# CONTENTS

## CHAPTER 1  CANCER PREVALENCE AND CAUSES

- Cancer: the world’s biggest killer ........................................ 1
- What is cancer, and what causes it? ...................................... 3
- Cancer now biggest killer in Australia, ahead of heart disease: WHO report ................................................................. 4
- Global battle against cancer won’t be won with treatment alone ............................................................ 6
- Cancer in Australia: an overview ........................................ 8
- Prevalence of cancer .......................................................... 10
- It’s all relative: how to understand cancer risk ...................... 12
- What really gives you cancer? ........................................... 14
- Known risk factors for cancer ............................................ 21
- Cancer and food .............................................................. 23
- Confused about your cancer risk from eating meat? Here’s what the figures mean .............................................. 27
- Why the causes of cancer are more than just random ‘bad luck’ .................................................................................. 29

## CHAPTER 2  CANCER PREVENTION AND AWARENESS

- Cut your cancer risk .......................................................... 31
- 37,000 Australians could avoid cancer every year .................. 35
- Six foods that increase or decrease your risk of cancer .......... 36
- Early detection through organised population screening ........ 38
- Breast cancer screening ..................................................... 41
- Eliminating cervical cancer globally .................................... 43
- Bowel cancer screening ..................................................... 45
- Bowel cancer facts ............................................................ 46
- What you need to know about prostate cancer ..................... 47
- Sun safety myths and facts .................................................. 49
- Skin cancer facts .............................................................. 49
- Promising prognosis as cancer deaths continue to fall .......... 51

**Exploring issues – worksheets and activities** ........................................ 53

- **Fast facts** .................................................................................. 57
- **Glossary** ....................................................................................... 58
- **Web links** ..................................................................................... 59
- **Index** .......................................................................................... 60
Cancer Prevention is Volume 409 in the ‘Issues in Society’ series of educational resource books. The aim of this series is to offer current, diverse information about important issues in our world, from an Australian perspective.

KEY ISSUES IN THIS TOPIC
According to the latest World Health Organization statistics, cancer is now the biggest killer globally. In Australia, about three in every ten deaths are caused by cancer. In Western countries, including Australia, the rise in cancer cases is attributable to ageing populations and increased screening. Lifestyle has also been highlighted as a major causal factor, with cancer particularly prevalent in countries where people have poor diets, inactive lifestyles and high smoking rates.

This book presents accessible information aimed at improving understanding around the causes and prevalence of cancer, as well as offering general advice on cancer prevention and awareness.

What are the risk factors for the most common forms of cancer, and what are the best approaches to early detection and prevention? The best cancer is the one you don’t get – prevention is the greatest cure.

SOURCES OF INFORMATION
Titles in the ‘Issues in Society’ series are individual resource books which provide an overview on a specific subject comprised of facts and opinions.

The information in this resource book is not from any single author, publication or organisation. The unique value of the ‘Issues in Society’ series lies in its diversity of content and perspectives.

The content comes from a wide variety of sources and includes:

- Newspaper reports and opinion pieces
- Website fact sheets
- Magazine and journal articles
- Statistics and surveys
- Government reports
- Literature from special interest groups

CRITICAL EVALUATION
As the information reproduced in this book is from a number of different sources, readers should always be aware of the origin of the text and whether or not the source is likely to be expressing a particular bias or agenda.

It is hoped that, as you read about the many aspects of the issues explored in this book, you will critically evaluate the information presented. In some cases, it is important that you decide whether you are being presented with facts or opinions. Does the writer give a biased or an unbiased report? If an opinion is being expressed, do you agree with the writer?

EXPLORING ISSUES
The ‘Exploring issues’ section at the back of this book features a range of ready-to-use worksheets relating to the articles and issues raised in this book. The activities and exercises in these worksheets are suitable for use by students at middle secondary school level and beyond.

FURTHER RESEARCH
This title offers a useful starting point for those who need convenient access to information about the issues involved. However, it is only a starting point. The ‘Web links’ section at the back of this book contains a list of useful websites which you can access for more reading on the topic.
CANCER: THE WORLD’S BIGGEST KILLER

The best cancer is the one you don’t get, so prevention remains vital, writes Terry Slevin in this article first published in The Conversation

The World Cancer Report 2014, the first global snapshot of cancer since 2008, shows the disease is now the world’s biggest killer. In 2012, there were 8.2 million cancer deaths and 14.1 million new cancer cases worldwide. Worse, those numbers are predicted to rise to 13 million deaths and 22 million cases per year by 2025. There is real reason for concern.

The report, released today, was produced by more than 250 experts from around the world and was edited and led by Australia’s own Professor Bernard Stewart from University of NSW, along with International Agency for Research on Cancer Director Dr Chris Wild.

Nothing can be discussed in health these days without considering cost. Those numbers are pretty frightening too. The report estimates that the cost of dealing with cancer around the world is in the vicinity of $US1.6 trillion. They suggest that equates to 2% of total global gross domestic product.

The numbers are mind-boggling. But what does it mean? What is the story in Australia and what do we do about it?

Well, it means cancer, along with cardiovascular disease, remains one of the biggest health challenges we face. Australia has the third-highest cancer rate in the world, behind Denmark and France.

Perversely, on a population level, a high rate of cancer could be considered a marker of a relatively healthy population.

Australia enjoys among the greatest life expectancy in the world. The longer we live, the greater our chance of being diagnosed with a degenerative disease such as cancer. That longevity is generally considered to be linked to improved safety (fewer road deaths and deaths at work), and improved management of big killers like cardiovascular disease and infectious diseases.

And while there is always room for improvement, by any international comparison Australia enjoys a very high quality health care system. These things are all good news.

The second factor in having high cancer rates is that we actively look for cancer in the form of cancer screening programs. The idea is obviously to find cancer early enough to successfully treat it. When we systematically go looking for more cancer (or most disease for that matter) we tend to find it.

So why are the number of deaths for cancer going up?

There are more people in Australia, and in the world. And there is still work to be done on the treatment front. Our treatments for breast cancer, prostate cancer and bowel cancer are getting better and more effective. We are not able to claim such success in relatively common cancers like lung cancer. And treatment is not so readily available in many countries.

But in Australia, like most developed countries, the death rate from cancer is actually coming down.

Prevention

The best cancer is the one you don’t get, so prevention remains vital.
We are making great progress on tobacco and Australia’s smoking rates are down to about 15%. But that still means there are too many million Australians smoking. So the first port of call for cancer prevention is giving up the fags.

On the tobacco front, Australia’s success should be shared internationally where we have some responsibility to pass our experience to nations where smoking rates remain high or are even increasing. Government action such as increasing tax on tobacco, plain packaging and supporting hard-hitting social marketing campaigns are the key.

For non-smokers, the most important way to reduce cancer risk is achieving or retaining a healthy weight – through healthy diet and being physically active. Healthy food and lots of movement are both thought to help reduce cancer risk, although the detail on diet remains challenging. But there is no doubt being obese increases your risk of developing a number of common cancers.

We also need government action to make healthier choices easier choices. Reducing the out-of-control marketing of unhealthy food, particularly that aimed at kids, might be a useful step.

Being SunSmart and cutting down on the booze are other well-established cancer prevention strategies.

International snapshot

No one should look at the World Cancer Report 2014 just through Australian eyes.

It is no surprise that there is an enormous gap between the haves and the have-nots. Less than 5% of the populations of Africa, Asia and Latin America are covered by formal cancer registries. So the data drawn upon for reports of this kind are sketchy for a big proportion of the world.

The data available suggests that while these folk report 60% of the world’s cancer cases, they account for 70% of the world’s cancer deaths.

It also shows that more than half the children diagnosed with cancer in Africa and Asia die as a result of the disease compared with less than 20% in the developed world.

We have a lot of knowledge and capacity to share. World Cancer Day is an initiative of the Union for International Cancer Control (UICC) made up of around 800 member cancer organisations from around the world. They rightly focus their efforts on a Robin Hood approach of taking (technologies and solutions) from the rich and trying to give (facilitate, communicate, support) to the poorer resourced parts of the world.

As Dr Margaret Chan wrote in the foreword of the WCR14:

Many developing countries find themselves in the grip of cancers from two vastly different worlds. Those associated with the world of poverty, including infection-related cancers, are still common, while those associated with the world of plenty are increasingly prevalent, owing to the adoption of industrialised lifestyles, with increasing use of tobacco, consumption of alcohol and highly processed foods, and lack of physical activity.

A report which aims to sum up the new information on cancer around the world over the past five years is going to have an enormous amount of vitally important material to battle cancer over the next five years. All involved should be proud of their effort. So now onto action!

Terry Slevin is Honorary Senior Lecturer in Public Health at Curtin University; Education and Research Director, at Cancer Council WA; and Chair of the Occupational and Environmental Cancer Committee, Cancer Council Australia.

Australia has the third-highest cancer rate in the world, behind Denmark and France.
What is cancer, and what causes it?

WHAT IS CANCER?

- Cancer is a group of diseases causing an uncontrolled division of abnormal cells in a part of the body, which have the potential to invade or spread to other parts of the body.
- The human body contains over 200 different types of cell, forming the basic units of life. Each of these cells has specific functions and is organised into the various organs such as the lungs, liver, skin and brain. To keep these organs functioning, cells grow and divide to replace other cells as they age and die.
- Normal cells multiply and grow in a highly controlled way within an incredibly complex genetic network, however this control can be lost if something causes a mistake to occur in the genetic blueprints of affected cells. Mutations in the DNA of genes controlling the network can disrupt this balance and cause an accumulation of excess cells, forming a tumour.
- Cancer is the term used to describe collections of these cells, growing and potentially spreading within the body.
- As cancerous cells can arise from almost any type of tissue cell, cancer actually refers to over 100 different known cancers that affect humans.
- Benign cancer cells (not dangerous) are those that do not spread beyond the immediate area in which they arise, whereas malignant cells are those which spread into surrounding areas or to different parts of the body. These cells are more commonly referred to as cancer.
- Possible signs and symptoms of cancer may include: abnormal bleeding, prolonged coughing, a new lump, unexplained weight loss, or a change in bowel movements, among others. These symptoms may indicate cancer, however they may also be caused by other issues.

WHAT CAUSES CANCER?

All of the risks and causes of cancer are not fully known, however they are attributable to both environmental (pollution; lifestyle, economic and behavioural factors) and inherited genetic factors. A number of chemical, biological and physical agents (called carcinogens) are known to trigger the mistakes in the cell blueprint that cause cancer. Examples of carcinogens include tobacco, ultraviolet radiation and asbestos.

Key risk factors in the causation of cancer include the following:

- Tobacco smoking (1 in 9 cancers, 1 in 5 cancer deaths)
- Alcohol (approximately 3% of cancers are related to the consumption of alcohol)
- Many cancers also occur as a direct result of diet, infectious agents or exposure to radiation (notably skin cancers caused by ultraviolet exposure to the sun)
- Some cancers also result from inherited ‘faulty’ genes.

It is nearly impossible to prove what caused a cancer in any individual, because most cancers have multiple possible causes. For example, if a heavy tobacco user develops lung cancer, then it was probably caused by the tobacco use (lifestyle factor) – but since everyone has a small chance of developing lung cancer in response to radiation or air pollution, there is a small chance that the lung cancer developed due to air pollution or radiation (environmental factor).

It is worth noting that not all cancers are associated with the risk factors mentioned above. Cancer can sometimes develop without any specific causes.

Cancer is generally not a transmissible disease, with the exception of rare transmissions that occur with pregnancies and via a marginal number of organ donors.

SOURCES

Cancer Council Australia, FAQ – What is cancer?
Saunders, D, Explainer: what is cancer?
Wikipedia, Cancer.
Cancer now biggest killer in Australia, ahead of heart disease: WHO report

Cancer has surpassed heart disease as the biggest killer in Australia, according to a new report from the World Health Organization (WHO). Sophie Scott and Alison Branley report for ABC News

GLOBAL KILLER

- 8.2 million deaths from cancer in 2012.
- Lung, liver, stomach, colorectal and breast cancers cause most deaths.
- 1.59 million lung cancer deaths in 2012.
- 745,000 liver cancer deaths in 2012.
- Tobacco use is biggest risk factor, accounting for 70 per cent of lung cancer deaths.
- Africa, Asia, Central and South America account for 70 per cent of world’s cancer deaths.

The WHO’s World Cancer Report found 8.2 million people died from cancer globally in 2012, including 40,000 Australians.

The report was last released six years ago and this is the first major international update on the disease since then.

It found that cancer surpassed heart disease as the world’s biggest killer in 2011, with 7.87 million cancer deaths compared to 7.02 million from heart disease. Stroke was considered separately.

