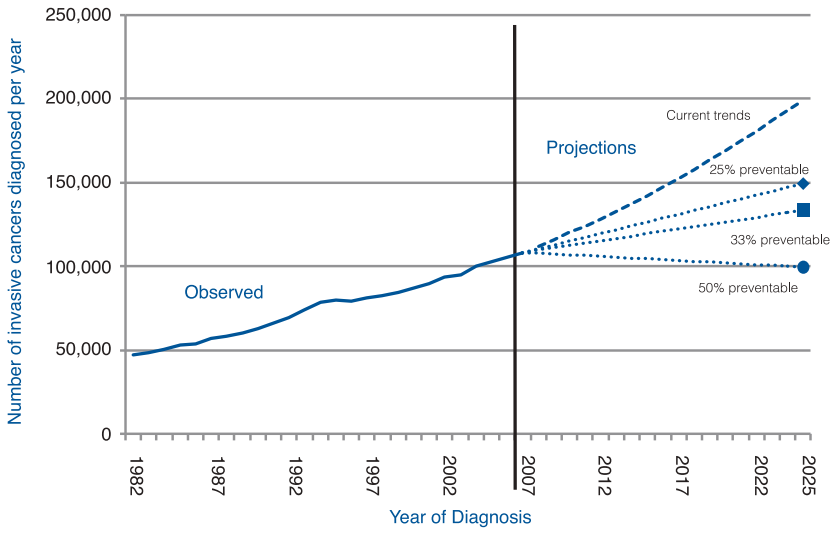
Where to from here?

In this paper we have specifically focused on the association between prevention and new diagnoses of cancer, rather than on cancer mortality. This is simply based on the understanding that in order to die from a cancer you first need to develop the cancer. So preventing the cancer developing in the first place will automatically have an impact, even if a delayed one, on mortality irrespective of advances in treatment and other management strategies. Prevention activities have much potential to impact on the future burden of cancer in Australia.

To examine the potential impact of primary prevention we estimated the number of cancers that would be diagnosed in 2025 by applying age and sex-specific population projections (Series "B"),[60] to current age and sex-specific cancer incidence rates. The series "B" population projections largely reflects current trends in fertility, life expectancy at birth, net overseas migration and net interstate migration This method assumes that the age and sex-specific cancer incidence rates averaged over the years 2005-2007 will be constant through to 2025. The eventual validity of this assumption cannot be determined, particularly in relation to the future directions of the obesity epidemic and the impact of declining smoking rates. However, a similar modelling process was used recently for a major US study,[61] and the overall Australian cancer incidence rates since 1998 have increased by less than 2% per year.[3] To assess the number of cancers that could be prevented we used published figures of one-third preventable cancers.[6] We additionally examined the number of incident cases that could be prevented based on different estimates of preventability.

Based on population growth and aging, it has been estimated that about 170,000 new cancers (excluding non-melanoma skin cancer) will be diagnosed in the year 2025.[4] Figure 1 presents a graph showing the total number of incident cases observed in Australia from 1982 to 2007 and the total number of expected cases from 2008 to 2025, joined with three estimates of the number of cases that could be prevented based on 25%, 33% and 50% preventability.

Figure 1: *Potential impact of prevention programs on projected incidence of invasive cancer in Australia.*



The top line represents the total number of incident cancers in Australia (observed 1982-2007; projected 2008-2025). The three dotted lines (25%, 33%, 50%) are the projected lines joining the observed data with the projections for 2025 based on different estimates of preventable cancers. For example, the line marked '25% preventable' reflects the projected incidence trends in cancer cases if 25% of the projected cancers were able to be prevented by the year 2025.

Thus one third of these cancers could be prevented by implementing appropriate preventive interventions now, potentially preventing nearly 57,000 new cancers in 2025 alone. Even preventing a quarter of cancers would mean that by 2025 around 42,000 fewer cancers would be diagnosed.

Clearly, in terms of reducing the overall burden of cancer in the community, primary prevention efforts are just one of several methods, coming alongside earlier detection and diagnosis of cancers and improved management techniques for diagnosed cancers. Much of the increase in survival outcomes and accompanying lower mortality rates for many cancers has been attributed to improvements in treatment.[62,63] However, despite their increasing utility in treating the diagnosed cancer, in addition to becoming more expensive, cancer treatments are still associated with a variety of side-effects.[64,65]

There is also much we don't know. Complicating any preventive efforts is that the causes of many cancers are currently not known. For example, while there are some established socio-demographic risk factors for prostate cancer,[66] the modifiable causes are still unknown, limiting any effective prevention efforts.[67] This is of concern since if current trends continue, the increase in prostate cancer incidence will mean that prostate cancer will account for about 20% of the total projected cancer counts in 2025.[4] Although the impact is lower, there is a similar lack of knowledge about the preventable risk factors for non-Hodgkin's lymphoma.[68] Further research is critical to better understand and quantify the causes of specific cancer types, and the importance of primary prevention underscores this urgency.

Increasing the relevance of primary prevention is that many of the lifestyle changes required will also impact on the incidence of other chronic diseases such as diabetes, hypertension, heart disease and stroke,[11] thus improving the overall health of the Australian population. There is also the potential for primary prevention efforts to reduce the current inequities in cancer outcomes specifically in relation to where people are living in Australia. There is a consistency between poorer cancer outcomes based on increased remoteness or area disadvantage,[39,69] and evidence of poorer diet, lower physical activity and greater obesity in these areas.[70-74]

There can be no denying that the goal of reducing cancer incidence through primary prevention will be difficult. While the key prevention messages are simple, the design and implementation of large-scale prevention programs or interventions that address diet and nutrition, exercise, healthy weight, smoking cessation and other behaviours are often complex and expensive. Lifestyle behaviours such as exercise are compounded by a trend towards increased sedentary behaviour associated with electronic work-related and recreational pursuits, suburban-orientated lifestyles requiring greater use of motor vehicle transport and greater demands on people's time, meaning that exercise requirements are often placed on a lower priority compared to competing demands or interests.

While the cost of large-scale prevention programs may be significant, when compared with the costs of treatment, prevention efforts have the potential to be a very cost-effective intervention for governments.[75] In the context of expenditure on health care, in 2007-2008 only 2% of Australia's total health expenditure was spent on preventive services or health promotion.[76] It also needs to be recognised that the time lag between a prevention intervention or program and reductions in cancer incidence is likely to be substantial, as has been shown with tobacco control and lung cancer incidence. However, this same example demonstrates that interventions can be successful over the long-term, and the prevention programs and government policies gradually implemented up to 20 or 30 years ago are now reaping their benefits.

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SUPPORT FOR RESEARCH 2012

The state and territory Cancer Councils, which comprise the member bodies of Cancer Council Australia, are the major sponsors of cancer research and related activities in Australia. Grants are made following competitive, peer-reviewed assessment of funds derived from donations and bequests.

In 2012, the value of these grants is more than $44 million.

Please note: for research grants spanning more than one year, only funds to be dispersed in 2012 have been included.

CANCER COUNCIL ACT

Research grants

J Altin The Australian National University	A new plasmid DNA delivery system - for vaccine development and cancer immunotherapy	$37,000
TOTAL RESEARCH FUNDED		**$37,000**

CANCER COUNCIL NSW

New research project grants

Tracy Bryan University of Sydney	Involvement of helicase DHX36 in human telomere maintenace	$97,508
Scott Cohen University of Sydney	Structure and inhibition of the human telomerase enzyme complex	$120,000
Sue Firth University of Sydney	IGFBP-3 enhances autophagy to promote breast cancer cell survival during stress	$120,000
Beric R Henderson University of Sydney	Novel regulation of beta-catenin intracellular transport and its role in cell polarity and migration	$120,000
Megan Hitchins University of New South Wales	The mechanistic basis for prediction of response to alkylating chemotherapy in high grade glioma patients by molecular markers of MGMT activity	$113,726
Geraldine M O'Neill University of Sydney	A sting in the tail: focal adhesion targeting and mechanotransduction	$108,723
Nicole M Verrills University of Newcastle (Co-funded with Cure Cancer Australia Foundation)	Activating a tumour supressor for leukaemia therapy	$80,000
Stuart G Tangye Garvan Institute of Medical Research	Mechanisms underlying impaired anti-EBV immune responses in the absence of SAP	$118,570
Total New Research Project Grants		**$878,527**

2012 Priority-driven Collaborative Cancer Research Scheme

Dr Kerrie L McDonald University of New South Wales	Mechanisms underpinning how brain cancer cells respond to drugs	$160,000
Dr Gianluca Severi Cancer Council Victoria	Risk and Prognostic Factors for Glioma in Australia	$91,840
Dr Anna Nowak University of Western Australia	Phase III trial of Concurrent and Adjuvant Temozolomide chemotherapy in non-1p/19q non deleted anaplastic glioma. The CATNON Intergroup Trial.	$20,736
Total 2012 Priority-driven Collaborative Cancer Research Scheme		**$272,576**

Continuing Research Project Grants

Mark Baker Macquarie University	A Colorectal Cancer "Interactome" Paradigm that Influences Patient Survival	$100,000
Robert C Baxter University of Sydney	Targetting IGFBP-3 signalling pathways as a novel therapeutic approach in triple-negative breast cancer	$119,614
Linda Bendall University of Sydney	The role of sphingosine-1-phosphate in haematopoietic stem cell egress from the bone marrow	$120,000
Tracy Bryan University of Sydney	G-quadruplex stabilisers as cancer therapeutics	$97,508
Tracy Bryan University of Sydney	Recruitment of human telomerase to telomeres	$120,000
Megan Chrircop University of Sydney	Drynamin as a new drug target for the treatment of glioblastoma	$120,000
Anna deFazio University of Sydney	Pathways of malignant progression in ovarian cancer	$119,500
Peter Greer University of Newcastle	Does the initial treatment plan predict doses delivered to normal tissues during prostate radiation therapy	$116,598
Peter Greer University of Newcastle	Real-time dose monitoring for patient safety in radiation therapy	$120,000
Beric Henderson University of Sydney	Regulation of APC intracellular dynamics and function	$120,000
Viive Howell University of Sydney	New opportunities for the study of ovarian cancer through caracteristation of mouse models	$114,508
Maija Kohonen-Corish Garvan Institute of Medical Research	Functional characterisation of the putative tumour suppressor gene MCC in colorectal cancer	$120,000
Tao Liu University of NSW	The critical role of the histone demethylase JMJD1A in cancer	$110,250
Tao Liu University of NSW	Targeting Myc onco-protein degradation for the treatment of Myc-induced malignancies	$106,500
Richard Lock University of NSW	Predicting the in vivo sensitivity of paediatric acute lymyphoblastic leukaemia to BH3-mimetic drugs	$109,750
Guy Lyons University of Sydney	Restoring epithelial differentiation to squamous cell carcinomas	$120,000
Karen MacKenzie University of NSW	The prognostic and therapeutic significance of dyskerin and telomerase enzyme activity in neuroblastoma	$117,508
Finlay Macrae Melbourne Health	The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers	$114,490
Bettina Meiser University of NSW	Too much, too soon? The impact of treatment-focused genetic testing in patients newly diagnosed with breast cancer	$22,020
John Rasko University of Sydney	The role of small non-coding RNAs (sncRNAs) in alternative splicing	$119,658
John Rasko University of Sydney	Dissecting the multi-component machine that controls chromatin architecture	$120,000
Phillip Vial University of Sydney	A next generation detector for radiotherapy treatment verification with dual capability for simultaneous imaging and dosimetry	$110,376
Robyn Ward University of NSW	Role of dietary compounds on PGC-1alpha methylation in colorectal cancer	$97,352
Robyn Ward University of NSW	Laterally spreading tumours of the colorectum: an alternative pathway of colorectal cancer development in the Western world	$120,000
Xu Zhang University of Newcastle	Targeting pro-survival mechanisms to sensitize human melanoma to immunotherapy	$119,750
Total Continuing Research Project Grants		**$2,775,382**

Continuing Research Project Grants

Philip Hogg University of NSW	Metabolism inhibitors for the treatment of brain and pancreatic cancer	$450,000
Lisa Horvath University of Sydney	Building capacity in pharmacogenomics across NSW: PRIMe (Pharmacogenomic Research for Individualised Medicine)	$300,000
Murray Norris University of NSW	Toward cure of childhood ALL: improved diagnostics, therapeutics and prevention strategies	$450,000
Chris Ormandy Garvan Institute of Medical Research	Personaling breast cancer management by discovering the transcriptional basis for tumour phenotype	$449,992
Roger Reddel Westmead	Alternative Lengthening of Telomeres: from basic biology to drug discovery	$450,000
Total Research Program Grants		**$2,099,992**