In Australia and other Western countries, the rise in cancer cases has been attributed to ageing populations and increased screening.

Lifestyle has also been highlighted as a major factor, with cancer particularly prevalent in countries where people have a poor diet and inactive lifestyles, and countries with high smoking rates.

Doctors predict global cancer rates will increase by three-quarters over the next two decades and they expect 20 million new cases by 2025.

Prevention is better than cure

The report says 3.7 million cancer deaths could have been avoided by lifestyle changes, such as quitting smoking, reducing alcohol intake and maintaining a healthy weight.

“About 5 per cent of all cancers is due to alcohol consumption – that’s an important part of the preventable cancer story,” said Cancer Council Australia’s Terry Slevin.

“Let’s make no bones about it, alcohol is a class one known carcinogen, it’s listed by the World Health Organization as such.”

Research shows women’s risk of breast cancer can increase by having as little as one alcoholic drink a day. For men, the risk of tumours increases with two to three drinks a day.

Lung cancer was the biggest killer globally. It was also the biggest killer among men, while breast cancer killed more women.

Mr Slevin said lung cancer was an area where treatments were less successful than other areas.

“That’s why prevention, when it comes to lung cancer, is so important,” he said.
Melanoma continued to be more of a problem in Australia than overseas, with Australians and New Zealanders twice as likely to be diagnosed than anywhere else in the world.

Prostate cancer is the most commonly diagnosed form of cancer in Australia, with the Cancer Council putting the number of diagnoses in 2009 at 21,800.

Prostate Cancer Foundation of Australia chief executive Anthony Lowe says more than 3,300 Australian men die from the disease each year and one in four men over 85 will develop it.

“Many cancers including prostate cancer are disease of ageing and the population is ageing,” he said.

“Unfortunately the lifestyle that we live in Australia – lack of exercise, poor diet and high alcohol consumption are certainly risk factors.”

Worldwide there are more than 14 million cancer diagnoses each year, the report found, and it costs the world more than $1 trillion each year.

It says one-fifth of that could be avoided by investing in prevention strategies.

**Cardiovascular disease as a whole still the most common cause of death**

The Heart Foundation says while cancer may have overtaken heart disease as Australia’s biggest killer, when cardiovascular disease is looked at as a whole, it adds up to be the most common cause of death.

Heart Foundation national director Dr Rob Grenfell says cardiovascular disease, which includes strokes as well as heart and vascular diseases, killed 45,622 people in 2011. It was closely followed by cancer, which claimed the lives of 43,721 Australians.

Heart disease alone killed 21,500.

Dr Grenfell says cancer and cardiovascular disease have common risk factors such as smoking, obesity and inactivity and could be tackled together.

“As a group of diseases, cancers and cardiovascular diseases are attributable to 60 per cent of the country’s deaths and both are largely preventable,” he said.

“If we were to have a coordinated approach to the management of these risk factors we would reduce the prevalence of preventable deaths.”

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GLOBAL BATTLE AGAINST CANCER WON’T BE WON WITH TREATMENT ALONE
EFFECTIVE PREVENTION MEASURES URGENTLY NEEDED TO PREVENT CANCER CRISIS

The International Agency for Research on Cancer (IARC), the specialised cancer agency of the World Health Organization, has recently launched the World Cancer Report 2014, a collaboration of over 250 leading scientists from more than 40 countries, describing multiple aspects of cancer research and control.

Based on the latest statistics on trends in cancer incidence and mortality worldwide, this new book reveals how the cancer burden is growing at an alarming pace and emphasises the need for urgent implementation of efficient prevention strategies to curb the disease.

“Despite exciting advances, this report shows that we cannot treat our way out of the cancer problem,” states Dr Christopher Wild, Director of IARC and co-editor of the book. “More commitment to prevention and early detection is desperately needed in order to complement improved treatments and address the alarming rise in cancer burden globally.”

Increasing global burden of cancer

In 2012, the worldwide burden of cancer rose to an estimated 14 million new cases per year, a figure expected to rise to 22 million annually within the next two decades. Over the same period, cancer deaths are predicted to rise from an estimated 8.2 million annually to 13 million per year. Globally, in 2012 the most common cancers diagnosed were those of the lung (1.8 million cases, 13.0% of the total), breast (1.7 million, 11.9%), and large bowel (1.4 million, 9.7%). The most common causes of cancer death were cancers of the lung (1.6 million, 19.4% of the total), liver (0.8 million, 9.1%), and stomach (0.7 million, 8.8%).

The cancer divide

As a consequence of growing and ageing populations, developing countries are disproportionately affected by the increasing numbers of cancers. More than 60% of the world’s total cases occur in Africa, Asia, and Central and South America, and these regions account for about 70% of the world’s cancer deaths, a situation that is made worse by the lack of early detection and access to treatment.

Avoidable deaths

Access to effective and affordable cancer treatments in developing countries, including for childhood cancers, would significantly reduce mortality, even in settings where health care services are less well developed.

However, the spiralling costs of the cancer burden are damaging the economies of even the richest countries and are way beyond the reach of developing countries, as well as placing impossible strains on health care systems. In 2010, the total annual economic cost of cancer was estimated to reach approximately US$1.16 trillion. Yet about half of all cancers could be avoided if current knowledge was adequately implemented.

“The rise of cancer worldwide is a major obstacle to human development and wellbeing. These new figures and projections send a strong signal that immediate action is needed to confront this human disaster, which touches every community worldwide, without exception,” stresses Dr Wild.

“Despite exciting advances, this report shows that we cannot treat our way out of the cancer problem. More commitment to prevention and early detection is desperately needed in order to complement improved treatments and address the alarming rise in cancer burden globally.”

Effective vaccination campaigns and health promotion

Many developing countries continue to be disproportionately affected by the double burden of high infection-related cancers (including those of the cervix, liver, and stomach) and the rising incidence of cancers (such as those of the lung, breast, and large bowel) associated with industrialised lifestyles.
Yet the implementation of effective vaccination against hepatitis B virus and human papillomavirus can markedly reduce cancers of the liver and cervix, respectively. Preventing the spread of tobacco use in low- and middle-income countries is of crucial importance to cancer control. Likewise, in rapidly industrialising countries, measures to promote physical activity and avoid obesity should also be prioritised in relation to cancers such as those of the large bowel and breast.

**Early detection, diagnosis, and treatment**

In addition, low-tech approaches to early detection and screening have proven their efficacy in developing countries. A prime example is cervical cancer screening using visual inspection with acetic acid and cryotherapy or cold coagulation treatment of precancerous lesions. This type of ‘screen-and-treat’ programme has been successfully implemented in India and Costa Rica, for example.

“Governments must show political commitment to progressively step up the implementation of high-quality screening and early detection programmes, which are an investment rather than a cost,” says Dr Bernard W. Stewart, co-editor of *World Cancer Report 2014*.

“Adequate legislation can encourage healthier behaviour, as well as having its recognised role in protecting people from workplace hazards and environmental pollutants,” stresses Dr Stewart. “In low- and middle-income countries, it is critical that governments commit to enforcing regulatory measures to protect their populations and implement cancer prevention plans.”


In 2012, the worldwide burden of cancer rose to an estimated 14 million new cases per year, a figure expected to rise to 22 million annually within the next two decades. Over the same period, cancer deaths are predicted to rise from an estimated 8.2 million annually to 13 million per year.

Cancer in Australia: an overview was prepared by the Australian Institute of Health and Welfare with support from state and territory members of the Australasian Association of Cancer Registries. It provides comprehensive national information and statistics on cancer, including the latest available data and projections, as well as trends over time. Information by Aboriginal and Torres Strait Islander status, state and territory, remoteness area, life stages and socioeconomic disadvantage are also presented.

Cancer is a major cause of illness in Australia

In 2014, it is estimated that 123,920 Australians will be diagnosed with cancer (excluding basal and squamous cell carcinoma of the skin, as these cancers are not notifiable diseases in Australia). More than half (55%) of the cancer cases diagnosed in Australia are expected to be for males. The most commonly reported cancers in 2014 are expected to be prostate cancer, followed by colorectal (bowel) cancer, breast cancer in females, melanoma of the skin, and lung cancer.

Between 1982 and 2014, the number of new cancer cases diagnosed more than doubled – from 47,417 to 123,920. This increase can be largely attributed to the rise in the incidence of prostate cancer, colorectal cancer, breast cancer in females and lung cancer. The increase can also be partly explained by the ageing and increasing size of the population, improved diagnoses through population health screening programs, and improvements in technologies and techniques used to identify and diagnose cancer.

Mortality rate due to cancer has fallen

In 2014, it is estimated that nearly 45,780 Australians will die from cancer. Cancer accounted for about 3 in 10 deaths in Australia. For all cancers combined,

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**ESTIMATED INCIDENCE OF CANCER IN 2014**

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<thead>
<tr>
<th>Site/type (ICD-10 codes)</th>
<th>Cases</th>
<th>ASR(b)</th>
<th>Site/type (ICD-10 codes)</th>
<th>Cases</th>
<th>ASR(b)</th>
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<td><strong>All cancers combined(c)</strong></td>
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<td><strong>540.4</strong></td>
<td><strong>All cancers combined(c)</strong></td>
<td><strong>55,660</strong></td>
<td><strong>406.2</strong></td>
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(a) The 2014 estimates are based on 2002-2011 incidence data (see Appendix G). The estimates are rounded to the nearest 10. Estimates less than 1,000 are rounded to the nearest 5.
(b) The rates were standardised to the Australian population as at 30 June 2001 and are expressed per 100,000 population.
(c) Includes cancers coded in the ICD-10 as C00-C97, D45, D46, D47.1 and D47.3, except those C44 codes that indicate a basal or squamous cell carcinoma of the skin.

Source: AIHW Australian Cancer Database 2011.
the age-standardised mortality rate is estimated to decrease by 20%, from 209 per 100,000 in 1982 to 168 per 100,000 in 2014.

In 2014, it is estimated that nearly 45,780 Australians will die from cancer. Cancer accounted for about 3 in 10 deaths in Australia.

Survival improved over time, but not consistent across all cancers

Five-year survival from all cancers combined increased from 46% in 1982-1986 to 67% in 2007-2011. The cancers with the largest survival gains over this time were prostate cancer, kidney cancer and non-Hodgkin lymphoma.

People living in Australia who were diagnosed with cancer generally had better survival prospects compared with people living in other countries and regions who were diagnosed with cancer.

Cancer outcomes differ across population groups

Cancer outcomes differ by Aboriginal and Torres Strait Islander status and remoteness area. In 2008-2012, for all cancers combined, Indigenous Australians experienced higher mortality rates than non-Indigenous Australians. In 2005-2009, incidence rates were highest for those living in inner regional areas of Australia; in 2008-2012, mortality rates were highest for those living in very remote areas.
**PREVALENCE OF CANCER**

**Australian Institute of Health and Welfare** explains cancer prevalence rates

### KEY FINDINGS

At the end of 2009 in Australia:
- 370,474 people were alive who had been diagnosed with cancer within the previous 5 years; this represented 1.7% of the Australian population.
- 5-year prevalence was higher in males than in females (56% and 44% of all prevalent cases, respectively).
- Among males, 5-year prevalence was highest for prostate cancer (42% of total male 5-year prevalence), followed by melanoma of the skin (13%) and colorectal cancer (13%).
- Among females, 5-year prevalence was highest for breast cancer (36% of total female 5-year prevalence), followed by colorectal cancer (13%) and melanoma of the skin (13%).

### About prevalence

Prevalence, or survivorship population, refers to the number of people alive who have ever been diagnosed with cancer. The combined effect of several factors – increasing incidence, decreasing mortality, improving survival, and developments in treatment – is leading to an increase in the population who have ever been diagnosed with cancer (see **Box 6.1**). Prevalence is a direct product of incidence and survival. Cancers with high incidence and high survival (such as melanoma of the skin) tend to have high prevalence, whereas cancers with low incidence and low survival (such as pancreatic cancer) tend to have low prevalence. In other cases, prevalence may represent a balance between conflicting incidence and survival patterns. For example, lung cancer has high incidence but low survival and therefore has low prevalence (AIHW & CA 2011).

This chapter presents limited-duration prevalence with an index date of 31 December 2009, based on the 2011 ACD, which contains actual national cancer data from 1982 to 2009 (see **Appendix F**). Data from the National Death Index (NDI) on deaths (from any cause) that occurred up to 31 December 2009, based on the 2011 ACD, which contains actual national cancer data from 1982 to 2009 (see **Appendix F**). Data from the National Death Index (NDI) on deaths (from any cause) that occurred up to 31 December 2011 were used to determine which people with cancer had died and when this occurred. Note that a person who was diagnosed with two separate cancers contributed separately to the prevalence of each cancer. However, this person would contribute only once towards prevalence of all cancers combined.

### Cancer prevalence

At the end of 2009, 370,474 people were alive who had been diagnosed with cancer in the previous 5 years (**Table 6.1**). This represented 1.7% of the Australian population. Males made up 56% of the 5-year prevalent cases. At the end of 2009, the 10-year prevalence of cancer was 581,208 and the 28-year prevalence was 861,057 (**Table 6.1**).

### Differences by age

Five-year prevalence for all cancers combined increased with age from those aged 0-14 to those aged 65-74, before decreasing for those aged 75-84 and 85 years and older. Note that in these prevalence statistics, age refers to the age of a person on the index date of 31 December 2009. At the end of 2009, Australians aged 75 years and over accounted for 27% of 5-year prevalence cases.

Five-year prevalence was highest for those aged 65-74 (100,648) and lowest for those aged 0-14 (2,173) (**Figure 6.1**).

### Cancer sites

Among males, prostate cancer had the highest 5-year prevalence of 86,207 males at the end of 2009. This was followed by melanoma of the skin (27,402) and colorectal cancer (26,700). Prostate cancer accounted for 42% of the total 5-year prevalence in males, while...
melanoma of the skin contributed 13% and colorectal cancer contributed 13%.

Among females, breast cancer had the highest 5-year prevalence (58,955 females), followed by colorectal cancer (21,896) and melanoma of the skin (20,962). Breast cancer accounted for 36% of the total 5-year prevalence in females, while colorectal cancer contributed 13% and melanoma of the skin contributed 13%.

For the majority of cancer sites, 5-year prevalence was higher in males than in females. 5-year prevalence for mesothelioma was 4 times higher in males than in females, and liver cancer and lip cancer were 2.8 times as high in males as in females.

Of the selected cancer sites, the lowest 5-year prevalence was observed for bladder cancer (Figure 6.2).

Of the selected cancers, the trend was most pronounced for bladder cancer, where 5-year prevalence was more than 3 times as high in males as in females (5,241 males and 1,498 females). 5-year prevalence for kidney cancer was nearly twice as high in males (6,291) as in females (3,336). In contrast, the 5-year prevalence for thyroid cancer was more than 3 times as high in females (6,482) as in males (2,057).


FIGURE 6.1: FIVE-YEAR PREVALENCE OF ALL CANCERS COMBINED BY AGE GROUP, AUSTRALIA, AS AT END OF 2009

Notes
1. Prevalence refers to the number of living people previously diagnosed with cancer, not the number of cancer cases.
2. Data for this figure are in online Table D6.1.

Source: AIHW ACD 2011.

FIGURE 6.2: FIVE-YEAR PREVALENCE OF SELECTED CANCERS, AUSTRALIA, AS AT THE END OF 2009

Notes
1. Prevalence refers to the number of living people previously diagnosed with cancer, not the number of cancer cases.
2. NHL = Non-Hodgkin lymphoma. Melanoma refers to melanoma of the skin.
3. Data for this figure are in Online Table D6.2.

Source: AIHW ACD 2011.
IT’S ALL RELATIVE: HOW TO UNDERSTAND CANCER RISK

Every body and circumstance is unique; one risk factor cannot be considered in isolation when applied to a real life context. This article by Ian Olver explains cancer risks in absolute and relative terms.

Absolute risk is the risk of developing a cancer over a certain period of time.

Relative risk is the risk one group of people has of developing a cancer compared to the risk of another group.

The Conversation’s cancer map (information reproduced in the following article) shows that the risk of bowel cancer is 10% higher for men and women who have one standard alcoholic drink every day, than for those who don’t drink any alcohol.

This is known as ‘relative risk’ and does not mean you have a 10% chance of getting bowel cancer if you drink one drink per day.

As the map says, it means your risk of bowel cancer is 10% higher than the risk of someone who doesn’t drink any alcohol.

This 10% matters not only in relation to someone else, but also in relation to the absolute risk of getting the particular cancer in the first place. If the absolute risk is small, then a 10% increase still doesn’t make your chances of getting cancer very high.

For instance, a man living in Australia has an absolute risk of 10% of developing bowel cancer over his lifetime. If he drinks one beer every day and his risk of bowel cancer increases by 10%, then it only goes up to 11% overall – so not much higher than it was in the first place.

ABSOLUTE RISK

The absolute risk of cancer is the chance of developing a certain cancer over a specified period of time, say in one year or in five years.

That chance will change depending on different
factors. The most important is a person's age. Since most cancers are more common in older age groups, your absolute risk of cancer will be higher as you get older.

One measure of absolute risk is the lifetime risk, which is the absolute risk of a certain cancer over the period of someone's life.

The graphs above and below show the risk for men and women who live in Australia getting certain cancers before the age of 85.

Women who have genetic changes in the BRCA1 or BRCA2 genes have around a 60% absolute lifetime risk of developing breast cancer. This absolute risk is high. But this risk is over a whole lifetime, so a woman with altered BRCA genes who ends up developing breast cancer may not do so until she is in her 70s or 80s.

**RELATIVE RISK**

Relative risk compares the risk of cancer in one group of people to that in another group.

The chance of a group with a common risk factor (such as obesity) developing cancer can be compared to the chance of another group of people with a healthy weight. This relative risk ratio will remain constant across the world. But absolute risk will vary depending on how common a cancer is in a particular region.

Relative risk may sometimes be quite high and lead people to believe the absolute risk of developing disease is higher than it actually is.

For instance, a woman from a Western country has a 2 in 100 chance (2% absolute lifetime risk) of developing cancer of the endometrium (lining of the uterus) by the age of 85.

If the woman is obese, her risk of endometrial cancer is twice that of a woman of ideal weight. That is, a relative risk of 2 or 100% greater chance of developing endometrial cancer than a woman who is not obese.

This 100% figure may sound like obese women have a very high risk of endometrial cancer. But, in fact, the risk is still quite low, since doubling the 2% population risk still only makes the absolute risk of endometrial cancer in obese women around 4%. This is still a low probability of cancer.

Be careful not to confuse relative risk with absolute risk and remember the time-frames over which absolute risk can apply.

Ian Olver is Director at Sansom Institute for Health Research; and Chair of Translational Cancer Research, University of South Australia.

**DISCLOSURE STATEMENT**

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**THE CONVERSATION**


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**AUSTRALIAN WOMEN’S LIFETIME RISK (%) OF CANCER DIAGNOSIS (BY 85)**

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>4.5</td>
</tr>
<tr>
<td>Melanoma (skin)</td>
<td>4.3</td>
</tr>
<tr>
<td>Breast</td>
<td>12.5</td>
</tr>
<tr>
<td>Bladder</td>
<td>0.60</td>
</tr>
<tr>
<td>Bowel</td>
<td>6.60</td>
</tr>
<tr>
<td>Kidney</td>
<td>0.9</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>1.3</td>
</tr>
<tr>
<td>Stomach</td>
<td>0.70</td>
</tr>
<tr>
<td>Liver</td>
<td>0.4</td>
</tr>
<tr>
<td>Cervical</td>
<td>0.60</td>
</tr>
<tr>
<td>Endometrium</td>
<td>2.1</td>
</tr>
<tr>
<td>Ovarian</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Source: Australian Government.
WHAT REALLY GIVES YOU CANCER?

There’s abundant advice out there on what you should or shouldn’t eat, drink, swallow, or stand next to, to avoid cancer. But it’s often lacking in evidence and the jumble of messages can be confusing.

This information is sourced from an interactive body map published by The Conversation which brings together the evidence on proven cancer causes. Using credible, scientific sources it answers questions about whether alcohol, red meat or sun exposure increase your cancer risk.

Cancer occurs when mutations in a cell’s DNA cause it to replicate without control, invading other tissues. Some cancer-causing mutations can be inherited; others induced, by infection with bacteria or viruses; or by environmental factors such as smoking, sun exposure and eating red meat.

This map’s focus is on induced factors. They are considered ‘modifiable’ because avoiding them lessens your chance of cancer.

Choose your gender and risk factor to see which body area can be affected. The selected body region will show you how much engaging in risks such as drinking alcohol, taking the contraceptive pill, or eating pickled vegetables, will increase your chance of certain cancers.

When reading the following body map information, keep in mind that every body and circumstance is unique; one risk factor cannot be considered in isolation when applied to a real life context.

Also remember the percentages portrayed are ‘relative risks’ which are different to ‘absolute risks’. The difference is explained in the preceding article, which will help you understand what relative risk really means for your chances of getting cancer.

RISK FACTORS
- Food and beverage
- Lifestyle and behaviour
- Disease and Illness
- Medication and treatment.

FOOD AND BEVERAGE

ALCOHOL

FEMALE

Bowel
A woman living in the developed world has around a 6.6% chance of getting bowel cancer in her lifetime. If she drinks one
standard alcoholic drink per day, her risk of bowel cancer is 10% higher than that of a woman who doesn’t drink.

**Liver**

A woman living in the developed world has around a 0.4% chance of getting liver cancer in her lifetime. If she drinks one standard alcoholic drink per day, her risk of liver cancer is 10% higher than that of a woman who doesn’t drink.

**Bowel**

A woman living in the developed world has around a 12.5% chance of getting cancer of the oral cavity or pharynx in her lifetime. If she drinks one standard alcoholic drink per day, her risk of oesophageal cancer is 20% higher than that of a woman who doesn’t drink.

**Oesophagus**

A woman living in the developed world has around a 0.8% chance of getting oesophageal cancer in her lifetime. If she drinks one standard alcoholic drink per day, her risk of oesophageal cancer is 20% higher than that of a woman who doesn’t drink.

**Larynx**

A woman living in the developed world has around a 0.1% chance of getting laryngeal cancer in her lifetime. If she drinks one standard alcoholic drink per day, her risk of laryngeal cancer is 10% higher than that of a woman who doesn’t drink.

**Oral cavity and pharynx**

A woman living in the developed world has around a 0.6% chance of getting cancer of the oral cavity or pharynx in her lifetime. If she drinks one standard alcoholic drink per day, her risk of cancer of the oral cavity or pharynx is 20% higher than that of a woman who doesn’t drink.

**MALE**

**Bowel**

A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he drinks one standard alcoholic drink per day, his risk of bowel cancer is 10% higher than that of a man who doesn’t drink.

**Liver**

A man living in the developed world has around a 0.4% chance of getting liver cancer in his lifetime. If she drinks one standard alcoholic drink per day, her risk of liver cancer is 10% higher than that of a man who doesn’t drink.

**Oesophagus**

A man living in the developed world has around a 1.8% chance of getting oesophageal cancer in his lifetime. If he drinks one standard alcoholic drink per day, his risk of oesophageal cancer is 20% higher than that of a man who doesn’t drink.

**Larynx**

A man living in the developed world has around a 0.5% chance of getting laryngeal cancer in his lifetime. If he drinks one standard alcoholic drink per day, his risk of laryngeal cancer is 10% higher than that of a man who doesn’t drink.

**Oral cavity and pharynx**

A man living in the developed world has around a 1.3% chance of getting cancer of the oral cavity or pharynx in his lifetime. If he drinks one standard alcoholic drink per day, his risk of cancer of the oral cavity or pharynx is 20% higher than that of a man who doesn’t drink.

**FEMALE**

**Bowel**

A woman living in the developed world has around a 0.5% chance of getting bowel cancer in her lifetime. If she eats less than 100g of fruit per day, her risk of bowel cancer is nearly two times that of a woman who doesn’t eat fruit. The World Cancer Research Fund recommends having no more than 500g of red meat per week.

**MALE**

**Bowel**

A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he eats red meat more than twice a week, his risk of bowel cancer is two times that of a man who doesn’t eat red meat. The World Cancer Research Fund recommends having no more than 500g of red meat per week.

**PROCESSED MEAT**

**FEMALE**

**Bowel**

A woman living in the developed world has around a 6.6% chance of getting bowel cancer in her lifetime. If she eats 50g of processed meat (equivalent to two slices of bacon) per day, her risk of bowel cancer is 20% higher than that of a woman who doesn’t eat processed meat.

**MALE**

**Bowel**

A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he eats red meat more than twice a week, his risk of bowel cancer is two times that of a man who doesn’t eat red meat. The World Cancer Research Fund recommends having no more than 500g of red meat per week.

**TOO MUCH SALT**

**FEMALE**

**Stomach**

A woman living in the developed world has around a 0.7% chance of getting stomach cancer in her lifetime. If she has a lot of salt in her diet, her risk of stomach cancer increases, but it is difficult to estimate by how much.

**MALE**

**Stomach**

A man living in the developed world has around a 1.6% chance of getting stomach cancer in his lifetime. If he has a lot of salt in his diet, his risk of stomach cancer increases, but it is difficult to estimate by how much.