New Strategic Research Partnership Grants

Prof Rob Sanson-Fisher University of Newcastle	New 3C	$400,000

Continuing Strategic Research Partnership Grants

Andrew Biankin Garvan Institute of Medical Research	Genotype guided cancer therapy (Genomic Theranostics)	$300,000
Jacob George University of Sydney	Epidemiology, prevention and management of liver cancer in NSW: Towards a strategic research partnership	$250,000
Kerrie McDonald University of New South Wales	Clinical Outcomes and Genetic Epidemiology of high grade Glioma: COGEG	$247,030
David Whiteman Queensland Institute of Medical Research	PROBE-NET : Progression of Barrett's Esophagus to Cancer Network	$189,758
Total Strategic Research Partnership Grants		**$986,788**

International Cancer Genome Consortium (ICGC)

Andrew Biankin Garvan Institute of Medical Research		$500,000
Total International Cancer Genome Consortium Grants		**$500,000**

International Cancer Genome Consortium (ICGC)

Cancer Epidemiology Research Unit (CERU) - Internal + External (Excluding NHMRC funding)	$3,164,294
45 and Up Cohort Study	$300,000
Test the acceptability and feasibility of Chronic Hepatitis B (CHB) screening, ongoing CHB management and liver cancer prevention in SouthWest Sydney	$184,000

Commissioned research projects

The construction and experience of fertility in the context of cancer: patient, partner and health professional perspectives	$30,000
Food labelling research	$40,000
Skin cancer prevention in people with darker skin - an investigation of knowledge, attitudes and behaviours	$40,000
Skin cancer prevention in outdoor workers - an investigation of knowledge, attitudes and behaviours	$30,000
Impact of tobacco retail outlets on smoking behaviours	$50,000
Youthlink - The Healthy Lifestyle Group Program to promote smoking cessation and reduce other disease risk behaviours	$25,000
Improving cancer treatment systems: a randomised controlled trial of a consumer action model for cancer patients receiving chemotherapy	$24,000
Tackling Tobacco evaluation	$40,000
Survey of members of parliament on views about cancer control	$50,000
Total Other Research Programs and Commissioned Research	**$3,977,294**
TOTAL RESEARCH FUNDED	**$11,490,559**

CANCER COUNCIL QLD

Research Grants 2012-2013

2012-2013

H Blanchard Griffith University	Design of inhibitors targeting the tumour promoting protein Galectin-1	$99,725
G Boyle Queensland Institute of Medical Research	Does "phenotype-switching" control melanoma proliferation, invasion and metastasis?	$99,428
M Brown The University of Queensland	Transcriptional regulation of non-code RNA genes implicated in breast cancer	$100,000
R Chess-Williams Bond University	Cytotoxic drugs, urothelial function and the ageing bladder	$90,593
J Clements Queensland University of Technology	Kallikrein proteases are key players in the ovarian tumour-stroma microenvironment	$100,000
M Cummings The University of Queensland	Re-defining the molecular evolution of breast cancer and its precursors	$100,000
C Farah The University of Queensland	Oral epithelial stem cell markers as a platform for better diagnosis of mouth cancer	$100,000
K Fong The University of Queensland	Detection of treatment-responsive lung cancer mutations	$95,450
B Gabrielli The University of Queensland	Defining a response to UV exposure that is defective in melanoma	$100,000
S Hayes Queensland University of Technology	LEGS follow-up: Lymphoedema Evaluation following Gynaecology Cancer Study	$99,225
N Hayward Queensland Institute of Medical Research	Characterisation of novel melanoma susceptibility genes through whole-genome sequencing	$99,362
T Holt Princess Alexandra Hospital	SCORAD III -- a randomised phase III trial comparing the effect on ambulation rate of single fraction radiotherapy to multifraction radiotherapy in patients with metastatic spinal cord compression	$64,000
J Hooper Mater Medical Research Institute	A novel molecular pathway in cancer	$100,000
B Leggett Queensland Institute of Medical Research	Molecular and clinical features of serrated adenomas that predict risk of malignant transformation and risk of development of further polyps	$98,725
M McGuckin Mater Medical Research Institute	Targeting MUC13 to sensitise colorectal cancer cells to apoptosis	$92,499
P Mollee Princess Alexandra Hospital	Catheter-related bloodstream infections in adults with cancer: a prospective randomised controlled trial	$87,400
P Pollock Queensland University of Technology	Genomic analysis of serous endometrial cancer and development of in vitro and in vivo models	$100,000
N Saunders The University of Queensland	Dysregulated H3K27me3 contributes to differentiation-insensitivity and squamous cell carcinoma development	$100,000
A Suhrbier Queensland Institute of Medical Research	The function of Sin1 isoforms in mTORC2 and Ras signalling	$100,000
I Vetter The University of Queensland	The pharmacology and molecular mechanisms of ciguatoxin-induced cold allodynia	$30,000
G Walker Queensland Institute of Medical Research	An ultraviolet radiation-induced inflammatory response involving infiltrating macrophages drives melanocyte proliferation and triggers melanoma development	$100,000
I Winkler Mater Medical Research Institute	Characterisation and manipulation of bone marrow niche factors regulating Myeloid Leukaemia Stem Cell fate	$99,723
C Yu The University of Queensland	Novel photodynamic therapy for targeted skin cancer treatment: an integrated bionanotechnology	$100,000
Total		**$2,156,130**

2011-2012		
J Bowles	The Nodal/Cripto signalling pathway in male germ cell development: relevance to testicular germ cell tumours	$100,000
I Frazer	Investigating the mechanisms by which immune cells (particularly T cells and NKT cells) target and eliminate cells expressing tumour antigens	$97,394
E Hacker	The response of human melanocytes in vivo to sunlight	$98,300
N Hayward	Identification of novel methylated tumour suppressor genes in melanoma	$99,736
G Hill	Therapeutic targeting of adhesion and costimulatory pathways after transplantation.	$100,000
R Khanna	Novel immunotherapy for herpes virus infection in stem cell transplant patients.	$97,508
K Khanna	Understanding the contribution of DNA repair genes in breast cancer metastasis	$99,736
F Macrae	The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers	$100,000
N McMillan	Development of nanoparticle mucosal delivery systems for siRNA-based cancer therapies	$89,000
J Neuzil	Transcription factors from the FoxO family regulate apoptosis induced by mitochondria-targeted drugs	$100,000
L Richards	Suppression of high-grade glioma by Nfib overexpression	$98,226
R Sturm	Investigating the BRN2/MITF axis in melanoma sphere formation and as a therapeutic target for metastatic melanoma	$87,508
J van der Pols	Sun protection and vitamin D	$42,925
P Yates	Achieving needs-based end-of-life services: A prospective, longitudinal study of pathways for advanced cancer patients	$100,000
J Young	Exome capture, miRNA and next generation sequencing in probands with hyperplastic polyposis	$100,000
M Francois	A novel role for SOX18 in regulating neo-lymphangiogenesis and tumour metastasis	$100,000
M Roberts	Skin bioavailability and targeted skin delivery by topical application	$85,000
Total		**$1,595,333**
Total Research Grants		**$3,751,463**

Strategic research partnership grant (2009-2013)

R Gardiner	University of Queensland	$250,000
Total strategic research partnership grant		**$250,000**

Fellowships

Senior research fellowships

N. Saunders Diamantina Institute, University of Queensland	$142,696
K MacDonald QIMR	$127,544
G Walker Queensland Institute of Medical Research	$135,121
M Kimlin Queensland University of Technology	$142,696
Fellowships Total	**$548,057**

PhD scholarships

2012-2014

Marissa Daniels University of Queensland	$30,000
Mark Bettington QIMR	$30,000

2011-2013		
Donald McLeod QIMR		$30,000
Bryony Thompson QIMR		$30,000
2011-2012		
A Neill Queensland Institute of Medical Research		$26,445
PhD scholarship program total		**$146,445**
Other grants		
Travel grants and Travelling Fellowships		$85,000
Australian paediatric cancer registry		$120,570
Other grants total		**$205,570**
Clinical trial data manager grants		
Holy Spirit Northside Private Hospital		
Gold Coast Hospital		
Greenslopes Private Hospital		
Mater Hospital		
Nambour General Hospital		
Premion		
Princess Alexandra Hospital	– Division of surgery – Haematology and medical oncology department – Radiation oncology department	
Radiation Oncology Services	– Mater Centre	
Royal Brisbane and Women's Hospital	– Gynaeoncology – Medical oncology – Radiation oncology – Surgery (Brisbane Colorectal Group)	
Royal Children's Hospital		
The Prince Charles Hospital		
The Wesley Research Institute		
Toowoomba Hospital		
Toowoomba Regional Cancer Research Centre		
Townsville Hospital		
Data managers total		**$1,220,800**
Epidemiology and psycho-oncology research programs		
Prostate cancer and supportive care outcomes trial		
Prostate cancer sexuality intervention		
Trial of mindfullness intervention for men with advanced prostate cancer		
Trial of a telephone-delivered rehabilitation program for colorectal cancer patients		
ProsCan for Life		
Breast Cancer Outcomes Study		
Lung Cancer and Stigma Study		
Chemobrain Study		
Descriptive Epidemiology Reports		
Geographical inequalities in Survival from Colorectal Cancer		
Beating the blues after cancer		
Epidemiology and psycho-oncology research programs total		**$3,124,000**
TOTAL RESEARCH FUNDED		**$9,246,335**

CANCER COUNCIL SA

BEAT CANCER PROJECT - A joint initiative of Cancer Council SA, South Australian Health and Medical Research Institute, SA Health and University of Adelaide, University of South Australia and Flinders University

Research grants

Dr Tina Bianco-Miotto University of Adelaide	An early obesogenic environment and prostate cancer	$87,500
Professor Andrew Zannettino Unversity of Adelaide	Does modifying the bone marrow stromal microenvironment alter the disease course of multiple myeloma?	$99,171
Dr Phulwinder Grover University of Adelaide	Investigation of circulating cancer stem cells in the blood of patients with colon cancer as a cause of secondary spread to the liver	$100,000
Professor Junia Vas de Melo University of Adelaide	Transcriptional and post-transcriptional regulation of the BCR-ABL gene in chronic myeloid leukaemia	$100,000
Dr Paul Drew University of Adelaide	Oesophageal adenocarcinoma from patients with or without Barrett's oesophagus: different gene expression and DNA methylation profiles, biomarkers for survival and response to treatment, and cancer biology?	$87,500
Dr Carmela Ricciardelli University of Adelaide	Annexin A2: a novel biomarker and therapeutic target for ovarian cancer	$93,723
Dr Amanada Townsend University of Adelaide	Impact of the activated EGFR-AKT-mTOR signalling pathway on prognosis and tumour resistance to anti-angiogenic targeted therapy for metastatic colorectal cancer	$92,678
Professor Greg Barritt Flinders University	Molecular mechanisms of rapamycin action on the liver	$92,319
Dr Yeesim Khew-Goodall University of Adelaide	Inhibiting cancer-associated fibroblasts activation in breast cancer by miR-29	$98,500
Professor Bogda Koczwara Flinders University	Improving return to employment of cancer patients treated with curative intent chemotherapy - a randomised controlled clinical trial of a shared care return to work rehabilitation plan versus usual care	$48,098
Professor Doug Brooks University of South Australia	Enabling Helicobacter pylori eradication by the innate immune system	$98,500
Total Research Project Grants		**$997,989**

Chairs in Cancer Research**

University of Adelaide	$250,000
Flinders University	$250,000
University of South Australia	$250,000
Total Research Chairs	**$750,000**

Research Fellowships and Senior Research Fellowships**

Professor Ross Butler University of South Australia	Novel non-invasive detection of early oesphageal and gastric dysplasia and neoplasia	$105,000
Dr Loretta Dorstyn University of Adelaide	Characterisation of the role and mechanisms of caspase-2 in tumour suppression	$100,000
Professor Gordon Howarth The University of Adelaide/Women's & Children's Hospital	Strategically developed bioactive nutraceutical formulations will prevent, or reduce the severity of, experimentally-induced intestinal mucositis	$100,000
Dr Carmela Ricciardelli Women's & Children's Hospital	The tumour microenvironment: Identification of novel cancer biomarkers and therapeutic targets	$105,000
Dr Philip Gregory The University of Adelaide	Discovery and functional characterisation of novel microRNAs and other non-coding RNAs that regulate epithelial-mesenchymal transition and breast cancer metastasis	$95,000
Dr Spomenka Simovic University of South Australia	Advanced therapeutic strategies for oral administration of anticancer drugs	$95,000
Total Research Fellowships		**$600,000**

Infrastructure Grants**

Dr Carole Pinnock Repatriation General Hospital	Clinical Prostate Cancer Data Base	$55,000
Professor Leun Bik To SA Pathology	SA Blood Cancer Tumour Bank	$240,000
Professor Wayne Tilley University of Adelaide/Hanson Institute	SA node of Australian Prostate Cancer Bioresource	$35,000
Professor Sharad Kumar SA Pathology	Purchase cell sorter	$50,000
Total Infrastructure Grants		**$380,000**

Other research grants

Data managers program**		
	Prostate Cancer	$14,875
	Familial Cancer Unit	$28,000
	RAH	$21,450
	FMC	$11,000
	TQEH	$7500
	Lyell McEwin Hospital	$4300
	Ashford Cancer Centre	$7500
	Women's & Children's Hospital	$3300
Micro-array facility**		$22,500
Travel Grants, Distinguished Visitors, PhD Top-ups**		$50,000
SANT Data Link**		$100,000
Total other research grants		**$270,425**
TOTAL RESEARCH FUNDED		**$2,998,414**

* Based on calendar year 2012
** Based on financial year to end 30 June 2012
All figures are based on budgeted figures.