**INADEQUATE INTAKE OF FRUITS**

**FEMALE**

**Stomach**

A woman living in the developed world has around a 0.7% chance of getting stomach cancer in her lifetime. If she eats less than 100g of fruit per day, her risk of stomach cancer is nearly two times that of a woman who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**Lung**

A woman living in the developed world has around a 4.5% chance of getting lung cancer in her lifetime. If she eats less than 100g of fruit per day, her risk of lung cancer is nearly two

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times that of a woman who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**Oesophagus**
A woman living in the developed world has around a 0.8% chance of getting oesophageal cancer in her lifetime. If she eats less than 100g of fruit per day, her risk of oesophageal cancer is 55% higher than that of a woman who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**Oral cavity and pharynx**
A woman living in the developed world has around a 0.8% chance of getting oesophageal cancer in her lifetime. If she eats less than 100g of fruit per day, her risk of cancer of the oral cavity or pharynx is nearly two times that of a woman who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**MALE**

**Stomach**
A man living in the developed world has around a 1.6% chance of getting stomach cancer in his lifetime. If he eats less than 100g of fruit per day, his risk of stomach cancer is nearly two times that of a man who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**Lung**
A man living in the developed world has around a 7.6% chance of getting lung cancer in his lifetime. If he eats less than 100g of fruit per day, his risk of stomach cancer is nearly two times that of a man who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**Oesophagus**
A man living in the developed world has around a 1.8% chance of getting oesophageal cancer in his lifetime. If he eats less than 100g of fruit per day, his risk of oesophageal cancer is 55% higher than that of a man who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**Oral cavity and pharynx**
A man living in the developed world has around a 1.3% chance of getting cancer of the oral cavity or pharynx in his lifetime. If he eats less than 100g of fruit per day, his risk of cancer of the oral cavity or pharynx is nearly two times that of a man who eats at least 100g of fruit per day. Experts recommend at least two serves (300g) of fruit per day.

**INADEQUATE INTAKE OF FIBRE**

**FEMALE**

**Bowel**
A woman living in the developed world has around a 10% chance of getting bowel cancer in her lifetime. If she consumes less than 6g of fibre per day, her risk of bowel cancer is 85% higher than that of a woman who consumes at least 6g of fibre per day. Experts recommend at least 30g of fibre per day – which can be found in foods such as corn, wheat and oats.

**MALE**

**Bowel**
A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he consumes less than 6g of fibre per day, his risk of bowel cancer is 85% higher than that of a man who consumes at least 6g of fibre per day. Experts recommend at least 30g of fibre per day – which can be found in foods such as corn, wheat and oats.

**INADEQUATE INTAKE OF NON-STARCHY VEGETABLES**

**FEMALE**

**Stomach**
A woman living in the developed world has around a 0.7% chance of getting stomach cancer in her lifetime. If she eats less than 100g of vegetables per day, her risk of stomach cancer is two times that of a woman who eats at least 100g of vegetables per day. Experts recommend at least five serves (375g) of vegetables per day.

**MALE**

**Stomach**
A man living in the developed world has around a 1.6% chance of getting stomach cancer in his lifetime. If he eats less than 100g of vegetables per day, his risk of stomach cancer is two times that of a man who eats at least 100g of vegetables per day. Experts recommend at least five serves (375g) of vegetables per day.

**LIFESTYLE AND BEHAVIOUR**

**SMOKING**

**FEMALE**

**Bowel**
A woman living in the developed world has around a 6.6% chance of getting bowel cancer in her lifetime. If she smokes, her risk of bowel cancer is 30% higher than that of a woman who doesn’t smoke.

**Bladder**
A woman living in the developed world has around a 0.6% chance of getting bladder cancer. If she smokes, her risk of bladder cancer is around two and a half times that of a woman who doesn’t smoke.

**Ovary**
A woman living in the developed world has around a 1.2% chance of getting ovarian cancer in her lifetime. If she smokes, her risk of ovarian cancer is 5% to 10% higher than that of a woman who doesn’t smoke.

**Pancreas**
A woman living in the developed world has around a 1.2% chance of getting pancreatic cancer in her lifetime. If she smokes, her risk of pancreatic cancer is two times that of a woman who doesn’t smoke.

**Stomach**
A woman living in the developed world has around a 0.7% chance of getting stomach cancer in her lifetime. If she smokes, her risk of stomach cancer is one and a half times that of a woman who doesn’t smoke.

**Kidney**
A woman living in the developed world has around a 1% chance of getting kidney cancer in her lifetime. If she smokes, her risk of kidney cancer is one and a half times that of a woman who doesn’t smoke.
Lung
A woman living in the developed world has around a 4.5% chance of getting lung cancer in her lifetime. If she smokes, her risk of lung cancer is nearly 13 times that of a woman who doesn’t smoke.

Oesophagus
A woman living in the developed world has around a 0.8% chance of getting oesophageal cancer in her lifetime. If she smokes, her risk of oesophageal cancer is seven times that of a woman who doesn’t smoke.

Leukaemia
A woman living in the developed world has around a 1.3% chance of getting leukaemia in her lifetime. If she smokes, her risk of leukaemia is 20% higher than that of a woman who doesn’t smoke.

Larynx
A woman living in the developed world has around a 0.1% chance of getting laryngeal cancer in her lifetime. If she smokes, her risk of laryngeal cancer is 13 times that of a woman who doesn’t smoke.

Oral cavity and pharynx
A woman living in the developed world has around a 0.6% chance of getting cancer of the oral cavity or pharynx in her lifetime. If she smokes, her risk of cancer of the oral cavity or pharynx is five times that of a woman who doesn’t smoke.

MALE
Bowel
A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he smokes, his risk of bowel cancer is 20% higher than that of a man who doesn’t smoke.

Bladder
A man living in the developed world has around a 2.3% chance of getting bladder cancer in his lifetime. If he smokes, his risk of bladder cancer is three times that of a man who doesn’t smoke.

Pancreas
A man living in the developed world has around a 1.5% chance of getting pancreatic cancer in his lifetime. If he smokes, his risk of pancreatic cancer is two times that of a man who doesn’t smoke.

Stomach
A man living in the developed world has around a 1.6% chance of getting stomach cancer in his lifetime. If he smokes, his risk of stomach cancer is two times that of a man who doesn’t smoke.

Kidney
A man living in the developed world has around a 2% chance of getting kidney cancer in his lifetime. If he smokes, his risk of kidney cancer is two and a half times that of a man who doesn’t smoke.

Lung
A man living in the developed world has around a 7.6% chance of getting lung cancer in his lifetime. If he smokes, his risk of lung cancer is 21 times that of a man who doesn’t smoke.

Oesophagus
A man living in the developed world has around a 1.8% chance of getting oesophageal cancer in his lifetime. If he smokes, his risk of oesophageal cancer is seven times that of a man who doesn’t smoke.

Leukaemia
A man living in the developed world has around a 2% chance of getting leukaemia in his lifetime. If he smokes, his risk of leukaemia is two times that of a man who doesn’t smoke.

Larynx
A man living in the developed world has around a 0.5% chance of getting laryngeal cancer in his lifetime. If he smokes, his risk of laryngeal cancer is nearly 15 times that of a man who doesn’t smoke.

Oral cavity and pharynx
A man living in the developed world has around a 1.3% chance of getting cancer of the oral cavity or pharynx in his lifetime. If he smokes, his risk of cancer of the oral cavity or pharynx is 11 times that of a man who doesn’t smoke.

SUN EXPOSURE AND ULTRAVIOLET RADIATION

FEMALE
Melanoma
A woman living in the developed world has around a 4.3% chance of getting melanoma of the skin in her lifetime. If she exposes herself to the sun, her risk of melanoma of the skin increases, but estimating relative risk is difficult. Sun exposure causes about 90% of cases of melanoma in the developed world. Using sunscreen is likely to reduce the incidence of melanoma by 10-15%.

MALE
Melanoma
A man living in the developed world has around a 7.1% chance of getting melanoma of the skin in his lifetime. If he exposes himself to the sun, his risk of melanoma of the skin increases, but estimating relative risk is difficult. Sun exposure causes about 90% of cases of melanoma in the developed world. Using sunscreen is likely to reduce the incidence of melanoma by 10-15%.

INADEQUATE PHYSICAL ACTIVITY

FEMALE
Bowel
A woman living in the developed world has around a 6.6% chance of getting bowel cancer in her lifetime. If she engages in less than one hour of physical activity per week, she has twice the risk of bowel cancer as a woman who engages in at least one hour of physical activity.
**Endometrium**
A woman living in the developed world has around a 2% chance of getting endometrial cancer in her lifetime. If she engages in less than 30 minutes of moderate physical activity on at least five days per week, her risk of endometrial cancer is two times that of a woman who engages in at least 30 minutes of moderate physical activity five days per week.

**Breast**
A woman living in the developed world has around a 12.5% chance of getting breast cancer in her lifetime. If she engages in less than 90 minutes of moderate physical activity per week, her risk of breast cancer is two times that of a woman who engages in at least 90 minutes of moderate physical activity.

**MALE**
**Bowel**
A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he engages in less than one hour of physical activity per week, he has twice the risk of bowel cancer as a man who engages in at least one hour of physical activity.

**DISEASE AND ILLNESS**

**OBESITY (BMI over 30)**

**FEMALE**
**Bowel**
A woman living in the developed world has around a 6.6% chance of getting bowel cancer in her lifetime. If she has obesity, her risk of bowel cancer is around 20% higher than that of a woman who isn’t obese.

**Ovary**
A woman living in the developed world has around a 1.2% chance of getting ovarian cancer in her lifetime. If she has obesity, her risk of ovarian cancer is around 10% higher than that of a woman who isn’t obese.

**Pancreas**
A woman living in the developed world has around a 1.2% chance of getting pancreatic cancer in her lifetime. If she has obesity, her risk of pancreatic cancer is nearly 30% higher than that of a woman who isn’t obese.

**Kidney**
A woman living in the developed world has around a 1% chance of getting kidney cancer in her lifetime. If she has obesity, her risk of kidney cancer is 70% higher than that of a woman who isn’t obese.

**Oesophagus**
A woman living in the developed world has around a 0.8% chance of getting oesophageal cancer in her lifetime. If she has obesity, her risk of oesophageal cancer is nearly two and a half times that of a woman who isn’t obese.

**MALE**
**Bowel**
A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he has obesity, his risk of bowel cancer is nearly 50% higher than that of a man who isn’t obese.

**Pancreas**
A man living in the developed world has around a 1.5% chance of getting pancreatic cancer in his lifetime. If he has obesity, his risk of pancreatic cancer is 30% higher than that of a man who isn’t obese.

**Kidney**
A man living in the developed world has around a 2% chance of getting kidney cancer in his lifetime. If he has obesity, his risk of kidney cancer is 70% higher than that of a man who isn’t obese.

**Oesophagus**
A man living in the developed world has around a 1.8% chance of getting oesophageal cancer in his lifetime. If he has obesity, his risk of oesophageal cancer is nearly two and a half times that of a man who isn’t obese.

**OVERWEIGHT (BMI between 25-30)**

**FEMALE**
**Bowel**
A woman living in the developed world has around a 6.6% chance of getting bowel cancer in her lifetime. If she is overweight, her risk of bowel cancer is around 10% higher than that of a woman who isn’t overweight.

**Endometrium**
A woman living in the developed world has around a 2% chance of getting endometrial cancer in her lifetime. If she has obesity, her risk of endometrial cancer is two times that of a woman who isn’t obese.
overweight, her risk of endometrial cancer is 50% higher than that of a woman who isn’t overweight.

**Pancreas**
A woman living in the developed world has around a 1.2% chance of getting pancreatic cancer in her lifetime. If she is overweight, her risk of pancreatic cancer is 10% higher than that of a woman who isn’t overweight.

**Kidney**
A woman living in the developed world has around a 1% chance of getting kidney cancer in her lifetime. If she is overweight, her risk of kidney cancer is 30% higher than that of a woman who isn’t overweight.

**Breast**
A woman living in the developed world has around a 0.8% chance of getting breast cancer in her lifetime. If she is post-menopausal and overweight, her risk of breast cancer is 13% higher than that of a post-menopausal woman who isn’t overweight.

**Oesophagus**
A woman living in the developed world has around a 0.8% chance of getting oesophageal cancer in her lifetime. If she is overweight, her risk of oesophageal cancer is around 50% higher than that of a woman who isn’t overweight.

**MALE**

**Bowel**
A man living in the developed world has around a 10% chance of getting bowel cancer in his lifetime. If he is overweight, his risk of bowel cancer is around 20% higher than that of a man who isn’t overweight.

**Pancreas**
A man living in the developed world has around a 1.5% chance of getting pancreatic cancer in his lifetime. If he is overweight, his risk of pancreatic cancer is 13% higher than that of a man who isn’t overweight.

**Kidney**
A man living in the developed world has around a 2% chance of getting kidney cancer in his lifetime. If he is overweight, his risk of kidney cancer is 30% higher than that of a man who isn’t overweight.

**Oesophagus**
A man living in the developed world has around a 1.8% chance of getting oesophageal cancer in his lifetime. If he is overweight, his risk of oesophageal cancer is around 50% higher than that of a man who isn’t overweight.

**FEMALE**

**Anus**
A woman living in the developed world has around a 0.2% chance of getting anal cancer. Around 90% of anal cancers are associated with HPV infection. Relative risk is hard to estimate but if a woman smokes or has weak immunity her risk of anal cancer is higher.

**Vulva**
Vulval cancer is very rare and both lifetime risk and relative risk are hard to estimate. Around 40% of vulval cancers are associated with HPV infection.

**Vagina**
Vaginal cancer is very rare and both lifetime risk and relative risk are hard to estimate. Around 70% of vaginal cancers are associated with HPV infection.

**Cervix**
A woman living in the developed world has around a 0.6% chance of getting cervical cancer in her lifetime. Virtually all cervical cancers are associated with HPV infection. Relative risk is hard to estimate but if a woman smokes, has weak immunity and takes the combined oral contraceptive pill, her risk of cervical cancer is higher.

**Oral cavity and pharynx**
A woman living in the developed world has around a 0.6% chance of getting cancer of the oral cavity or pharynx in her lifetime. Around 40% of cancers of the oral cavity or pharynx are associated with HPV infection. Relative risk is hard to estimate.

**MALE**

**Penis**
A man living in the developed world has around a 0.2% chance of getting penis cancer. Around 45% of penis cancers are associated with HPV infection. Relative risk is hard to estimate.

**Anus**
A man living in the developed world has around a 0.1% chance of getting anal cancer. Around 90% of anal cancers are associated with HPV infection. Relative risk is hard to estimate but if a man smokes or has weak immunity his risk of anal cancer is higher.

**Oral cavity and pharynx**
A man living in the developed world has around a 1.3% chance of getting cancer of the oral cavity or pharynx in his lifetime. Around 40% of cancers of the oral cavity or pharynx are associated with HPV infection. Relative risk is hard to estimate.

**HELCOBACTER PYLORI**

**FEMALE**

**Stomach**
A woman living in the developed world has around a 0.7% chance of getting stomach cancer in her lifetime. If she is infected with H. pylori, her risk of stomach cancer is around six times that of a woman who isn’t infected.

**MALE**

**Stomach**
A man living in the developed world has around a 1.6% chance of getting stomach cancer in his lifetime. If he is infected with H. pylori, his risk of stomach cancer is around six times that of a man who isn’t infected.

**HUMAN PAPILLOMA VIRUS**

**FEMALE**

**Anus**
A woman living in the developed world has around a 0.2% chance of getting anal cancer. Around 90% of anal cancers are associated with HPV infection. Relative risk is hard to estimate but if a woman smokes or has weak immunity her risk of anal cancer is higher.

**Vulva**
Vulval cancer is very rare and both lifetime risk and relative risk are hard to estimate. Around 40% of vulval cancers are associated with HPV infection.

**FEMALE**

**Liver**
A woman living in the developed world has around a 0.4% chance of getting liver cancer in her lifetime. If she is infected with Hepatitis B, her risk of liver cancer is 20 times that of a woman who isn’t infected.

**MALE**

**Liver**
A man living in the developed world has around a 1% chance of getting liver cancer in his lifetime. If he is infected with Hepatitis B, his risk of liver cancer is 20 times that of a man who isn’t infected.
HORMONE REPLACEMENT THERAPY

MALE
Bowel
A woman living in the developed world has a 2% chance of getting bowel cancer in her lifetime. If she is on oestrogen-only HRT, her risk of bowel cancer REDUCES. The reduction in bowel cancer risk appears to be unrelated to the duration of HRT treatment.

Endometrium
A woman living in the developed world has a 2% chance of getting endometrial cancer in her lifetime. If she has not had a hysterectomy and is on oestrogen-only HRT for five years and over, her risk of endometrial cancer is up to 11 times higher than that of a woman who isn’t on HRT. A woman on oestrogen-only HRT for up to five years has two times the risk of endometrial cancer than a woman who isn’t on HRT. Risk of endometrial cancer increases with duration of use and remains elevated for up to ten years after stopping treatment. Adding progestogen will decrease the risk of endometrial cancer but women on combined HRT still have a slightly increased risk than those who aren’t.

Ovary
A woman living in the developed world has around a 1.2% chance of getting ovarian cancer in her lifetime. If she is on oestrogen-only or combined HRT, her risk of ovarian cancer is around 20% higher than that of a woman who isn’t on HRT.

FEMALE
Breast
A woman living in the developed world has around a 2.2% chance of getting breast cancer in her lifetime. If she is on combined HRT for over five years, her risk of breast cancer is 70% higher than that of a woman who isn’t on HRT. A woman on combined HRT for over five years has nearly two times the risk of breast cancer as a woman who isn’t on HRT. A woman only has an increased risk of breast cancer while she is on HRT and the risk disappears when she goes off it. If a woman is on oestrogen-only HRT, her risk of breast cancer is around 30% higher than that of a woman who isn’t on HRT.

Not applicable.

HEPATITIS C

FEMALE
Liver
A woman living in the developed world has around a 0.4% chance of getting liver cancer in her lifetime. If she is infected with Hepatitis C, her risk of liver cancer is 24 times that of a woman who isn’t infected.

Non-Hodgkin’s lymphoma
A woman living in the developed world has around a 2.2% chance of getting non-Hodgkin’s lymphoma in her lifetime. If she is infected with Hepatitis C, her risk of non-Hodgkin’s lymphoma is nearly two times that of a woman who isn’t infected.

MALE
Liver
A man living in the developed world has around a 1% chance of getting liver cancer in his lifetime. If he is infected with Hepatitis C, his risk of liver cancer is 24 times that of a man who isn’t infected.

Non-Hodgkin’s lymphoma
A man living in the developed world has around a 3% chance of getting non-Hodgkin’s lymphoma in his lifetime. If he is infected with Hepatitis C, his risk of non-Hodgkin’s lymphoma is nearly seven times that of a man who isn’t infected.

MEDICATION AND TREATMENT

COMBINED ORAL CONTRACEPTIVE PILL

FEMALE
Endometrium
A woman living in the developed world has a 2% chance of getting endometrial cancer in her lifetime. If she takes the combined contraceptive pill, her risk of endometrial cancer REDUCES for every year she is taking it and stays low for at least two decades after she stops taking it.

Ovary
A woman living in the developed world has around a 1.2% chance of getting ovarian cancer in her lifetime. If she takes the combined contraceptive pill, her risk of ovarian cancer is REDUCED, even up to three decades after she stops taking it.

Breast
A woman living in the developed world has around a 12.5% chance of getting breast cancer in her lifetime. If she takes the combined contraceptive pill, her risk of breast cancer is 20% higher than that of a woman who doesn’t take the pill. If she stops taking the pill, her risk of breast cancer disappears after ten years.

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THE CONVERSATION

KNOWN RISK FACTORS FOR CANCER

An extract from a report produced by the Australia Institute of Health and Welfare featuring an overview of recognised cancer risk factors

A risk factor is any factor associated with an increased likelihood of a person developing a health disorder or health condition, such as cancer. Understanding what causes cancer is essential in setting processes and policies designed to successfully prevent, detect and treat the disease. For most cancers the causes are not fully understood. However, some factors that place individuals at a greater risk for cancer are well recognised and are outlined below. These risk factors were sourced from World Cancer Report 2014 (IARC 2014) and Food, nutrition, physical activity and the prevention of cancer: a global perspective (WCRF & AICR 2007).

There has been increasing interest in the life course approach to reducing the incidence of chronic diseases, such as cancer. Studies suggest that exposure to risks during childhood, adolescence and early adult life influence the risk of adult incidence and mortality due to chronic disease (Uauy & Solomons 2005). Preventing death from cancer has often focused on early detection and treatment rather than on modifying long-term behaviour and exposure to risk factors.

It should be noted that exposure to a risk factor does not mean that a person will develop cancer. Many

SMOKING/PASSIVE SMOKING, AND SMOKELESS TOBACCO USE

Smoking is the major cause of cancer in humans. Evidence suggests that active and, for some cases, passive smoking can cause cancers of the:

- Bladder
- Bone marrow (myeloid leukaemia)
- Cervix
- Kidney
- Larynx
- Liver
- Lung
- Nasal cavity and nasal sinuses
- Oral cavity (lip, mouth, tongue)
- Oesophagus
- Pancreas
- Pharynx
- Stomach.

ALCOHOL CONSUMPTION

Alcohol consumption is an important risk factor for cancer. The risk of cancer increases with the amount of alcohol consumed. Cancers associated with alcohol consumption include those of the:

- Breast (females)
- Colon and rectum
- Larynx
- Liver
- Oesophagus
- Oral cavity (lip, mouth, tongue)
- Pharynx.

DIET

Evidence suggests that high intake of particular foods (such as processed meat, and foods that are high in fat) may be associated with an increased risk of cancers of the:

- Breast
- Colon and rectum
- Kidney
- Oesophagus
- Pancreas
- Prostate
- Stomach
- Uterus.

OBESITY AND PHYSICAL INACTIVITY

Obesity is defined as abnormal or excessive fat accumulations that may impair health, and a body mass index of 30 and over. Physical activity is an important part of a healthy lifestyle. Doing little or no physical activity increases an individual’s risk of being overweight or obese, and is associated with a higher risk of developing cancer. Obesity and lack of physical activity increase the risk of cancers of the:

- Breast (females)
- Colon and rectum
- Endometrium
- Gallbladder
- Kidney
- Oesophagus
- Ovary
- Pancreas.
CHRONIC INFECTIONS
Cancer associated with chronic infections (such as viruses, bacteria and parasites) include those of the:

- Bladder
- Blood or bone marrow (leukaemias)
- Cervix
- Gallbladder
- Liver
- Lung
- Lymphatic system (lymphomas)
- Nasopharynx and oropharynx
- Oral cavity (lip, mouth, tongue)
- Stomach.

FAMILY HISTORY AND GENETIC SUSCEPTIBILITY
Some gene mutations increase the risk of cancer being passed from parent to child.
Genetic inheritance increases the risk of cancers of the:

- Bladder
- Blood or bone marrow (leukaemias)
- Breast
- Colon and rectum
- Gallbladder
- Liver
- Lung
- Lymphatic system (lymphomas)
- Stomach.

OCCUPATIONAL EXPOSURES
Occupational exposures include exposures to chemicals, dust, radiation and industrial processes.
Cancers that have been found to be caused by occupational exposures include those of the:

- Bladder
- Blood or bone marrow (leukaemias)
- Kidney
- Liver
- Lung
- Lymphatic system (lymphomas)
- Mesothelium
- Nasal cavity
- Nasopharynx
- Non-melanoma of the skin
- Oesophagus
- Oral cavity (lip, mouth, tongue)
- Pharynx
- Stomach.

SUNLIGHT
Excessive exposure to the ultraviolet rays of the sun is a risk factor for some cancers. The risk of cancer due to excessive exposure to sunlight is highest for people who have fair skin, blond or red hair, freckles, and/or a tendency to burn easily. Sunlight is a risk factor for:

- Melanoma of the skin
- Non-melanoma skin cancer.

RADIATION
Ionising radiation from natural sources, from nuclear accidents and explosions, and from diagnostic X-rays can be risk factors for cancer. The most common source of radiation for the average person is diagnostic X-rays; however, the risk of developing a cancer after an X-ray is minimal and the benefits nearly always outweigh the risk. Ionising radiation can increase the risk of cancers of the:

- Blood or bone marrow (leukaemias)
- Breast
- Lung
- Thyroid.

MEDICAL AND IATROGENIC FACTORS
Medical and iatrogenic factors relate to the inadvertent adverse effect of, or complication resulting from, medical treatment or advice. For example, drugs or treatment used for one disease can potentially lead to the development of a secondary condition.
Cancers relating to medical and iatrogenic factors include those of the:

- Bladder
- Colon and rectum
- Kidney
- Liver
- Lung
- Mesothelium
- Oesophagus
- Pancreas.

REPRODUCTIVE AND HORMONAL FACTORS
Reproductive hormones are thought to influence the risk of developing some cancers. For women, the risk can be related to reproductive history, endogenous and exogenous hormone exposures and child-bearing.
Cancers associated with reproductive and hormonal factors include those of the:

- Breast
- Endometrium
- Ovary
- Prostate
- Thyroid.