RESEARCH ADMINISTERED AND FUNDED SOLELY BY CANCER COUNCIL SA*

Cancer Council SA

Peter Nelson Leukaemia Research Fellowship

H Ramshaw IMVS Hanson Institute		$100,000

Senior research fellowships

L Butler*	Androgen signalling in the normal human breast: role and implications for breast cancer risk, Dame Roma Mitchell Cancer Research Laboratories, Adelaide University Hanson Institute	$20,780

Research fellowships

N Moore	Medroxyprogesterone acetate (MDA) action in the normal human breast: implications for breast cancer risk in suers of hormone replacement therapy, Dame Roma Mitchell Cancer Resarch Laboratories, Adelaide University Hanson Institute	$67,427

W Bruce Hall cancer research fellowship

T Bianco-Miotto	Epigenetic mechanisms and theapies in prostate cancer, Dame Roma Mitchell Cancer Research Laboratories, Adelaide University Hanson Institute	$88,158

W Bruce Hall cancer research fellowship

Chair in Cancer Prevention (Behavioural Science)		$324,000
SA Cancer Genome Facility		$105,000
Organisational Grants		$46,977
TOTAL RESEARCH FUNDED		**$752,342**

CANCER COUNCIL TASMANIA

Research Grants

CCTAS NHMRC Grant		
J Dickenson	Prostate cancer risk variants in integrin genes and their role in prostate cancer development	$46,232

Small Grants Program

To be announced May 2012		$40,000

Chemist Warehouse Emerging Researcher

To be announced May 2012		$8000

Funded by David Collins Leukaemia Foundation (DCLF)

$46,232

Cancer Council Tasmania Fellowship

Stuart Ferguson	Investigating support interventions to improve quit rates of smokers	$92,464

Other

Royal Hobart Hospital	Data Management Clinical Trials	$32,500
Launceston General Hospital	Data Management Clinical Trials	$37,500

Scholarships

Jeanne Foster Scholarships		$5000
Athena Karydis Foniadakis Scholarship		$5000
Cancer Council Tasmania Honours	UTAS Honours Student	$10,000
TOTAL RESEARCH FUNDED		**$322,928**

Scholarships

R Turner, P B Bloomfield, M O O'Sullivan	The Tasmanian Womens' Anal Neoplasia Study	$12,000
J Charlesworth, A Holloway, J Dickenson	Epigenomics of familial prostate cancer	
J A Staal, Tracey Dickson	The inhibition of malignant glioma proliferation using novel taxol-like derivatives that are capabile of crossing the blood brain barrier	$7,000
CCTas NHMRC Grant (Dr Greg Woods)	Role of Vitamin D3 and metallotheinein	
TOTAL RESEARCH FUNDED		**$341,928**

CANCER COUNCIL VICTORIA

Fellowships

Carden fellowship

D Metcalf Walter and Eliza Hall Institute of Medical Research	Regulatory control of normal and leukaemic cells	$243,000

Lions fellowship

A Ng Walter and Eliza Hall Institute of Medical Research	Identification of genetic factors involved in haematopoeisis and the development of blood cancers	$16,000 (approx)

Dunlop fellowship

C Scott Walter and Eliza Hall Institute of Medical Research	The generation of improved mouse models of high-grade serous ovarian cancer for preclinical development of therapeutics for women with ovarian cancer	$300,145
Total fellowships		**$559,145**

Research grants-in-aid

M Buchert, M Ernst Ludwig Institute for Cancer Research	Molecular elucidation of PI-3K/mTor pathway as a therapeutic target in inflammation-associated (gastrointestinal) cancers	$100,000
I Campbell, A Trainer, L Lipton, P James, M Doyle Peter MacCallum Cancer Centre	Identification of novel genes predisposing to familial colorectal cancer by full exome sequencing	$100,000
A Dobrovic, T Mikeska Peter MacCallum Cancer Centre	Constitutional DNA methylation: a new paradigm for predisposition to lung cancer	$100,000
C Hawkins, D Curtis, E Algar La Trobe University	Are direct apoptosis inducers less mutagenic than chemotherapy drugs?	$98,725
J Hopper, J Stone, C Apicella, E Makalic, D Schmidt, R MacInnis The University of Melbourne	Mammographic density of young women and their relatives	$99,997
P Humbert Peter MacCallum Cancer Centre	The role of cell polarity regulators in mammary gland development and breast cancer	$100,000
R Johnstone, Peter MacCallum Cancer Centre	Defining the apoptotic and therapeutic activities of histone deacetylase inhibitors	$98,723
P Lobachevsky, R Martin, O Martin Peter MacCallum Cancer Centre	Radioprotection by combination of DNA binding antioxidants and aminothiol radical scavengers	$100,000
M McCormack, W Shi Walter and Eliza Hall Institute of Medical Research	Identifying commonality amongst T cell oncogenes	$100,000
W Phillips Peter MacCallum Cancer Centre	Identifying genetic changes that cooperate with PIK3CA mutation	$100,000
A Scott, V Pillay, J Mariadason, N Tebbutt Ludwig Institute for Cancer Research	siRNA therapies for colorectal cancer	$100,000
J Waithman Ludwig Institute for Cancer Research	The initiation of the cellular immune response to cutaneous melanoma	$98,418
Total new research grants-in-aid		**$1,195,863**

Continuing research grants-in-aid

R Anderson Peter MacCallum Cancer Centre	Regulation of breast cancer metastasis by bone morphogenetic protein 4	$100,000
L Bach, G Rice Monash University	Insulin-like growth factor binding protein-6 and ovarian cancer	$97,508
C Christophi, E Ager, P Angus, V Muralidharan Austin Health	Mechanisms of renin angiotensin system-regulated growth of colorectal liver metastases	$90,076
P Ekert, A Lopez Walter and Eliza Hall Institute of Medical Research	Transcriptional and post-translational mechanisms regulating apoptosis in cytokine receptor signalling	$100,000

P Ekert, A Lopez Walter and Eliza Hall Institute of Medical Research	Transcriptional and post-translational mechanisms regulating apoptosis in cytokine receptor signalling	$100,000
K Harvey Peter MacCallum Cancer Centre	Phosphorylation-mediated regulation of the Hippo tumour suppressor pathway	$100,000
D Izon, A Wei St Vincent's Institute	Identification of leukaemia-initiating cells in mixed lineage leukaemia	$100,000
B Jenkins Monash Institute of Medical Research	Novel regulation of microRNAs by cytokine signalling pathways in gastric inflammation and cancer	$98,736
M Kershaw, P Darcy Peter MacCallum Cancer Centre	Investigations into differential responses to immunotherapy of orthotopic tumours compared to subcutaneous tumours	$100,000
F Macrae, A Boussioutas, J Clarke, D Topping, S Toden, P Lynch, A Spigelman, M Appleyard, P Hollington, H Ee, D Cameron Melbourne Health	The effects of butyrylated high amylose maize starch on polyposis in FAP volunteers	$100,000
B Mann, A Skandarajah, A Rose, B Chua, J Forbes Melbourne Health	PROSPECT -- Post-operative Radiotherapy Omission in Selected Patients with Early breast Cancer Trial	$96,654
B Parker, P Hertzog Peter MacCallum Cancer Centre	Silencing of Irf7 expression in breast cancer cells as a mechanism of immune escape during metastasis	$99,508
M Smyth, M Teng Peter MacCallum Cancer Centre	Immunoregulation of the tumor microenvironment	$99,736
J Cebon Ludwig Institute for Cancer Research	Regulatory T cells specific for human tumour antigens	$90,250
P Fuller, A Drummond Prince Henry's Institute of Medical Research	Molecular pathogenesis of granulosa cell tumours of the ovary	$100,000
Y Haupt Peter MacCallum Cancer Centre	A role for E6AP in the regulation of p53 in response to stress	$100,000
R Hicks, G McArthur, J Desai Peter MacCallum Cancer Centre	The role of glucose metabolism in oncogene addiction	$98,250
L Purton, K W Ng St Vincent's Institute of Medical Research	Roles of retinoic acid receptors in bone and haemopoiesis	$100,000
J Rood, M Brown, G Carter Monash University	Clostridium-directed enzyme prodrug therapy (CDEPT): an innovative approach to treating cancer	$96,250
J Rossjohn, J McCluskey Monash University	A structural and functional investigation into tumour rejection by NKT cells	$99,250
S Selemidis, E Williams, G Drummond Monash University	Novel pharmacological targets for suppression of tumour angiogenesis	$100,000
M Southey, D Goldgar University of Melbourne	Identification of the breast cancer susceptibility gene on chromosome 4 with next generation sequencing	$89,800
T Stewart Peter MacCallum Cancer Centre	Use of anti-CCL2 mAb therapy as an adjuvant to reduce tumour growth and tumour-induced immunosuppression	$9,615
Total continuing research grants-in-aid		**$2,065,633**

Postdoctoral research fellowships

H Do Peter MacCallum Cancer Centre	Improved detection of clinically important mutations in lung cancer	$68,725
TBA (to commence January 2012)		$68,725
D Miles Monash Institute of Medical Research	Defining the genetic basis of testis cancer	$33,754
D Zotos Walter and Eliza Hall Institute	The contribution of Bcl-6 to B cell derived tumours of varying origins	$33,754
Two fellowships to be appointed mid-year		$68,725
Total postdoctoral research fellowships		**$273,683**

Postgraduate research scholarships

F Chang	Murdoch Children's Research Institute	$29,580
M Christie	Ludwig Institute for Cancer Research	$6565
G Ryan	Monash Institute of Pharmaceutical Sciences	$29,580
E Valente	Walter & Eliza Hall Institute	$7277
AK Win	University of Melbourne	$39,270
Four 'science' and two 'medical' postgraduate scholarships to commence January 2012		$209,500
Total postgraduate research scholarships		**$321,772**

Other

21 summer Vacation Studentships were awarded	$30,750
Support for medical and scientific activities	$297,000
Total other	**$327,750**

Clinical research

Cancer Council supports clinical research via the Cancer Trials Management Scheme, which aims to increase clinical trial recruitment by funding on-site trial coordinators. In 2012, Cancer Council Victoria will contribute $600,000 to more than 40 research departments across the State.	$600,000

Victorian Cancer Biobank

The Victorian Cancer Biobank (Biobank) is an infrastructure platform that supports cancer researchers in academia and industry. The Biobank supplies biospecimens from cryostorage and supports clinical and translational research studies by providing the service of processing samples according to study specific protocols.	$2,300,000

Cancer control research

Cancer Epidemiology Centre	$4,794,000
Victorian Cancer Registry	$3,453,000
The Melbourne Collaborative Cohort Study (Health 2020)	$1,062,000
Centre for Behavioural Research in Cancer	$4,197,000
Knowledge Building (Tobacco Control Unit)	$908,000
Total cancer control research programs	**$14,414,000**
TOTAL RESEARCH FUNDED	**$22,057,846**