ENVIRONMENTAL POLLUTION
There are many pollutants in the environment that may cause cancer. People are exposed to these pollutants through the air, drinking water, food, soil, sediments, surface waters and groundwater.
Pollution can contribute to cancers of the:

- Bladder
- Colon and rectum
- Kidney
- Liver
- Lung
- Skin
- Stomach.

people are exposed to at least one cancer risk factor but will never get cancer.

The foods we eat can affect our risk of developing certain types of cancer. High-energy and high-fat diets can lead to obesity and are generally thought to increase the risk of some cancers. Enjoying a wide variety of nutritious foods as described in the Australian Dietary Guidelines may help to prevent cancer.

Eating a wide variety of foods from each of the five food groups, in the amounts recommended helps maintain a healthy and interesting diet and provides a range of different nutrients to the body. Eating a variety of foods promotes good health and can help reduce the risk of disease.

The five food groups are:

- Fruit
- Vegetables and legumes/beans
- Lean meats and poultry, fish, eggs, tofu, nuts and seeds, legumes/beans
- Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties
- Milk, yoghurt, cheese and alternatives, mostly reduced fat.

Foods are grouped together because they provide similar amounts of key nutrients. For example, key nutrients of the milk, yoghurt, cheese and alternatives group include calcium and protein. These food groups make up the Australian Guide to Healthy Eating.

Diet is just one of the lifestyle factors that influence the risk of developing cancer. Smoking, obesity, alcohol, sun exposure and physical activity levels are also important. Although some foods can affect cancer risk, there is no evidence that specific foods can cause or cure cancer.

**Seven grains a day**

Eating seven or more serves daily of a variety of grains, grain products, legumes, roots and tubers will also provide protective benefits against cancer. The less processed the grains, the better, so try aim for wholegrain foods. Oats, brown rice, corn, rye, kidney beans and lentils are all good foods to consume. Diets high in refined starch and refined sugar may increase the risk of stomach cancer and bowel cancer.

**Meat and bowel cancer**

There is now convincing scientific evidence that eating processed meat increases bowel cancer risk. The World Cancer Research Fund (WCRF) has recently recommended that people avoid eating processed meat. Processed meats include any meat that has been preserved by curing, salting or smoking, or by adding...
There is now convincing scientific evidence that eating processed meat increases bowel cancer risk. The World Cancer Research Fund (WCRF) has recently recommended that people avoid eating processed meat.

chemical preservatives. These include hot dogs, ham, bacon, and some sausages and burgers.

It is recommended that children are not given processed meats. This is because many of the habits we develop as children last into adulthood. Substitutes for processed meats that are recommended for children include fish or lean poultry, lean meats or low-fat cheese.

There is convincing evidence that red meat also increases a person’s risk of bowel cancer. It is recommended that individuals, particularly men, decrease their intake of red meat. The WCRF recommends limiting the amount of fresh red meat we eat to less than 500g of cooked (or 700g uncooked) red meat a week. Some research suggests that eating burnt or charred meat may increase cancer risk, but the evidence is unclear.

The Australian Guide to Healthy Eating recommends consuming a range of variety of foods from the food group ‘lean meats and poultry, fish, eggs, tofu, nuts and seeds and legumes and beans.’

Fats and cancer

There has been a great deal of interest in a possible link between fat and cancer. Current evidence does not indicate a direct link between fat intake and particular types of cancer (with the possible exception of prostate cancer). However, a high-fat diet may lead to obesity, which is a risk factor for several cancers, including cancers of the colon, breast, kidney, oesophagus, gallbladder and endometrium.

Fruits, vegetables and cancer

Eating fruit and vegetables has long been known to provide many health benefits. Fruits and vegetables contain many vitamins, minerals and antioxidants, which may help to decrease your risk of cancer in particular areas of the digestion system, such as the mouth and stomach.

Evidence has weakened over recent years over the role of fruit and vegetables in preventing cancer. Yet fruits and vegetables are still an important part of your diet and may play an indirect effect of preventing cancer because they are relatively low in kilojoules (energy) and consumption is associated with a healthier weight.

Common cancers and food

Some common cancers may be affected by what we eat, such as lung cancer, breast cancer, prostate cancer and bowel cancer.

Lung cancer

Lung cancer is the leading cause of death from cancer in the world and smoking is mostly responsible. It is thought that compounds called carotenoids (present in significant amounts in fruits and vegetables), as well as vitamin E, are probably responsible for some of this effect when sourced from whole foods.

Recent evidence suggests that cruciferous vegetables such as cabbage, cauliflower, broccoli and bok choy are excellent vegetable choices. However, it is recommended that smokers and non-smokers enjoy a variety of vegetables and fruit every day. While fruits and vegetables may offer some degree of protection, not smoking is by far the best prevention.

Breast cancer

Breast cancer is the most common type of cancer among women in the world. There is an increased risk of breast cancer with factors such as rapid early growth, greater adult height and weight gain in adulthood. Much of the risk of developing breast cancer involves factors that influence oestrogen levels during a woman’s reproductive life, such as age of menarche (first period), late menopause, number of pregnancies, having the first pregnancy late in life and breastfeeding practices.

The rate of breast cancer also increases with age. Postmenopausal women who are carrying too much weight, particularly around their middle, have more than twice the average risk of breast cancer. Diets high in foods containing mono-unsaturated fat, such as olive oil, canola oil, some nuts and seeds, and high in vegetables may reduce the risk. Alcohol consumption increases the risk.

Prostate cancer

Prostate cancer is the most common cancer in Australian men. Men over the age of 50 are at greater risk. However, it can be seen in younger men as well. Vegetables (soy, in particular) may decrease the risk, while a high-fat diet that comprises mostly of animal fat sources (such as dairy products, fatty meats and takeaway foods) may increase the risk.

Lycopene is a potent antioxidant found in tomatoes, tomato-based products, watermelon and strawberries that may help lower the risk of prostate cancer. Evidence suggests that consuming one to two serves of tomatoes...
per day (where a serve is half a cup or 75 grams) is associated with reduced risk of prostate cancer.

**Bowel cancer**

Bowel cancer (colorectal cancer) is the second most common cause of cancer-related death in Australia. Up to 70 per cent of cases can be prevented by following a healthy lifestyle. Keeping a healthy weight, being physically active and having a diet high in vegetables and fibre are protective, while consuming a large amount of red meat, processed meat and alcohol may increase the risk.

**Foods and drinks to limit**

Foods and drinks to limit in your diet or have less of include:

- Fatty red meats and processed meats
- Highly processed foods that are low in fibre
- Heavily salted and pickled foods
- Alcohol.

**Foods to ‘eat more’**

The strongest protective anti-cancer effect has been shown with:

- Vegetables, especially raw vegetables or salads, such as leafy green vegetables and carrots
- Foods high in dietary fibre, such as grains and cereals
- Tomatoes
- Citrus fruits
- Cruciferous vegetables like broccoli, cabbage, Brussels sprouts, bok choy and other Asian greens.

Include more of these vegetables and fruits in your diet, along with other varieties.

**Supplements are not the answer**

Results of studies that show a protective effect of foods containing certain nutrients should not be taken to mean that these nutrients, when isolated and taken as supplements, will provide the same benefits for cancer prevention.

In some cases, there has been an increased risk of cancer in those people who take nutrient supplements at doses higher than the usual amount of that nutrient normally eaten in foods. For example, the use of beta-carotene and vitamin E supplements has not been proven to be effective in either prevention or treatment of lung cancer. In fact, several studies have shown that beta-carotene supplements actually increase the risk of lung cancer. In fact, several studies have shown that beta-carotene and vitamin E supplements have not been proven to be effective in either prevention or treatment of existing cancer.

**Foods that may increase cancer risk**

While a high-energy, low-fibre diet may increase a person’s risk of developing cancer, some individual foods have also been singled out as potentially causing cancer (carcinogenic). These include:

- **Artificial sweeteners** – such as aspartame, saccharin and cyclamate. Laboratory rats can develop bladder cancer if fed huge amounts of saccharin or cyclamate, although this is at levels thousands of times greater than a normal diet. International studies have shown that humans are not affected in the same way. Artificial sweeteners are considered safe to eat.
- **Cured, pickled or salty foods** – bacon and other cured or pickled meats contain a substance called nitrate, which has the potential to cause cancer in laboratory animals when eaten in large doses. How this research relates to humans isn’t clear. To be on the safe side, it is best to limit the amount of cured meats in the diet, because they are generally high in fat and salt. Salt has also been associated with an increased risk of stomach cancer and should be consumed in limited amounts.
- **Burnt or barbecued foods** – a group of carcinogenic substances called polycyclic aromatic hydrocarbons (PAHs) can be produced if foods are overheated or burnt. Although charred or smoked foods could contain traces of PAHs, experts agree that the amount in the average Australian diet is too low to be considered a significant cancer risk. However, when cooking, it’s best to use relatively low temperature methods wherever possible, and limit your intake of char-grilled meats and foods. Low-temperature cooking methods include steaming, boiling, poaching, stewing, casseroling, braising, baking and microwaving or roasting.
- **Peanuts** – some laboratory animals can develop cancer after eating peanuts that are contaminated with toxin-producing moulds. However, peanuts sold in Australia are generally uncontaminated and contamination is routinely screened for.
- **Alcohol** – consuming alcohol increases the risk of cancers of the mouth, pharynx, larynx, oesophagus, breast, bowel and liver. The risk is even greater in those people who smoke. Even small amounts of alcohol can increase your risk. To reduce their risk of disease, men should drink less than two standard drinks a day and women less than one standard drink a day.

**Treating cancer with food**

While food plays an important role in preventing some cancers, the therapeutic value of food in treating existing cancer is less clear. It is true that a person with cancer needs excellent nutrition in order to better cope with the physical demands of the illness and the rigours of medical treatment.

Claims that particular foods, vitamins or micronutrients can kill cancer cells should be viewed with scepticism. To date, there is little scientific proof that a particular food or supplement can cure cancer or destroy cancer cells.

Nutrition for the person with cancer is important for many reasons, including:

- The immune system needs bolstering to fight at full strength.
The diet may be adjusted to cope with various symptoms, such as constipation, diarrhoea or nausea.

Loss of appetite or an increased metabolism means that high-energy foods may need to be included in the daily diet.

Extra protein may be needed to help prevent loss of muscle from weight loss.

**Where to get help**

- Your doctor
- Dietitians Association of Australia Tel. 1800 812 942
- Nutrition Australia (Vic) Tel. (03) 8341 5800

**Things to remember**

- High-fat, low-fibre diets may increase the risk of many cancers including bowel, lung, prostate and uterine cancers.
- You can reduce your risk of developing cancer by eating a wide variety of nutritious foods as described in the *Australian Guide to Healthy Eating*.
- Even though diet can influence your risk of developing cancer, there is little evidence that special foods can be used to cure existing cancers.

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Confused about your cancer risk from eating meat? Here’s what the figures mean

METHODS OF COMMUNICATING RELATIVE RISK TO THE PUBLIC ARE OFTEN CONFUSING, EXPLAIN DALLAS ENGLISH AND TERRY SLEVIN

In a recent report on processed meat and risk of bowel cancer, the International Agency for Research on Cancer (IARC) stated:

Each 50 gram portion of processed meat eaten daily increases the risk of colorectal cancer by 18%.

This method of communicating risk led to confusion and some hostile reactions. Scientists can explain risks of cancer and other diseases in several ways; some are easier to understand than others.

Relative risk

The IARC statement is based on a summary of many epidemiological studies assessing the relationship between meat consumption and bowel cancer, including a study by one of us. Epidemiology is the science of studying the distribution and determinants of disease in populations. At its heart lie comparisons of the frequency of disease for people exposed or not exposed to a particular substance, environmental condition or lifestyle.

In this case, IARC was comparing the risk of bowel cancer for people who eat 50 grams of processed meat per day with the risk for those who don’t eat processed meat at all.

The 18% increase means the risk of developing bowel cancer is 1.18 times higher for those who eat 50 grams of processed meat per day compared to those who eat none. The figure 1.18 is known as ‘relative risk’.

Put this way, the increase is quite small. By contrast, men who smoke cigarettes have about 20 times the risk of developing lung cancer as men who do not smoke. Expressed as a percentage, the increase in risk due to smoking is 1,900%.

A potential problem with presenting relative risk in the format IARC uses is that many people will incorrectly conclude that if they ate processed meat, they had an 18% (almost one in five) chance of getting bowel cancer. Thus, they were misled.

Presenting relative risks to the public in any format is not very informative. A better way to communicate the effect of specific risk factors is to present what is known as the ‘absolute risk’.

Absolute risk

If we assume that a quarter of the Australian population eats 50 grams per day of processed meat, then the lifetime risk for the three-quarters who eat no processed meat would be 7.9% (or about one in 13). For those who eat 50 grams per day, the lifetime risk would be 9.3% (or about one in 11).

LIFETIME RISK OF BOWEL CANCER DIAGNOSIS IN AUSTRALIA (%)
then the lifetime risk for the three-quarters who eat no processed meat would be 7.9% (or about one in 13). For those who eat 50 grams per day, the lifetime risk would be 9.3% (or about one in 11).

Although our estimate that one-quarter of the population eat 50 grams of processed meat daily is not likely to be correct, changing this proportion does not have much effect on the two absolute risks.

Of course, this naive calculation assumes everything else is equal; that people who eat processed meat differ in no other ways that affect risk of bowel cancer from those who do not.

But we know many factors contribute to risk of bowel cancer – being overweight, alcohol consumption, being physically inactive and family history, to name a few. With so many variables driving risk, it is clear no two people are likely to have exactly the same risk profile.

Cancer Research UK presented the risks in this way.

Out of every 1,000 people in the UK, about 61 will develop bowel cancer at some point in their lives.

Those who eat the lowest amount of processed meat are likely to have a lower lifetime risk than the rest of the population (about 56 cases per 1,000 low meat-eaters).

If you only expect to live to 65, your chance of getting bowel cancer is 2.9% if you don’t eat processed meat and 3.4% if you eat 50 grams each day. Of course, if you indulge more, the risk increases, but to similar proportions for each additional 50 grams per day.

Absolute risks allow people to personalise the effects and to better compare them. Yes, calculating absolute risk requires a strong assumption that there are no other differences between people who are exposed and not exposed. But we still believe that being able to compare absolute risks is more informative and less likely to mislead than relative risks.

### Population attributable fraction

Another useful way of communicating the burden of cancer due to a risk factor is to calculate what is known as the population attributable fraction – that is, the fraction of cancer that is due to the risk factor.

Researchers recently estimated that 18% of bowel cancers in Australia could be attributed to consumption of red and processed meat (they did not have data to allow them to separate the effects of processed and red meat). This equated to about 2,600 cases in 2010.

The increase in risk due to red and processed meat is small, but together they account for many cases because Australians eat a lot of meat.

A lot of public money, via taxes or donated funds to cancer organisations, is invested in research. There is a moral imperative to report the findings of such research, but rarely is one study definitive.

So major reviews by IARC are vital to bring together the best assessment of the evidence about what does and does not contribute to cancer risk. And people want to know.

The best cancer is the one you never get. Given we know the cause of about one-third of cancers in Australia (smoking, alcohol, lack of exercise and nutrition factors), it is not unreasonable to give the best available information to people about what we know.

But clearly we have a way to go in better communicating what these risks really mean and how people can use this information in their daily choices.

Luckily, decades of solid evidence underpins some pretty simple advice to stack the cancer odds in your favour.

For most people:
- **Do more:** physical activity, eating fruit and vegetables
- **Do less:** drink alcohol, eat high-calorie food, processed and probably red meat, expose skin to intense sunlight
- **Don’t:** smoke.

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**Confused about your cancer risk from eating meat? Here’s what the figures mean.**

What causes cancer? This deceptively simple question has a devilishly complex answer. So when US researchers proposed a relatively simple mathematical formula to explain a longstanding conundrum in cancer earlier this year, it was bound to get a lot of attention.

The study published in the journal *Science* suggested a correlation between the variation in cancer occurrence between different tissues and the number of stem cell divisions in each tissue. In other words, it said the tissues most vulnerable to cancer are those with the greatest number of stem cell divisions.

Most of the reporting about the research ran with the line that “cancer is all down to bad luck”, implying that developing the disease is out of our hands and that preventative efforts might be useless. But is that really the case?

Much of the misunderstanding seems to have arisen from the authors’ statement that a third of the variation in cancer risk among tissues is attributable to environmental or inherited factors, with the majority due to random mutations during DNA replication in normal cells. This statement about relative risk was overblown into blanket conclusions about the underlying causes of cancer.

**The wonder of replication**

Cancer emerges when one of the cells that make up your tissues (and organs) grows and divides without control, losing its specialised function and invading other tissue. This happens when normal control of cell growth and division is compromised through changes, or mutations, in your genome (the chemical instruction book for life).

Mutations lie at the heart of cancer biology. The genome is made from a chemical alphabet of just four letters (A,T,G, and C) ‘written’ into DNA. It works like a kind of computer software for our cells, with strict instructions for growth and function.

Each of the 100 trillion cells in your body contains roughly six billion letters (called nucleotides) of this code, condensed into a thin strand of DNA about two metres long. To put this into perspective, if you stretched out all the DNA in a human body it would reach around the moon and back several times.

Every time a cell divides, the genome must be copied...
accurately and quickly. This synthesis of new DNA is called replication, and the numbers behind it are staggering. UK researcher John Diffley has calculated that you will have synthesised the equivalent of a light-year of DNA (10 trillion kilometres) by the time you’re 50.

Words simply cannot do this amazing process justice, but a short video by award-winning animator Drew Berry will blow your mind (View the video at www.hhmi.org/biointeractive/dna-replication-advanced-detail).

DNA replication has evolved to be incredibly efficient and reliable, but random mistakes (mutations) occasionally happen. Still, they occur at a rate of less than once per genome per cell division, thanks to some impressive molecular proofreading machines, which constantly survey the newly copied DNA and correct errors.

But with so many cells dividing so often, DNA replication still represents a major source of mutations. And every cell division increases the chance of accumulating mutations in important genes, increasing the likelihood of cancer.

**Other sources of mutation**

Mutations can take many forms and can emerge in a number of ways – not just through replication errors. We inherit between 50 and 100 mutations from our parents at birth, for instance, and any new or *de novo* mutations act on this inherited genetic background.

Even normal cellular metabolism damages DNA through the production of reactive oxygen. And, in a sinister twist, many of the inherited mutations that predispose people to cancer hit genes that control the DNA proofreading and repair systems (such as the breast cancer genes BRCA1 and BRCA2). This has the effect of amplifying the rate of new mutations.

The other major causes of DNA mutation are lifestyle or environmental factors. We are exposed to a range of these in our everyday lives, such as UV radiation from sunshine, and chemicals including asbestos or from smoking cigarettes.

Lifestyle factors including diet and alcohol consumption may also contribute. Some viruses and bacteria are known to cause DNA damage leading to cancer. They include the human papillomavirus (HPV) for cervical cancer and *H. pylori* for gastric cancer.

Although these different agents leave unique chemical signatures in the DNA, they are still essentially random events. Random mutations are, in fact, the raw material driving evolution. And the processes of mutation and evolution are accelerated in cancer. Indeed, we are only now starting to understand the importance of evolution in driving cancer emergence and spread, as well as its resistance to therapy.

**Minimising risk**

Where does this leave the idea that cancer is all down to bad luck? Is modifying your lifestyle to minimise exposure to risk factors futile?

As usual, reality lies somewhere in the middle of competing narratives. Life is a kind of genetic gamble. We have to play the cards dealt us, but we can stack the odds in either direction by altering our exposure to environmental and lifestyle factors. Suggesting cancer is all down to bad luck dilutes the important message that risk can be modified by behaviour.

The cancer lexicon is littered with notions of guilt and blame. Death is often framed as “losing the battle with cancer”, for instance. And patients and their families are bombarded by gurus profiteering from various diet and lifestyle interventions. Their implicit messages can often leave people feeling that their cancer is all their own fault and wondering if there was something they could have done differently.

The fact remains that, in many cases, there isn’t.

**DISCLOSURE STATEMENT**

Darren Saunders is Laboratory Head at the Garvan Institute.

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Suggesting cancer is all down to bad luck dilutes the important message that risk can be modified by behaviour.

STOP CANCER!
CUT YOUR CANCER RISK

WHAT WILL YOU DO TODAY TO HELP BEAT CANCER? THIS CANCER COUNCIL SA GUIDE PROVIDES HELPFUL ADVICE TO PROMPT YOU INTO ACTION

CUT YOUR CANCER RISK

CHOOSE A HEALTHY LIFESTYLE

Did you know that at least one in three cancers diagnosed are preventable?

The number of cancer deaths could be reduced significantly by choosing a healthy lifestyle. Whether you have been diagnosed with cancer or you have never had cancer, there are a number of things you can do to decrease your cancer risk.

It makes good sense to choose a healthy lifestyle as it:
• Reduces your risk of cancer.
• Reduces your risk of cancer returning.
• Improves your overall quality of life.
• May improve your survival.
• Lowers your risk of other serious diseases such as heart disease, diabetes and obesity.

Action plan to reduce your cancer risk:
1. Don’t smoke.
2. Be SunSmart.
3. Be active.
4. Aim for a healthy weight.
5. Eat for health.
6. Avoid or limit alcohol.
7. Ask about cancer screening.

STOP SMOKING
CALL QUITLINE 13 7848

THE BEST THING YOU CAN DO FOR YOUR HEALTH IS TO QUIT SMOKING

Almost one in four cancer deaths are due to smoking

Around 15,000 Australians die from smoking-related diseases each year.

Smoking can cause many cancers including cancer of the lung, mouth, throat, colon, stomach, pancreas, kidney, vulva, penis and bladder.

The good news is that it’s never too late to stop. Stopping smoking has immediate and long-term benefits. All people that smoke would benefit from stopping smoking; regardless of their age or if they already have a smoking-related illness.

Getting help can greatly improve your chance of quitting successfully. Enlist the support of your family and friends. Call the Quitline on 13 7848 for information, practical assistance and support. Quitline’s qualified counsellors are available to help you get through the process of stopping smoking.

Avoid passive smoking. Even if you don’t smoke, breathing in other people’s cigarette smoke can increase your risk of cancer. Make sure you and your family are smoke-free.

Action plan to stop smoking:
1. Call Quitline on 13 7848.
2. Discuss stopping smoking with a GP, pharmacist or community health worker and plan your quitting strategy.
3. Your chance of quitting successfully is increased.
3. If you combine counselling support and stop smoking medication.
4. Remember that stopping smoking can take several attempts, never give up giving up!

**BE SUNSMART PROTECT YOUR SKIN**

**SLIP, SLOP, SLAP, SEEK, SLIDE**

80 per cent of cancers diagnosed in Australia each year are skin cancers

Every year, Australians are treated for over 750,000 skin cancers, yet it is almost totally preventable.

Whenever UV radiation levels reach 3 and above, sun protection is recommended. Skin can burn in as little as 15 minutes in summer if not protected from the sun. The longer you expose your skin to the sun, the greater your risk of getting skin cancer.

Check the SunSmart UV Alert when planning your outdoor activities. Use clothing, a hat, sunscreen, shade and sunglasses in combination to protect your skin when UV levels are 3 and above.

Ensure you choose a sunscreen that offers broad spectrum protection, has an SPF of 30 or higher, and is water resistant. Also be sure to apply an adequate amount - you should be able to see a thin film on the skin after application and reapply every two hours.

**Action plan to be SunSmart when UV levels reach 3 and above:**

1. Check the daily SunSmart UV Alert and protect your skin during the sun protection times. Check the Alert for your location at www.bom.gov.au or download the free SunSmart App at www.sunsmart.com.au/resources/sunsmart-app

**BE ACTIVE**

SEE BEING ACTIVE AS AN OPPORTUNITY, NOT AN INCONVENIENCE

Physical activity has many health benefits

Physical activity can reduce your risk of a range of health problems, including some cancers, heart disease, diabetes and obesity.

For good health, at least 30 minutes of moderate physical activity or exercise on most, preferably all days of the week is recommended. Moderate intensity physical activity causes a slight, but not noticeable increase in breathing and heart rate, for example brisk walking or mowing the lawn.

To reduce your risk of some cancers, including bowel, breast (after menopause) and endometrium, the more physically active you are the better. As your fitness improves aim for 60 minutes of moderate intensity or 30 minutes of vigorous intensity activity everyday. Vigorous intensity physical activity makes you ‘huff and puff’ for example running and aerobics.

It is important to remember total exercise each day does not need to be continuous. Physical activity can be performed in smaller bouts of exercise, with a minimum of ten minutes at a time being of benefit.