CANCER COUNCIL WESTERN AUSTRALIA

Cancer Council WA

Research Project Grants 1st year

B Klopcic School of Medicine & Pharmacology (UWA)	The effect of intratumoural CpG-Oligodeoxynucleotide delivery on the tumour microenvironment in mouse models of colorectal cancer	$90,000
G Yeoh School of Biomedical, Biomolecular & Chemical Sciences (UWA)	Establishing the cellular and molecular mechanisms which link liver progenitor cells, inflammation and hepatocellular carcinoma	$90,000
F Pixley School of Medicine & Pharmacology (UWA)	Identification of pY721 CSF-1R activated signalling pathways that regulate macrophage migration and tumour progression	$90,000
C Robinson School of Medicine & Pharmacology (UWA)	A high fidelity model of malignant mesothelioma	$87,500
A Nowak School of Medicine & Pharmacology (UWA)	Characterisation and predictive value of the human cellular immune response to chemoimmunotherapy with cisplatin, pemetrexed, and CD40 activation	$89,983
D Joseph Radiation Oncology (SCGH)	Verification of long-term outcomes of the randomised TARGIT trial: TARGeted Intraoperative radioTherapy for early breast cancer	$45,000

C Bond School of Biomedical, Biomolecular & Chemical Sciences (UWA)	Dissecting the molecular role of DBHS oncoproteins in gene regulation	$89,853
E Ingley Centre for Medical Research (WAIMR)	Control of nuclear/cytoplasmic shuttling by Liar	$90,000
D Joske Department of Haematology (SCGH)	A pilot study of the effect of green tea polyphenols in untreated patients with early stage chronic lymphocytic leukaemia	$90,000
G Lee School of Medicine & Pharmacology (UWA)	A multicentre randomized study comparing indwelling pleural catheter vs talc pleuodesis in patients with a malignant pleural effusion	$61,807

Research Project Grants 2nd year

R London School of Biomedical, Biomolecular & Chemical Sciences (UWA)	The balance of proliferation and cell death signalling in growth, differentiation and transformation of liver stem/progenitor cells	$90,147
B Robinson School of Medicine & Pharmacology (UWA)	Determining the phenotype and function of cells in the tumour environment that suppress CD8 T cell function and proliferation during anti-PD-L1 tumour therapy	$80,000
Total research grants		**$994,290**

Vacation Scholarship

K Holyman School of Science (Curtin)	Why do general practitioners refer patients for computed tomography of the head?	$3000
J Preuss School of Surgery (UWA)	BCCT.core versus the Harris Scale in the assessment of aesthetic outcome post breast reconstructive surgery	$3000
K Lim School of Pathology & Laboratory Medicine (UWA)	The role of CREG2 in the differentiation and proliferation of osteoclast and osteoblast	$3000
J Lee School of Science (Curtin)	Doctor's knowledge about ionising radiation exposure doses during computed tomography examinations	$3000

James Crofts Hope Foundation Vacation Scholarship

C Tynan WA Centre for Cancer & Palliative Care (Curtin)	Determining the needs of Grade III-IV high grade glioma patients and carers	$3000
Total vacation research scholarship		**$15,000**

Suzanne Cavanagh Early Career Investigator Grants

C Jackaman School of Biomedical Science (Curtin)	Does aging impact anti-cancer immune responses?	$24,991
C Bertram School of Biomedical, Biomolecular & Chemical Sciences (UWA)	Mode and molecular mechanisms of tea tree oil-induced tumour cell death in vivo	$24,117
S Medic School of Medical Sciences (ECU)	What happens to PAX 3 in melanoma cells?	$24,759
M Baker Health & Wellness Institute (ECU)	The effect of whole-body vibration therapy on bone loss in breast cancer survivors	$24,032
Total early career investigator grants		**$97,899**

Research Fellowships

R Ganss	WA Institute for Medical Research	$20,000
E Ingley	WA Institute for Medical Research	$100,000
B Callus	School of Chemistry and Biochemistry (UWA)	$80,000
R McLaughlin	School of Electrical, Electronic and Computer Engineering (UWA)	$100,000
A Fox	WA Institute for Medical Research	$100,000
Total research fellowships		**$400,000**

Cancer Pathology Postdoctoral Fellowship

TBA	School of Pathology and Laboratory Medicine (UWA)	$75,000
Total cancer pathology postdoctoral fellowship		**$75,000**

Postdoctoral Research Fellowships

P Cormie	School of Exercise, Biomedical & Health Science (ECU)	$75,000
C Johnson	School of Surgery (UWA)	$75,000
Total postdoctoral research fellowships		**$150,000**

PhD Top Up Scholarships

J Girschik WA Institute for Medical Research (UWA)	Lifetime sleep quality as a risk factor for developing breast cancer	$12,000
G Levin School of Exercise, Biomedical and Health Science (ECU)	Mental health, cognition and quality of life in cancer survivors: the effect of physical exercise	$12,000
B Hug School of Physics (UWA)	Advanced radiotherapy techniques - development and modelling of advanced radiation guided technologies	$8000
A Passman School of Biomedical, Biomolecular and Chemical Sciences (UWA)	Establishing the molecular and genetic mechanisms of liver progenitor cell transformation and whether these are linked to hepatocellular carcinoma development in vivo	$12,000
Total PhD top up scholarship		**$44,000**

Honours Scholarships

K Jajko School of Biomedical, Biomolecular and Chemical Sciences (UWA)	miR-193 expression and function in malignant mesothelioma cells	$7500
J Thompson School of Physics (UWA)	Dose calculation for combined radiotherapy/brachytherapy for prostate cancer treatment	$7500
A Hand School of Medical Sciences (ECU)	Nano mechanical analysis of metastatic melanoma cancer cells using atomic force microscopy	$7500
Total honours scholarship		**$22,500**

John Nott Cancer Fellowship Travel Support Fund

Dr Sarah Guiliford Royal Marsden NHS Foundation Trust and Institute of Cancer Research, UK	To visit Perth and work with the team in the Department of Radiation Oncology at Sir Charles Gairdner Hospital in the area of clinical trials	$5940
Total John Nott Travel Grant		**$5940**

Professorial Chairs

Chair of Palliative and Supportive Care	School of Nursing and Midwifery (ECU)	$115,000
Chair of Behavioural Cancer Research	Centre for Behavioural Research & Cancer Control (Curtin)	$125,000
Chair of Clinical Cancer Research	School of Medicine and Pharmacology (UWA)	$318,610
Total professorial chairs		**$558,610**

Other Research Grants

Cancer Council Crawford Rural Cancer Research Initiative	$146,617
Bone Tumour Registry	$30,000
Travel Grants	$15,000
Priority-driven Collaborative Cancer Research Scheme	$40,000
Total other research grants	**$231,617**
TOTAL RESEARCH FUNDED	**$2,594,856**

Australian Behavioural Research in Cancer

Newcastle Cancer Control Collaborative (New-3C) NSW

In July 2011, Cancer Council NSW and the University of Newcastle established a new three-year strategic research partnership through support of the Newcastle Cancer Control Collaborative (New-3C). New-3C is embedded within the University of Newcastle's multidisciplinary Priority Research Centre for Health Behaviour under the leadership of Laureate Professor Rob Sanson-Fisher. The New-3C partnership will undertake high quality, applied, intervention-focused, behavioural cancer control research in the following four broad priority areas: (1) reducing preventable cancer health risks; (2) reducing inequities in health risks and cancer care; (3) improving the delivery of patient-centred cancer care; and (4) bridging the evidence-practice gap.

The first large-scale initiative of the New-3C partnership is a randomised controlled trial assessing the effectiveness of a consumer-driven breakthrough action model in improving aspects of cancer treatment systems which have been identified as priorities by patients receiving chemotherapy. Fourteen hospitals will be recruited and randomly allocated to intervention or control. Intervention hospitals will implement a modified breakthrough series approach. Cancer Council NSW volunteers will collect data from patients undergoing chemotherapy to identify the top unmet needs. A Consumer Action Group, chaired by a Cancer Council NSW consumer advocate, will then work with hospitals to commit to targets to resolve the identified issues. Each hospital will internally monitor progress towards set goals on a three monthly basis, with goals constantly revised. This will be the first rigorous trial of a consumer-led intervention for improving quality of cancer care, and has significant potential for national translation. The study will provide the opportunity for meaningful engagement of cancer consumers in identifying, implementing and evaluating strategies of change. It is predicted that consumer-led system-based change will reduce patients' unmet needs and improve quality of life. Funded by an Australian Research Council Linkage Project Grant, this initiative draws heavily on the broader collaboration of service providers, researchers and policy-makers.

Centre for Behavioural Research in Cancer (CBRC), Victoria

What is the role of alcohol outlet density, alcohol price and alcohol promotion in adolescents' drinking behaviours?

There is increasing concern about the level of alcohol misuse among adolescents and young adults. CBRC, along with Turning Point and the National Drug Research Institute, with the support of VicHealth and the Foundation for Alcohol Research and Education (FARE), have been awarded a three-year NHMRC Partnership Grant to examine the impact of different policies and media influences on changes in adolescent alcohol use over time. Data on adolescent drinking behaviours will be obtained from triennial national cross-sectional surveys of secondary students conducted from 1993 to 2011. For each policy or media influence, data will be collated for the 24 months preceding each survey year and related to adolescents' alcohol use (prevalence of drinking and risky drinking among current drinkers and amount consumed). Effects of changes in outlet density, taxation, alcohol control policies and alcohol-related news coverage on adolescents' alcohol use will be examined using data from Victoria and Western Australia for the period 1993 to 2011 (long-term trends). In addition, data from Victoria, Western Australia, Northern Territory, New South Wales and Queensland will be used to examine the relative roles of the preceding variables, along with alcohol industry marketing and alcohol control mass media campaigns on adolescents' alcohol consumption for the shorter period of 2002 to 2011. The study will be the first internationally to examine the relative roles of policies and media influences purported to push alcohol usage up and down on trends in adolescents' drinking behaviours.

Do larger pictorial health warnings diminish the need for plain packaging of cigarettes?

While past research has demonstrated that health warnings are more noticeable when presented on a plain cigarette pack and considered more serious, few studies have specifically examined the combined impact of plain packaging and pictorial health warnings on measures of brand appeal. This study aimed to test the relative impact on adult consumer perceptions of increasing size of pictorial health warnings presented on plain versus branded packs. Using a three (30%, 70% and 100% size front-of-pack pictorial health warnings) by two (branded v plain) between-subjects online experiment, 1203 Australian adult smokers consecutively viewed and rated six cigarette brands within their randomly allocated pack condition. Results indicated that plain packaging reduced elements of brand appeal far more than increasing the size of pictorial health warnings, so that when packs were plain, increasing the size of pictorial health warnings above 30% did not further reduce brand appeal. Plain packaging also undermined most other measured ratings of brand appeal including smoker characteristics and positive taste expectations, but there were fewer effects of increasing the size of pictorial health warnings on ratings. Finally, plain packaging, but not larger pictorial health warnings, reduced purchase intentions. These findings indicate that plain packaging offers unique advantages in reducing brand appeal and purchase intention among Australian smokers. This paper has been published online in *Addiction.*

Cancer Council Australia

Home renovators asbestos warning

A study published in the *Medical Journal of Australia* in September found that home renovations were causing an alarming number of asbestos-related diseases in Australia.

The study found that 35.7 per cent of female mesothelioma cases and 8.4 per cent of male cases in Western Australia, between 2005 and 2008, were attributable to home renovation.

Chair of Cancer Council Australia's Environmental and Occupational Cancer Risk Committee, Terry Slevin, said it was likely the data was indicative of a national problem.

There were 554 men and 106 women diagnosed with mesothelioma in Australia in 2007.

"Australia has the highest per capita incidence of mesothelioma in the world and it's estimated that up to 18,000 Australians are likely to die from this disease by 2020," Mr Slevin said. "It can take 20 to 40 years after exposure to asbestos for the symptoms of disease to appear, so we need to do far more to reduce Australians' exposure to asbestos."

In Australia, houses that are between 30 and 60 years old have a significant prospect of containing asbestos material of one kind or another. Cancer Council Australia urges home renovators to be aware of potential asbestos in the walls, ceilings and floors.

Australia funds global efforts against tobacco deaths

International efforts to reduce the health harms of tobacco use were boosted by a $700,000 Australian Government grant announced in September at a United Nations meeting on non-communicable diseases in New York.

Cancer Council Australia Chief Executive Officer, Professor Ian Olver, and his counterpart at the National Heart Foundation, Dr Lyn Roberts, said the funds would support the Framework Convention for Tobacco Control (FCTC), a World Health Organisation treaty aimed at reducing the impact of tobacco on health worldwide; $400,000 would assist countries in preparing guidelines on the use of taxation to reduce smoking rates.

"Funding guidelines on tobacco tax has great potential to reduce the global tobacco toll, because increased price through taxation is one of the main reasons smoking rates are relatively low in countries like Australia," said Professor Olver.

Dr Roberts said: "By taking the lead on innovative public health policy like plain packaging, and helping other countries to help themselves by developing guidelines on tobacco tax, Australia is showing great global leadership."

Lung cancer in women on the rise, while male rates decline

New research released in November indicates that women's smoking rates are on the rise.

Professor Olver said a net increase in lung cancer incidence in Australian women compared with men could be attributed to chronological differences in smoking behaviour between the sexes.

"Smoking prevalence in Australian men peaked in the 1940s, for women it was the mid-70s, so it's not surprising lung cancer rates in men are declining while they are on the rise in women," he said.

"If you look at a number of cigarette brands targeting women today, you can see how much effort the tobacco companies put into making the pack a sleek, stylish fashion accessory.

"The rate of smoking among Australian teenagers aged 14 to 17 is higher for girls than boys, so it's important we remove the glamour that some young women associate with smoking."

Landmark day as Parliament signs off on tobacco packaging bills

21 November will be remembered as a great day in public health history, with the passage in the House of Representatives of world-first legislation to mandate plain packaging of tobacco products, according to Cancer Council Australia.

Professor Olver said glossy, branded tobacco packaging was a deadly form of tobacco advertising, so its elimination was expected to result in fewer smokers, particularly young people.

"All tobacco advertising is deadly, because it seeks to addict people to a product that will kill half of them if they use it over the long term," he said.

"Documents obtained from the tobacco industry show how much the tobacco companies rely on pack design to attract new smokers, particularly in countries like Australia where they can't advertise through mainstream media.

"You only have to look at how desperate the tobacco companies are to stop plain packaging for confirmation that pack design is seen as critical to sales.

"Australia is now set to become the first nation in the world to end this type of tobacco advertising. This is a great day in public health policy."

Professor Olver congratulated Australia's Federal Parliament, and in particular the Minister for Health, Nicola Roxon, for supporting the ground-breaking public health measure.

Teen attitudes to tanning changing

In November, Cancer Council Australia launched new research as part of National Skin Cancer Action Week. The research showed that young Australians are changing their attitudes towards tanning with fewer seeking the bronzed look.

Cancer Council's National Sun Protection Survey conducted in summer 2010-11, showed that preference for a suntan among 12 to 17 year-olds had steadily dropped, down to 45% - a 15% fall since 2003-04. The survey results also indicated that only 12% of teens believe a tanned person is more healthy.

Professor Olver welcomed the findings and said the survey demonstrated Australia's public health campaigns were beginning to show real results that would, over time, lead to a reduction in skin cancer rates.

"The sun protection message is starting to cut through, with teens more aware of the risks of tanning and sunburn," Professor Olver said. "While these are encouraging results, we've still got a big job to convince the remaining 45% of teens to ditch the tan."

A particularly worrying aspect of the research, according to Professor Olver, was that 12 to 14 year-olds were more prone to sunburn than older teens (15-17), even though they were less likely to seek a tan. "This indicates that 12-14 year olds are doing outdoor activities, which is a good thing, but they are neglecting to cover up," he said.

According to the Australasian College of Dermatologists' Dr Philip Artemi, skin damage is cumulative, with sun exposure in younger years contributing to the lifetime risk of skin cancer.

"The research shows attitudes are changing, which is great news," Dr Artemi said. "There are more than 10,300 cases of melanoma in Australia each year and it's the most common cancer among people aged 15 to 44. We can expect this figure to drop over time as the trend for young people to avoid tanning continues to improve."

Cancer Council creates iheard.com.au to help dispel myths

Cancer Council research released in November found that three quarters (76%) of Australians were confused about cancer prevention, mistakenly believing measures like drinking plenty of water (50%), getting enough sleep (47%) and positive thinking (43%) could reduce their risk of cancer.

According to the survey, there was limited awareness of the link between cancer and some factors known to increase risk, such as processed meat (31%), alcohol (47%) and being overweight (53%).

Australians also incorrectly thought cancer was caused by non-carcinogenic factors, with more than half (54%) blaming stress.

In an effort to combat the misconceptions, Cancer Council has launched a new website, iheard.com.au, to provide evidence-based answers to questions about cancer.

Professor Olver said the survey results highlighted the level of misinformation about cancer, much of it sourced from websites and social media, where fanciful claims could be made without any credible scientific evidence.

"There is a huge amount of misinformation out there and, as a result, many Australians are confused about the real factors that increase their risk of cancer and the lifestyle choices they can make to decrease their risk," he said.

Cancer Council Scientific Advisor and international carcinogens expert, Professor Bernard Stewart, said people often blamed unknown or unlikely environmental factors for cancer, such as deodorant and food additives, rather than proven carcinogens.

"At least a third of cancers can be avoided through lifestyle choices, including not smoking, limiting alcohol, regular exercise, a healthy diet, maintaining a healthy weight, being SunSmart and getting checked for certain cancers at recommended ages," said Professor Stewart.

Call on government to help detect silent killer in thousands of Australians

Thousands of Australians will die unnecessarily unless the National Bowel Cancer Screening Program is expanded in the 2012-13 federal budget, according to Cancer Council Australia.

Releasing Cancer Council Australia's pre-budget submission to Treasury in December, Professor Olver said it seemed unthinkable when the program was introduced in the 2005-06 budget that we would be waiting more than six years later for it to be expanded beyond three age groups.

"Thousands of Australians are walking around right now, in apparent good health, with an early-stage bowel cancer or precancerous polyp that will kill them," Professor Olver said.

"Expanding the National Bowel Cancer Screening Program will enable doctors to detect hundreds and over time thousands of those cancers before they become symptomatic – by which time it is often too late for a quick, low-cost surgical intervention".

"For so many people to die because of delays in government investment is a tragedy. This Government has done some great things in cancer policy, such as plain packaging for tobacco products and capital funding for cancer services, so why are we still waiting for expansion of the National Bowel Cancer Screening Program?

"Bowel cancer might not be a popular conversation topic, and it lacks the public profile of breast cancer, but the fact is it's the nation's number two cancer killer after lung cancer, yet it's easy and inexpensive to treat if detected early."

Professor Olver urged all Australians to demand Government expand the screening program by visiting the campaign website at http://www.getbehindbowelscreening.com.au/ and emailing their local MP.

Sun exposure at work – a $38 million burn for employers

A report calculating the cost of sun damage at work to Australian employers released in December found 1360 workers compensation claims for sun related injury or disease were made in Australia between 2000-2009, at a total cost of $38.4 million to employers.

The *Occupational exposure to ultraviolet (UV) radiation* report, produced by *Cancer Council Western Australia,* highlights how sun exposure at work is becoming

increasingly recognised in the courts and the number and cost of claims is increasing over time. The report showed that total payments for skin cancer claims doubled from $2 million in 2001-02 to $4 million in 2008-09.

"This report is a stark reminder to employers that their duty of care extends to protecting workers from over-exposure to the sun and that UV radiation is a known cause of injury and disease," said Terry Slevin, Chair of Cancer Council Australia's Occupational and Environmental Cancer Risk Committee.

"The important message for employers is that all of the cost, stress and pain associated with these claims can be avoided.

"My advice to anyone who employs people to work outdoors is to develop and institute sun protection policies and procedures as a priority, or be prepared to face the legal and financial consequences down the track."

Cancer Voices Australia

Cancer Voices Australia (CVA) has been working across a range of issues in recent months.

CVA and Darcy v Myriad Genetics Inc.

The CVA challenge to the BRAC-1 gene patenting by Myriad began in the Federal Court of Australia on 20 February 2012. The hearing was scheduled for five sitting days.

Positron Emission Tomography

Access to appropriate diagnostic testing directly impacts upon many people affected by cancer. PET and MRI for detection, pre-treatment planning and monitoring of cancer are seen to be best practice. CVA has been working with a coalition including the Australian Diagnostic Imaging Association, Royal Australian and New Zealand College of Radiology, Australian Society for Ultrasound in Medicine and Private Cancer Physicians of Australia to increase awareness about this issue.

Other Cancer Voices members have assisted and this matter continues to be a major advocacy issue for cancer patients.

Position Statements

Stereotactic Radiotherapy

In past years there have major developments in radiotherapy treatment and new technology. CVA believes that information about new technology does not reflect a patient view.

Working with the College of Radiation Oncology, CVA has developed a statement that we believe provides valuable information to our constituency. We thank the college for their assistance.

Partnership Policy

Details the process and policy CVA follows when engaging with other organisations.

Patient Charter

CVA's Charter reflects the views of the Board and its members and may mirror the Charter of other Cancer Organisations.

Clinical Trials

Access to clinical trials remains an issue for CVA and a position statement details CVA's policy in this area.

All statements are found on our website: www.cancervoicesaustralia.org.au

Clinical Trials and Research

CVA remains committed to the inclusion of consumers in the development of research and clinical trials in this country. Together with the Clinical Oncological Society of Australia (COSA), and the cooperative trials groups, a framework for the inclusion of consumers at all levels of the trials' process is being developed.

A steering committee (chaired by CVA's Executive Officer) and comprising a number of CVA/Cancer Voices members, will report to Cancer Australia in June 2012. CVA also continues dialogue with the National Health and Medical Research Council to provide more and appropriate funding for translational research in this country.

John Stubbs, Executive Officer.

Clinical Guidelines Network

Cancer Council Australia's Cancer Guidelines Portal is progressing well and clinical practice guidelines can be accessed online at http://wiki.cancer.org.au/australia

Guidelines in development are also provided through the portal in an access restricted area for working party members' use only, before drafts are released for public comment.

Clinical practice guidelines for surveillance colonoscopy in adenoma follow-up, following curative resection of colorectal cancer, and for cancer surveillance in inflammatory bowel disease

The final draft guidelines were approved by National Health and Medical Research Council for publication at their Council meeting in October 2011. The Guidelines will be published as an online resource and can be accessed at http://wiki.cancer.org.au/australia.

Clinical practice guidelines for the prevention, treatment and management of lung cancer

Non-small cell lung cancer topic sections have been uploaded to the guidelines portal for public comment and will be followed by small cell lung cancer, open for public consultation in April.

Relevant organisations, experts and interested parties will be consulted during the public comment phase.

Recently recruited topic authors have developed the key clinical questions to be searched for small cell lung cancer limited and extensive disease. These authors received their search results in late November and have been working on appraising their articles and writing up their content for public consultation in April.

Clinical practice guidelines for the treatment and management of endometrial cancer

The final version of the guidelines, which focus on the management and treatment of apparent early stage low risk and high risk endometrial cancer, has been disseminated to interested parties.

The guidelines were developed with funding from Cancer Australia and can be accessed from the guidelines portal at http://wiki.cancer.org.au/australia.

Clinical practice guidelines for the management of sarcoma

Literature searches have been completed and the scheduled results sent to working party authors to develop their topic content.

The draft guidelines are scheduled for release for public consultation in April 2012. Relevant organisations, experts and interested parties will be consulted during the public commenting phase.

Clinical practice guidelines for the diagnosis and management of Barrett's oesophagus and mucosal neoplasia

Cancer Council Australia is planning development of guidelines for detection, assessment and management of Barrett's oesophagus and mucosal neoplasia in partnership with Cancer Council NSW.

The multidisciplinary working party, chaired by Professor David Whiteman, held its initial meeting in November. Preliminary clinical questions have been developed for the literature search process.

For more information on guidelines activity contact Clinical Guidelines Network Manager, Christine Vuletich, on 02 8063 4100 or christine.vuletich@cancer.org.au

Christine Vuletich,
Clinical Guidelines Network Manager.

Clinical Oncological Society of Australia

2011 proved to be a very busy year for Clinical Oncological Society of Australia (COSA) staff and members.

The 2011 Annual Scientific Meeting (ASM), themed of 'Partnerships against cancer – bridging gaps, breaking barriers' was held in Perth in November. Over 900 delegates registered and a further 99 attended the Advanced Trainees Workshop – 'Everything you need to know about colorectal cancer'.

The scientific program focused on urological and prostate cancer, as well as the role of primary care in cancer. COSA was proud to continue its tradition of partnering with relevant organisations, this year joining with the Australian and New Zealand Urogenital and Prostate Cancer Trials Group (ANZUP) and the Primary Care Collaborative Cancer Clinical Trials Group (PC4).

The meeting tackled the most important, yet often difficult challenges of the profession including workforce, cancer coordination, prevention and early detection, and engagement with consumers.

In particular, we were pleased to bring consumers into the meeting in an integrated way that recognised them as key partners in our work, and we hope this continues for future ASMs.

In 2012, COSA is partnering with the International Psycho-Oncology Society (IPOS) and their Australian partners Cancer Council Queensland, PoCoG (Psycho-Oncology Cooperative Research Group) and OZPOS (COSA's Psycho-Oncology Professional Group) to deliver an extensive psycho-oncology program. COSA disease themes will concentrate on skin cancer and carcinoma of the unknown primary (with an emphasis on hepatobiliary), but we will do our best to ensure there is something of interest in the program for everyone.

This joint conference will be held 13 to 15 November 2012 at the Brisbane Convention and Exhibition Centre. More information is available at www.cosa-ipos.org.

We are pleased to announce that Professor Ian Frazer, creator of the human papillomavirus vaccine and Australian of the Year 2006, has accepted our invitation to deliver the Presidential Lecture in Brisbane this year.

Our activities over recent months have reflected the broad range of influence consistent with COSA's strategic directions.

- The Consumer Engagement in Clinical Cancer Research project funded by Cancer Australia gained a lot of traction in late 2011, and we are now moving into the next phase of the project which is to develop and pilot educational resources and tools for consumers working in the Cancer Cooperative Trials Groups.
- Two of three CanTeen funded guidances for health professionals working with Adolescents and Young Adults (AYAs) are now finalised and available on COSAs website (www.cosa.org.au) – fertility preservation and

psychosocial issues. The third guidance, looking at early detection, is under development and should be available for public consultation shortly.

- COSA is hosting a Cancer Care Coordination Conference 6-7 March 2012 in Melbourne. The conference will inform on best practice in areas that increasingly impact on coordinated care, including sustainability of Coordinator roles into the future, the unique needs of the elderly patient and Australian Aboriginal peoples, survivorship issues, and care coordination of adolescents and young adults. Workshops will cover three key areas: caring for ourselves, research and improving practice. For more information please visit www.cosaccc2012.org
- In 2011 COSA hosted two Fellows under our Asia-Pacific Mentoring Program, one in collaboration with the Royal Australian and New Zealand College of Radiologists, Faculty of Radiation Oncology (FRO). We look forward to welcoming two new Fellows in 2012 – COSA has committed to the program again in 2012, as had FRO.

Marie Malica, Executive Officer.

Medical Oncology Group of Australia

Over the last six months the Medical Oncology Group of Australia's (MOGA) focus has been on addressing oncology drugs and treatment issues with the aim of benefiting both patients and clinicians nationally, in addition to managing a range of important educational and professional programs.

The association's work with oncology drugs and treatments is a priority area and has recently seen a number of notable occurrences. Late in 2011, MOGA developed a submission to support approval for new prostate cancer drugs (including abiraterone and cabazitaxel) to be included on the Pharmaceutical Benefits Schedule.

It is the professional view of MOGA that this class of drugs will address an important unmet need with regard to recurrence or progression in castrate-resistant disease after Taxotere in Australia and the Association will continue lobbying for this listing which is still pending a positive decision from the Pharmaceutical Benefits Advisory Committee.

Prostate cancer is one of the commonest cancers in men. While some of the focus on prostate cancer relates to the over-diagnosis and over-treatment of this disease, each year approximately 30000 men still die of advanced prostate cancer in the United States, making it the second most common cause of cancer-related death in American men. In Australia, close to 3300 men die of prostate cancer each year, which is equal to the number of women who die from breast cancer annually [www.prostate.org.au].

Recently the association also focused media attention on the shortage of doxil in Australia and its impact on patients as well as the support cancer clinicians can provide.

Tamoxifen will also be the subject of an ongoing Therapeutics Goods Administration campaign in 2012. A MOGA position paper on Tamoxifen for the Prevention of Breast Cancer, developed by Associate Professor Kelly Anne Phillips from the Peter MacCallum Cancer Centre, provides a case for extending or changing the current indication for Tamoxifen to aid in breast cancer prevention. It also highlights the usual range of systemic barriers that beset the Australian regulatory process and the need for the association to continue to lobby and advocate for oncology drugs and treatment access in Australia.

The 2012 MOGA Annual Scientific Meeting (8-10 August), entitled Targeting Cancer from Diagnosis to Cure in conjunction with the Cooperative Trials Group for Neuro-Oncology, will feature a half-day Neuro-Oncology Symposium. The meeting, to be held in Brisbane, will include a blend of tumour specific sessions with a focus on gentourinary and prostate cancer as well as sessions on Australian Health Directives targeted therapies, clinical trials and emerging oncology drugs, and treatment issues.

Applications for the Australia & Asia Pacific Clinical Research Development (ACORD) Workshop, to be held from 9-15 September on the Sunshine Coast have closed and are being processed.

Collaborating partners include the American Society of Clinical Oncology (ASCO), the European Society of Medical Oncology (ESMO), the American Association for Cancer Research (AACR), Cancer Council of Australia and the Clinical Oncological Society of Australia.

Up to 60 junior clinicians and young to mid-career consultants in all oncology disciplines, selected on merit and, from across the Asia Pacific region will be allocated a place at this career changing workshop. Participating clinicians will develop expertise in clinical trials design and research.

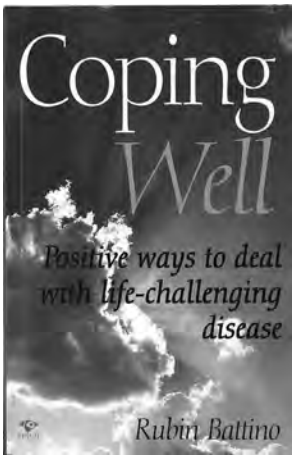
For more information please visit www.acordworkshop.org.au or call MOGA on 02 9256 9651.

Associate Professor Gary Richardson, Chairman.



Coping Well: Positive ways to deal with life-challenging disease

Rubin Battino
Finch Publishing (2003)
ISBN: 9781876451431
198 pages
RRP: AU$26.95



A focus on the importance of a positive attitude to assist in developing coping strategies when faced with a life challenging illness is echoed within this text, with the many methods to achieve it described throughout the chapters.

There are dedicated discussions on relaxation methods, guided imagery, art therapy, journaling and structured writing that can be an effective tool for coping for both those with the disease and for carers. Video taping, the development of autobiographies and attendance at support groups which offer an atmosphere of hope and encouragement through the sharing of experiences are highlighted as effective methods to assist with coping.

Suggestions for surviving while in hospital, communicating with medical personnel and developing methods to take a role in controlling the medical experience such as access to medical records, patients' rights and contacting patient representatives within the health system are discussed.

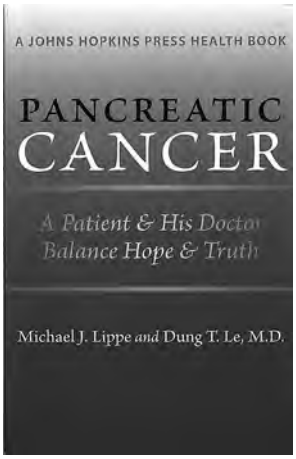
The author encourages individuals to take positive steps to plan and arrange wills, advanced health care directives, enduring guardianship, enduring power of attorney and finances to reduce stress within the environment. The text completes with a brief discussion on pain management, nutrition, physical exercise, laughter and living and dying well.

This text is recommended to individuals and carers affected by life challenging diseases, oncology and palliative care nurses, allied health professionals and students of nursing and medicine.

Louise Nicholson, Outpatient Oncology Services, Royal Hobart Hospital, Tasmania.

Pancreatic Cancer – A Patient and His Doctor Balance Hope and Truth

Michael Lippe and Dung Le
A Johns Hopkins University Press (2011)
ISBN: 978-1-4214-0062-4
171 pages
RRP: US$18.95 (paperback)



This book comprises 11 chapters, alternating between two authors (a patient with metastatic pancreatic cancer and an oncologist).

Prior to the cancer diagnosis, Mr Lippe (the patient) was first diagnosed with a cardiac condition and was seeing a cardiologist. In 2007, the sign of epigastic pain eventually led him to see the cardiologist's wife (Dr Le), who happened to be an oncologist specialising in pancreatic cancer.

The stated aim of this book is to serve as a resource for those who work with or are trying to come to grips with pancreatic cancer. Although this book focuses on the author whose disease is advanced at diagnosis, there is a supplemental section at the end providing additional information in relation to other stages of pancreatic cancer.

This book provides you with a movie experience - the authors describe their experience in such a detailed way from pre-diagnosis of the disease to the adjustment of death. For example, the patient describes how the first sign appeared, how calm the oncologist was during the first consultation, even the temperature and the length of trip they had to travel for their appointment. The chapters written by the medical oncologist are very readable for lay people. The medical information in these chapters is illustrated with diagrams and simple terms.

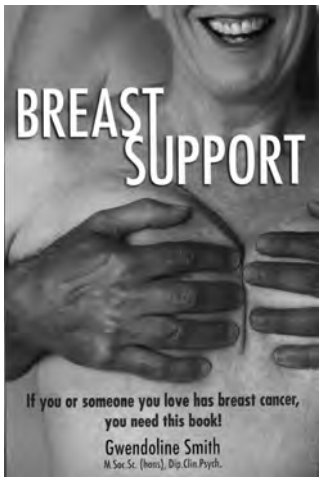
No matter how experienced a professional might be in dealing with patients with pancreatic cancer, it is refreshing to hear from the patient's perspective, reading how they navigate through the system before they land in our clinic and receive our care.

Overall, I would recommend this book to all health professionals who care for patients with pancreatic cancer (both novice and seasoned), as well as those who are adjusting to a diagnosis of pancreatic cancer.

Raymond Chan, Cancer Care Services, Royal Brisbane and Women's Hospital, Queensland.

Breast Support

Gwendoline Smith
Exisle Publishing (2011)
ISBN: 978-1-921-497919
RRP: AU$29.99 (paperback)
181 pages



One is immediately struck by the front cover photo of this book; a man's hand's grasping the breasts of a woman with a beaming smile. A brief flick through the pages reveals attention grabbing images and an expectation that this book will leave a strong impression.

Breast Support is a self-help styled book designed to provide information and support to women with breast cancer and their supporters. Gwendoline Smith, the author, has a diploma in clinical psychology, works in New Zealand and was diagnosed with breast cancer in 2009. She discloses her medical history of bi polar disorder, referring often in the text to its impact on her experience. She coins the apt term the 'Breast Cancer Highway' and uses this analogy to describe her experiences of travelling the path of breast cancer diagnosis and treatment.

Purporting to be user friendly and informative for all women with breast cancer, the book is designed as a 'dip in and out of' resource to access advice at different points along their experience of the Breast Cancer Highway. Opinion from her own medical team, whom she regards highly, is offered throughout the book.

Easy to read, this book is structured in chapters with an introduction including its evolution and some breast cancer facts and figures. Chapters chronologically follow the author's experience from time of diagnosis through treatment. Each chapter contains text boxes with red print summarising a series of tips for women as well, as bold red boxes with tips for supporters. Visual images include family shots, post-operative photos of the author's dressings and breast implants, imaging equipment and a variety of diagrams. With the use of a self-confessed quirky sense of humour, she provides some sound advice on talking to family and friends, effects on partners including those in lesbian relationships, preparing for investigations and the importance of a strong support team and self-care.

While the book is useful for reflections on early diagnostic experiences, the author later concedes that information about other common breast cancer treatments such as radio, chemo and anti-hormone therapy are not in her realm of experience. Referencing is limited and some clinical information is inaccurate.

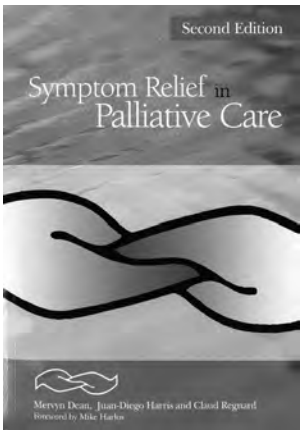
Unfortunately, having established this book as a must read for all women with breast cancer, *Breast Support* is built around one person's experiences; an experience not articulated well enough to form a clear clinical picture. At times confusing from the health professional's perspective, it is likely to be even more confusing for a newly diagnosed woman. As highlighted by the author, interpreting results and medical jargon as a lay person is very difficult. It appears the author tracks an initial diagnosis of ductal carcinoma in situ, is later diagnosed with invasive breast cancer, proceeds with surgery but no further oncological treatment follows. Yet, less common procedures such as MRI and breast reconstruction receive considerable attention. Though not unique, this is an atypical invasive breast cancer treatment pathway.

Generously offering her story as an example of the difficulties of being diagnosed with breast cancer, Gwendoline Smith tells an interesting and valuable story of one person's experience. However, as a guide for all people with breast cancer, the book's value is limited. For the broader community of women newly diagnosed with breast cancer the subjective nature of the book may not provide the spectrum of information useful to many in the targeted audience. Better pitched as a memoir rather than an essential guide, many readers may enjoy the humorous reflections and advice.

Sally Timmins, Northeast Health, Wangaratta, Victoria.

Symptom Relief in Palliative Care

Mervyn Dean, Juan-Diego Harris and Claud Regnard
Second Edition
Radcliffe Publishing (2011)
ISBN: 978-184619-355-2
RRP: US$59.95
362 pages



This book is the second edition written on symptom relief in palliative care by Dr Mervyn Dean, Palliative Care Physician from Canada; Dr Juan-Diego Harris, Physician in Palliative Care and pain medicine, and Dr Claud Regnard Palliative Care physician from the UK.

Symptom Relief in Palliative Care has been written specifically for the Canadian and American market, However, the content is beneficial for Australian consumers and health care professionals working in the palliative care and cancer services arena.

This book is easily read, very well referenced and is structured to enable the reader to conveniently review a specific topic of interest. The clinical decision and action checklist and key points, along with the problem-orientated summary tables which address clinical decisions and actions, give a quick guide and easy reference to a problem at hand. The palliative care emergencies are grouped together at the back of the book for quick reference.

Consequences of advanced disease, answering difficult questions, breaking difficult news, identifying the person with severe communication difficulty and advanced care planning are some of the excellent issues addressed in the book. *Symptom Relief in Palliative Care* covers a comprehensive range of topics and is very informative. An extensive reference list can be found at the end of each chapter. The index is user friendly and functional.

This is no doubt an easy to use desk reference book for anyone involved in palliative care service provision. As stated by the authors in the preface, this is not meant to be the comprehensive palliative medicine text. It seems to me that this text offers readers an immediate reference on what are the current treatment options in various clinical scenarios. This is in particularly useful for the experienced clinician to use as a quick reference and reminder.

In conclusion, this book is highly relevant and I would certainly recommend this text to health care professionals for cancer and palliative care settings and hospital libraries, as well as consumers.

Charmaine O'Connor, Department of Palliative Care, Liverpool Hospital, New South Wales.

Perspectives on Complementary and Alternative Medicines

Ian Olver and Monica Robotin (Editors)
Imperial College Press (2012)
ISBN: 978-1-84816-556-4
RRP: US$124.00
465 pages

As busy clinicians with many things competing for our time and attention, asking patients about their use of complementary or alternative medicines/therapies (CAM) is most likely going to lead to a disclosure that many of us may not know how to deal with. Where do you find the information on interactions? What evidence is there for usage? Why would a patient want to use anything other than conventional medicine? And what type of therapy is that anyway? As half of our patients will be using CAM, it is in the interests of our patients that we know something about the topic, or at least know where to find information.

Ian Olver and Monica Robotin have told the reader that the aim of this book was to gather a wide range of perspectives on complementary and alternative medicine in the context of cancer care, and present them to readers to form their own conclusions. The contributors include health educators, oncology clinicians, complementary medicine clinicians, researchers and consumers, all given the freedom to express themselves in their own styles. What this has resulted in is a "Lively mix of poignant stories, strong opinions and scientific reviews". As far as I am aware, it is the first Australian book to be published on this topic. All the similar texts I have seen have come from North America and Europe.

The chapters are arranged in a logical sequence with various definitions of CAM, understanding CAM through classification and examples, and reasons people with a diagnosis of cancer might use CAM. Explanations of and literature reviews of different types of CAM follow as well as safety issues, research issues and how natural materials are used for drug development.

Sociological factors behind why people are choosing to use CAM and what this means for health practitioners, health policy makers, funders and health designers explain why we have seen such a huge increase in CAM use in recent years. There is also an interesting discussion around regulation of complementary medicines and the importance of striving toward practitioner registration.

The chapters I particularly enjoyed were from the clinicians. David Joske's narrative on the creation of the SolarisCare model, an integrative oncology centre at Perth's Sir Charles Gairdner Hospital, was particularly informative, giving an account of the processes involved in establishing the centre, and the challenges and rewards of a model that combines non-ingestable complementary therapies with conventional care. This is useful information for centres that may be looking to expand their services in a similar way. Most importantly, the centre's data has shown that the patients who participate in the complementary therapy sessions have reduced symptom distress and improved quality of life.

Angela McClelland, Eurobodalla Oncology Service, Moruya, New South Wales.



CALENDAR OF MEETINGS

AUSTRALIA AND NEW ZEALAND

Date	Name of Meeting	Place	Secretariat
March			
6-7	Clinical Oncological Society of Australia Cancer Care Coordinators Conference	Melbourne, Victoria	Clinical Oncological Society of Australia (COSA) Website: www.cosa.org.au Email: cosa@cancer.org.au Phone: +61 2 8063 4100
May			
1-4	Trans-Tasman Radiation Oncology group 24th Annual Scientific Meeting	Darwin, Northern Territory	Trans-Tasman Radiation Oncology group (TROG) Website: www.trog.com.au Email: trog@trog.com.au Phone: +61 2 4014 3911
15-18	Australasian Leukaemia and Lymphoma Group Scientific Meeting	Sydney, New South Wales	Australasian Leukaemia and Lymphoma Group (ALLG) Website: www.allg.org.au Email: Dilupa.Uduwela@petermac.org Phone: +61 3 9656 2764
24 -26	9th Australasian Lymphology Association Conference	Cairns, Queensland	Australasian Lymphology Association (ALA) Website: www.alaconference.com.au Email: ala@thinkbusinessevents.com.au Phone: +61 3 9417 1350
July			
26 -28	Cancer Nurses Society of Australia 15th Winter Congress 2012	Hobart, Tasmania	Cancer Nurses Society of Australia (CNSA) Website: www.cnsa.org.au Email: info@cnsa.org.au Phone: +61 2 8063 4100
September			
9-15	Australia and Asia Pacific Clinical Oncology Research Development (ACORD) Workshop 2012	Sunshine Coast, Queensland	Australia and Asia Pacific Clinical Oncology Research Development (ACORD) Website: www.acordworkshop.org.au Email: moga@moga.org.au Phone: +61 2 8247 6210
October			
23 -26	Sydney International Breast Cancer Congress 2012	Sydney, New South Wales	Sydney International Breast Cancer Congress 2012 Managers Website: www.sydneybreastcancer2012.com Email: sydneybreastcancer2012@arinex.com.au Phone: + 61 2 9265 0700
November			
11 -15	14th World Congress of Psycho-Oncology	Brisbane, Queensland	International Psycho-Oncology Society (IPOS) and Clinical Oncological Society of Australia (COSA) Website: www.ipos-society.org/ipos2012 Email: cosa@cancer.org.au Phone: + 61 8063 4100
13 -15	Clinical Oncological Society of Australia 39th Annual Scientific Meeting	Brisbane, Queensland	Clinical Oncological Society of Australia (COSA) Website: www.cosa.org.au Email: cosa@cancer.org.au Phone: +61 2 80634100
2013			
March			
7-8	International Meeting on Psychosocial Aspects of Hereditary Cancer	Sydney, New South Wales	International Meeting on Psychosocial Aspects of Hereditary Cancer (IMPAHC) 2013 Website: www.impahc2013.com.au Email: info@impahc2013.com.au Phone: +61 2 9382 3440

INTERNATIONAL

Date	Name of Meeting	Place	Secretariat
March			
3-4	3rd Asian Breast Cancer Congress (HCG Foundation)	Bangalore, India	Asian Breast Cancer Congress Website: www.abcconline.net Email: abcc2012@gmail.com Phone: +91 9880914343
3	Lung Cancer 2012: The New Paradigm	Washington, United States of America	Washington Hospital Center Website: www.whcenter.org Email: WHCCME@gmail.com Phone: +1 202 877 7000
2-4	St Jude-Viva Forum in Pediatric Oncology	Singapore	St. Jude-Viva Forum Website: www.viva.sg/stjude/ Email: sjvf@nuhs.edu.sg
7-8	1st Joint Conference on Management of Colorectal, Breast and Lung Cancers	Dammam, Saudi Arabia	King Fahad Specialist Hospital, Roswell Park Cancer Institute, Saudi Cancer Foundation, American Society of Clinical Oncology. Website: www.asco-gulf.com Email: membermail@asco.org Phone: + 1 571 483 1300
8-10	10th International Symposium on Targeted Anticancer Therapies	Amsterdam, Holland	New Drug Development Organisation Education Foundation Website: www.tatcongress.org Email: tat@mccm.nl Phone: +31 (0) 88 0898100
9	Scientific and Clinical Update in Geriatric Oncology: A New Battlefront	Philadelphia, United States of America	Kimmel Cancer Center Website: www.kimmelcancercenter.org./symposium Phone: +1 888 955 1212
9-10	European Society Medical Oncology Conference on Sarcoma and Gastrointestinal stromal tumour (GIST)	Milan, Italy	European Society for Medical Oncology (ESMO) Website: www.esmo.org Email: registration@esmo.org Phone: +41 (0)91 973 19 26
10-11	Colorectal Polyps and Cancers: A Multidisciplinary Approach	Scottsdale, United States of America	American Society for Gastrointestinal Endoscopy (ASGE) Website: www.public.asge.org Email: education@asge.org Phone: +1 630 573 0600
10-14	22nd Annual National Interdisciplinary Breast Center Conference	Las Vegas, United States of America	National Consortium of Breast Centers Inc. Website: www.breastcare.org Email: NCBC@breastcare.org Phone: + 1 574 267 8058
18 -21	3rd European Lung Cancer Conference (ELCC)	Geneva, Switzerland	European Society for Medical Oncology (ESMO) and International Association for the Study of Lung Cancer (IASLC) Website: www.esmo.org Email: lungcancer2012@esmo.org Phone: +41 (0)91 973 19 24
19-22	17th Reach to Recovery International Breast Cancer Support Conference	Cape Town, South Africa	Reach for Recovery South Africa Website: www.reachtorecovery2013.org/ Email: info@reachtorecovery2013.org Phone: +27 21 683 2934
20-24	8th European Breast Cancer Conference	Brussels, Belgium	European Cancer Organisation (ECCO) Website: www.ecco.org.eu Email: nicola.pellegrino@ecco-org.eu Phone: +32 02 775 02 07
20-24	15th World Conference on Tobacco or Health	Singapore	World Conference on Tobacco or Health Website: www.wctoh2012.org Email: info@wctoh2012.org Phone: +65 6496 5554

CALENDAR OF MEETINGS

Date	Name of Meeting	Place	Secretariat
March			
21-23	International Society of Paediatric Oncology Africa Congress	Cape Town, South Africa	International Society of Paediatric Oncology (SIOP) and International Confederation Childhood Cancer Patients Organisations (ICCCPO) Africa Website: www.siopafrica 2012.co.za Email: events.suemc@tiscali.co.za Phone: +27 (0)11 4473876
22-24	1st St Gallan International Gastro-Intestinal Cancer Conference	St Gallan, Switzerland	St.Gallen Oncology Conferences (SONK) Website: www.oncoconferences.ch Email: info@oncoconferences.ch Phone: +41 71 243 0032
23-24	Advances In Breast Cancer 2012	Washington DC, United States of America	Washington Hospital Center Website: www.whcenter.org Email: WHCCME@gmail.com Phone: +1 202 877 8220
April			
2-4	American Society of Clinical Oncology and Middle East Cancer Consortium Palliative Care Course	Ankara, Turkey	Middle East Cancer Consortium Website: www.mecc.cancer.gov/pc.html Email: cancer@mecc-research.com Phone: +90 972 4 8501821
15-17	European Multidisciplinary Colorectal Cancer Congress 2012	Prague, Czech Republic	Dutch Colorectal Cancer Group (DCCG) Website: www.dccg.nl/conferences/emccc Email: info@dccg.nl Phone: +31 (0)70 3067 200
15 -8	28th International Association of Breast Cancer Research Breakthrough Breast Cancer Conference	Manchester, England	Manchester Cancer Research Centre Website: www.mcrc.manchester.ac.uk Email: iabcr-breakthrough@mcrc.man.ac.uk Phone: + 0161 446 3156
18-21	3rd European Lung Cancer Conference	Geneva, Switzerland	European Society for Medical Oncology (ESMO) Website: www.esmo.org Email: lungcancer2012@esmo.org Phone: +41 (0)91 973 19 24
20-22	Ultrasound in the New Millennium: The Cancer Patient	Houston, United States of America	MD Anderson Cancer Center Website: www.mdanderson.org Email: register@mdanderson.org Phone: +1 713 792 2223
26-27	European Oncology Nursing Society-8 Spring Convention	Geneva, Switzerland	European Oncology Nursing Society (EONS) Website: www.ecco-org.eu Email: eons8@ecco-org.eu Phone: +32 2 775 02 01
27-29	12th Pan Arab Cancer Congress	Tunisia	Arab Medical Association Against Cancer (AMAAC) Website: www.amaac.org Email: drsamikhatib@gmail.com Phone: +962 79 5547875
May			
3-4	13th International Paediatric haematology and Oncology Update Meeting	Edinburgh, United Kingdom	International Paediatric Haematology and Oncology Update Meeting (IPHOUM) Website: www.iphoum.com Email: iphoum@indexcommunications.com Phone: +44 (0) 1794 511331
3-5	4th IMPAKT Breast Cancer Conference	Brussels, Belgium	European Society for Medical Oncology (ESMO) Website: www.esmo.org/events/breast-2012-impakt.html Email: esmo@esmo.org Phone: +41 91 973 19 00

CALENDAR OF MEETINGS

Date	Name of Meeting	Place	Secretariat
May			
4-8	1st World Convention of Young People with cancer and cancer survivors	Pichincha, Ecuador	Fundacion Jovenes Contra el Cancer Website: www.jovenescontraelcancer.org Email: coordinacion@jovenescontraelcancer.org Phone: + 593 2438 441
10-12	World Brachytherapy Congress	Barcelona, Spain	European Society for Radiotherapy and Oncology (ESTRO) Website: www.estro-events.org Email: events@estro.org Phone: +32 2 775 93 40
9-13	European Society Therapeutic Radiology Oncology 31st International Oncology Forum	Barcelona, Spain	European Society for Therapeutic Radiology and Oncology (ESTRO) Website: www.estro.org Email: events@estro.org Phone: +32 2 775 93 40
15-16	25th Annual Meeting of the European Musculo-Skeletal Oncology Society and 13th Symposium European Musculo-Skeletal Oncology Society Nurse Group	Bologna, Italy	European Musculo-Skeletal Oncology Society (EMSOS) Website: www.emsos.org/emsos-meetings/actual-meetings Email: alba.balladelli@ior.it Phone: +39 051 6366757-767
June			
1-5	American Society Clinical Oncology Annual Conference	Chicago, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: + 1 571 483-1300
7-8	5th Familial Cancer Conference	Madrid, Spain	European School of Oncology (ESO) Website: www.eso.net Email: eso@eso.net Phone: +39 02 8546451
13-15	The 10th International Conference of the Asian Clinical Oncology Society	Seoul, South Korea	Asian Clinical Oncology Society (ACOS) Website: www.acos2012.org Email: office@acos2012.org Phone: +82 2 3476 7700
25-26	Teenage Cancer Trust 7th International Conference on Teenage and Young Adult Cancer Medicine	London, England	Teenage Cancer Trust Website: www.teenagecancertrust.org Email: tct@indexcommunications.com Phone: +44 (0) 1794 511331
27-30	European Society Medical Oncology 14th World Congress on Gastrointestinal Cancer	Barcelona, Spain	European Society for Medical Oncology (ESMO) Website: www.worldgicancer.com/WCGI/WGIC2012/index.asp Email: info@imedex.com Phone: +1 770 751 7332
28 -30	Multinational Association Supportive Care in Cancer and International Society Oral Oncology International Symposium "Supportive Care makes excellent cancer care possible"	New York City, United States of America	Multinational Association of Supportive Care in Cancer (MASCC) Website: www2.kenes.com/mascc/pages/home.aspx Email: mascc@kenes.com Phone: +41 22 908 0488
28-30	European Society of Musculoskeletal Radiology 2012 – Annual Scientific Meeting	Innsbruck, Austria	European Society of Musculoskeletal Radiology Website: www.essr.org Email: office@essr.org Phone: +43 1 535 33 85
28-30	3rd International Conference on Thoracic Oncology	Rome, Italy	Association of Thoracic Oncology Website: www.oncologiatoracica.it Email: oncologiatoracica@yahoo.it

CALENDAR OF MEETINGS

Date	Name of Meeting	Place	Secretariat
July			
7-10	22nd Biennial Congress of the European Association for Cancer Research	Barcelona, Spain	European Cancer Organisation (ECCO) Website: www.ecco-org.eu Email: eacr22@ecco-org.eu Phone: +32 2 775 02 01
12-13	2012 Best of American Society Clinical Oncology Chicago	Chicago, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: +1 571 483 1300
25-27	Cancer in Never-Smokers	Rio de Janeiro, Brazil	International Association for the Study of Lung Cancer Website: www.lalca2012.org Email: lalca2012@icsevents.com Phone: +1 604 681 2153
26-28	Beyond the Global Standard of Medical Oncology – Perspectives from Asia.	Osaka, Japan	Japanese Society of Medical Oncology (JSMO) Website: square.umin.ac.jp/jsmo2012/en/index.html Email: jsco@gakkai.net Phone: +81 3 6809 1250
August			
3-4	2012 Best of American Society Clinical Oncology Boston	Boston, United States of America	American Society of Clinical Oncology (ASCO) Website: boa2012.asco.org Email: membermail@asco.org Phone: + 1 571 483 1300
10-11	2012 Best of American Society Clinical Oncology San Diego	San Diego, United States of America	American Society of Clinical Oncology (ASCO) Website: boa2012.asco.org Email: membermail@asco.org Phone: +1 571 483 1300
27-30	Union for International Cancer Control World Cancer Congress	Montreal, Canada	Union for International Cancer Control (UICC) Website: www.worldcancercongress.org Email: congress@uicc.org Phone: +41 22 809 1811
September			
13-15	2012 Breast Cancer Symposium	San Francisco, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: + 57 1 483 1300
14-16	International Liver Cancer Association Sixth Annual Conference	Berlin, Germany	International Liver Cancer Association (ILCA) Website: www.ilca2012.org Email: info@ilca-online.org Phone: +32 (0)2 789 2345
28-2 October	37th European Society Medical Oncology Conference	Vienna, Austria	European Society for Medical Oncology (ESMO) Website: www.esmo.org Email: registration@esmo.org Phone: +41 91 973 19 26
October			
3-5	Global Summit on International Breast Health: “Breast Cancer – Quality of Life”	Vienna, Austria	The Breast Health Global Initiative (BHGI) Website: www.bhgi.info/ Email: mhartman@fhcrc.org Phone: + 1 (206) 667-3538
18-19	Cancer Care in the Older Population	Cairo, Egypt	South & East Mediterranean College of Oncology (SEMCO) Website: www.semco-oncology.info Email: atef.badran@gmail.com Phone: +20 2 25 35 14 24

CALENDAR OF MEETINGS

Date	Name of Meeting	Place	Secretariat
October			
25-27	European Society Cardiac Radiology 11th Annual Scientific Meeting	Barcelona, Spain	European Society Cardiac Radiology (ESCR) Website: www.escr.org/cms/website.php Email: office@escr.org Phone: +43 1 535 50 93
25-27	50th Japanese Society Clinical Oncology Annual Meeting	Yokohama, Japan	Japan Society of Clinical Oncology Website: www.congre.co.jp/jsco2012/english/index.html Email: jsco2012@congre.co.jp Phone: +81 6 6229 2555
November			
4-7	National Cancer Research Institute Cancer Conference	Liverpool, England	National Cancer Research Institute (NCRI) Website: www.ncri.org.uk/ncriconference Email: ncriconference@ncri.org.uk Phone: +44 (0)20 3469 5453
8-10	BCY1 – Breast Cancer in Young Women	Dublin, Ireland	European School of Oncology (ESO) Website: www.eso.net/events-2.html Email: eso@eso.net Phone: +39 02 8546451
9-10	2nd International Conference on Cancer and the Heart	Houston, United States of America	MD Anderson Cancer Center Website: www.mdanderson.org Email: register@mdanderson.org. Phone: + 1 713 792 2223
30-1 Dec	American Society of Clinical Oncology's Quality Care Symposium	San Diego, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: + 1 571 483 1300
2013			
January			
24-26	2013 Gastrointestinal Cancers Symposium	San Francisco, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: + 1 571 483 1300
February			
14-16	2013 Genitourinary Cancers Symposium	Florida, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: + 1 571 483 1300
March			
12-16	13th International Conference of Primary Therapy of Early Breast Cancer	St Gallen, Switzerland	St Gallen Oncology Website: www.oncoconferences.ch Email: info@oncoconferences.ch Phone: +41 (0) 71 243 0032
May			
31 – 4 June	2013 American Society Clinical Oncology Annual Meeting	Chicago, United States of America	American Society of Clinical Oncology (ASCO) Website: www.asco.org.au Email: membermail@asco.org Phone: + 1 571 483 1300

CANCER COUNCIL AUSTRALIA

Cancer Council Australia is the nation's peak cancer control organisation.

Its members are the leading state and territory Cancer Councils, working together to undertake and fund cancer research, prevent and control cancer and provide information and support for people affected by cancer.

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CLINICAL ONCOLOGICAL SOCIETY OF AUSTRALIA

The Clinical Oncological Society of Australia (COSA) is a multidisciplinary society for health professionals working in cancer research or the treatment, rehabilitation or palliation of cancer patients.

It conducts an annual scientific meeting, seminars and educational activities related to current cancer issues. COSA is affiliated with Cancer Council Australia.

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www.cosa.org.au or cosa@cancer.org.au

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Medical Members: $160
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PROFESSIONAL GROUPS

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Information for contributors

Cancer Forum provides an avenue for communication between all those involved in the fight against cancer and especially seeks to promote contact across disciplinary barriers.

To this end articles need to be comprehensible to as wide a section of the readership as possible. Authors should provide sufficient introductory material to place their articles in context for those outside their field of specialisation.

Format

Cancer Forum welcomes original articles about medical, scientific, political, social, educational and administrative aspects of cancer control. All manuscripts should be submitted by email to info@cancerforum.org.au as MS Word documents.

Length: 2000-2500 words.

Font: Arial - 20pt for title, 12pt for headings and 10pt for text.

Following the title, include your full name, organisation and email address.

Include an introductory heading and sub-headings that describe the content.

Number pages in the footer.

Abstract

All manuscripts must include an abstract of approximately 200 words, providing a summary of the key findings or statements.

Illustrations

Photographs and line drawings can be submitted via email or on disk, preferably in tiff or jpeg format, or as transparencies or high quality prints.

If images are not owned by the author, written permission to reproduce the images should be provided with the submission.

Referencing

Reference numbers within the text should be superscripted and placed after punctuation.

The list of references at the end of the paper should be numbered consecutively in the order in which they are first mentioned and be consistent with the National Library of Medicine's International Committee of Medical Journal Editors' *Uniform Requirements for Manuscripts Submitted to Biomedical Journals.*

> eg. Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25;347(4):284-7.

A full guide is available at www.nlm.nih.gov/bsd/uniform_requirements.html

The Editorial Board will make the final decision on publication of articles and may request clarifications or additional information.

Manuscripts should be emailed to:

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