**Action plan to be physically active:**

1. See being active as an opportunity, not an inconvenience.
2. Be active everyday, in as many ways as you can, such as walking instead of driving and walking in your lunch break.
3. Walk or cycle to work and walk up stairs instead of taking the lift or escalator.
4. Do something you enjoy or can do with a friend, such as tennis, swimming or dancing.
5. Build up your exercise slowly, whichever exercise you choose.
6. Reduce your sitting time. At work: stand during phone calls, hold walking meetings, get up and speak to a colleague rather than send an email.
7. If you haven’t exercised for a while, talk to your doctor before starting.
HEALTHY WEIGHT

AIM FOR A HEALTHY BODY WEIGHT

Staying in shape is important for overall health

Being overweight increases the risk of cancers of the breast (after menopause), bowel, endometrium oesophagus, pancreas and kidney.

If you are overweight, you may be eating more than you need for your level of activity. Eating a balanced diet and being more active are two of the best ways to stay within a healthy weight range and reduce your risk of cancer.

Is your weight healthy?

The easiest way to find out if your weight is healthy is to measure your waist. Use a tape measure to measure your waist at the narrowest point. If this is not obvious, then measure at the belly button level. Aim for a waist measurement under 80cm for women or under 94cm for men. If your waist is above this you are at an increased risk of developing a chronic disease such as some cancers, heart disease and diabetes. Measurements above 88cm for women and 102cm for men substantially increases your chronic disease risk.

What is Body Mass Index (BMI)?

Your BMI is another way of measuring whether you are in a healthy weight range. It is calculated by dividing your weight (in kilograms) by your height (in metres squared). Then compare your result to the BMI table below. A BMI of 25 or more means it is time to take action for better health and to reduce your risk of cancer.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5-25</td>
<td>Healthy weight</td>
</tr>
<tr>
<td>25-30</td>
<td>Overweight</td>
</tr>
<tr>
<td>Greater than 30</td>
<td>Obese</td>
</tr>
</tbody>
</table>

Action plan for staying in shape:

1. Eat a healthy diet (see ‘Eat for health’, below).
2. Be active for at least 30 minutes each day.
3. Eat according to your needs. Be mindful of portion size, non-hungry eating and keep high kJ, low-nutrient foods to a minimum.
4. Set a good example for children by making healthy food choices and being active.

EAT FOR HEALTH

CHOOSE PLENTY OF FRUIT AND VEGETABLES

Healthy eating habits are an important step in reducing your cancer risk

While there is no one food that can protect against cancer, there are steps you can take to lower your overall risk.

Eating plenty of fruit, vegetables and legumes (for example beans, lentils and chickpeas) is important to your overall health and may help protect against some cancers, especially cancers of the digestive system. Try to eat at least five servings of vegetables and two servings of fruit a day.

Choose wholegrain or wholemeal foods. They are an important part of a healthy diet as they are excellent sources of vitamins, minerals, protein, dietary fibre and protective phytochemicals.

Lean red meat is an important source of nutrients in the Australian diet but it should be limited to no more than 455g of lean cooked red meat per week. This could be consumed across the week via a number of patterns, i.e. daily but no more than 65g each day (most adults current portion size is much larger than this) or a larger serve less frequently for example 110g every second day. Consumption of processed meats, such as ham, bacon, sausages and salami, which are high in fat and sodium, should be limited. Eating lots of red and processed meats has been linked to bowel cancer.

Action plan to eat for health:

1. Aim for two serves of fruit and five serves of vegetables everyday.
2. Eat a variety of wholegrain cereals, breads and pastas.
3. Choose fish, poultry or vegetarian options instead of red meat for some meals.
4. Choose foods low in salt.
5. Choose a low fat diet, particularly low in saturated fat.
6. Limit high kJ, nutrient poor foods such as fast foods and sugary drinks.
7. Teach your children healthy eating. Getting children interested in cooking and eating healthy foods gives them a great start for a healthy life.
AVOID OR LIMIT ALCOHOL

TRY ALCOHOL-FREE DAYS AND NON-ALCOHOLIC DRINKS

Alcohol consumption can cause some cancers

There is evidence that drinking alcohol increases your risk of cancers of the bowel, breast, mouth, pharynx, larynx, oesophagus and liver.

Try to avoid drinking alcohol. If you choose to drink alcohol, drink within the National Health and Medical Research Council guidelines for alcohol consumption, which state:

For healthy men and women, drinking no more than two standard drinks on any day reduces the lifetime risk of harm from alcohol-related disease or injury. The lifetime risk of harm from drinking alcohol increases with the amount consumed.

Action plan for limiting alcohol:
1. Choose low alcohol drinks.
2. Dilute alcoholic drinks, for example try a wine spritzer (wine and soda water) or a shandy (beer and lemonade).
3. Use water to quench your thirst and sip alcoholic drinks slowly.
4. Avoid binge drinking (more than 2 standard drinks on any occasion).
5. Eat some food while you drink alcohol.

A standard drink equals:
- 100ml of wine (one bottle of wine contains about seven standard drinks).
- 285ml (1 schooner) of full strength beer.
- 425ml (1 pint) of low alcohol beer.
- 30ml (1 nip) of spirits.
- 60ml (2 nips) of sherry.
- 200-250ml alcoholic soda (2/3 bottle).

Cocktails may contain more than three standard drinks!

Alcohol and smoking

It has been known for a long time that smoking is harmful to health. The combined effects of smoking and alcohol greatly increase the risk of cancer, more so than from either of these factors alone. Up to 75 per cent of cancers of the upper airway and digestive system can be related to the combined use of alcohol and smoking.

KEEP AN EYE ON YOURSELF

A FEW MINUTES COULD MAKE A WORLD OF DIFFERENCE

Finding cancer early offers one of the best chances of effectively treating some cancers

Know your body.

Take quick action and see your doctor straight away if you notice anything unusual.

By yourself, or with the help of a partner or a friend, look for:
- A new lump or thickening in any part of your body.
- A sore that does not heal.
- Unusual breast changes e.g. lumps, lumpiness, a thickened area, unusual nipple discharge, a nipple that turns inwards (if it hasn’t always been that way), a change in shape or colour, an unusual pain or a change in skin texture.
- A spot or mole that is new or has changed in shape, size, colour or bleeds.
- Unusual bleeding or discharge.
- Any vaginal bleeding after menopause.
- Persistent indigestion or difficulty swallowing.
- Any changes in your bowel habits e.g. diarrhoea, constipation or blood in the bowel action.
- Any unexpected weight loss.
- Coughing, hoarseness or a sore throat that doesn’t go away.

These signs don’t mean you have cancer but it is important to have them checked by your local doctor, as the earlier cancer is detected the better the outcomes.

Cancer Council SA provides advice and information on finding cancer early on the website www.cancersa.org.au or call Cancer Council Helpline 13 11 20.

ASK ABOUT CANCER SCREENING

DON’T MAKE EXCUSES, MAKE AN APPOINTMENT

Screening for bowel, breast and cervical cancer saves lives

These regular checks are some of the best health habits to follow.

Bowel cancer

Everyone over 50 should complete a faecal occult blood test (FOBT) every two years to check for bowel
Almost 40,000 Australian cancer cases could be prevented each year through changes in lifestyle, according to a ground-breaking study of cancer incidence and preventable causes in Australia. The study, which was conducted by QIMR Berghofer Medical Research Institute (and funded by Cancer Council Australia), showed that a third of cancers could be prevented.

Cancer Council Australia CEO, Professor Sanchia Aranda, said the ground-breaking research should encourage Australians to be positive about reducing their risk. "Of 13 identified risk factors, smoking, UV radiation, body weight, poor diet and alcohol caused around 90 per cent of all preventable cancers." It's time to bust the myth that everything gives you cancer and do more to reduce the risks that we know cause cancer," said Professor Aranda.

According to Professor Aranda, CEO of Cancer Council Australia, "Of 13 identified risk factors, smoking, UV radiation, body weight, poor diet and alcohol caused around 90 per cent of all preventable cancers."

What about prostate cancer

There is currently no test to differentiate between prostate cancers that are slow-growing and unlikely to cause harm, and those that are aggressive and require treatment. Because the side effects of prostate cancer testing and treatment are often very serious, we encourage men concerned about prostate cancer to speak to their doctor to make an informed decision about whether testing is right for them. Visit www.prostatehealth.org.au.

SIX FOODS THAT INCREASE OR DECREASE YOUR RISK OF CANCER

A series of small changes to how you eat and live now will build the framework for a long, healthy and cancer-free life, writes nutrition academic Tim Crowe

If you believe cancer is a disease that strikes from nowhere with little in your control to prevent it, you’d be mistaken on both counts. Most cases of cancer are considered preventable by positive nutrition and lifestyle choices.

Six new nutrition cancer prevention guidelines published today in the *Journal of the American College of Nutrition* reinforce some sound advice, but also include a surprise or two.

Cancer is a big killer of Australians, and is responsible for 30% of all deaths each year. The ‘big five’ in order of incidence are prostate, bowel, breast, melanoma and lung cancer. Our love of the sun and smoking mostly explain the last two, but it is food, exercise and other lifestyle choices that explain much of a person’s risk of cancer.

So what do these six new cancer prevention recommendations tell us? And how much notice should we take?

1. **Eat plenty of fruits and vegetables**
   
   Unfortunately, there is no ‘cancer prevention super-food’; it is a combination of food variety that gives the greatest benefit.

   Why are fruit and vegetables so good? Take your pick from any and all of the following: antioxidants, fibre, phytochemicals and weight control.

   One group of vegetables you may care to give a closer look at during your weekly shop, are the dark leafy greens.

   These include broccoli, spinach, leaf lettuce and kale – foods that are true nutrient powerhouses.

2. **Limit or avoid alcohol**

   When it comes to alcohol, forget about justifying drinking because it is good for your heart. Alcohol is strongly linked to cancer of the mouth, oesophagus, breast, colon and liver; the more you drink, the greater the risk.

   Alcohol through conversion to acetaldehyde can directly damage cellular DNA. It can also damage the liver, increase the solubility of other cancer-causing chemicals, increase the level of estrogen, and decrease the levels of some beneficial nutrients such as folate.

   Risk, though, needs to be balanced with lifestyle and enjoyment. There are many other positive things you can do to reduce cancer risk without giving up your favourite drink altogether.

3+4. **Avoid red and processed meat**

   The advice on avoiding processed meat is well supported by evidence. This agrees with the biggest voice in the cancer prevention business, the World Cancer Research Fund (WCRF) which rates the link between red meat and colorectal cancer as ‘convincing’ – the highest level of evidence possible.

   Meat lovers can take some solace though. The WCRF recommends keeping consumption of red meat to under 500 grams of cooked meat per week.

   Fish and chicken are good alternatives if the thought of missing a daily steak is too much for you.

   Following on from the advice on limiting red meat, is a recommendation to avoid overcooking meat; especially from grilling and frying.

   When meat, chicken and fish is overcooked at high temperatures for a long time, natural reactions in the food can produce heterocyclic amines (HCAs).

   HCA’s are considered potent causes of breast, lung, colon, stomach and prostate cancer – at least in animal models.
5. **Women: eat soy foods to reduce your risk of breast cancer**

This is a surprising recommendation, more so that when groups such as the WCRF have looked at the evidence, it barely made it to the ‘limited’ level of evidence.

Soy contains a class of phytochemicals called isoflavones which have chemical structures similar to estrogen. These isoflavones are thought to partly inhibit a woman's own natural estrogen in stimulating cell growth. That’s the theory at least.

Soy foods are a staple of vegetarian diets and the recommendation advises choosing natural soy foods such as edamame, tempeh or tofu and to steer clear of protein concentrates often found in supplements.

Women who are being treated for estrogen-receptor-positive breast cancer should avoid soy supplements because they contain high concentrations of isoflavones.

6. **Men: limit or avoid dairy products to reduce your risk of prostate cancer**

This certainly stands out as the most controversial recommendation and the one that could grab the headlines.

This recommendation is a good example of needing to balance risk when it comes to lifestyle choices in preventing cancer. While there is some limited evidence that dairy products can raise a man's risk of prostate cancer, there is also a higher level of evidence (which the WCRF classifies as ‘probable’) that milk and calcium can lower the risk of colorectal cancer.

A diet high in calcium can lead to a decrease in vitamin D production. Vitamin D is an important regulator of cell growth and proliferation so less of it may lead to prostate cancer cells growing unchecked.

In the colon, though, it’s a different matter. Calcium can bind to potentially carcinogenic compounds in the intestine, making them insoluble and easily excreted. Calcium can also directly influence cell development, slowing down proliferation.

What’s a guy to do? If you enjoy dairy foods, there is no need to avoid them. If you have a family history of prostate cancer, you may want to have a bit less. If colon cancer runs in your family, a bit more could help.

**Other ways to reduce your cancer risk**

While not part of the nutrition recommendations, physical activity is now recognised as a potent ‘cancer-preventing’ habit. Estimates link regular physical activity to a 20-40% lower risk of colon and breast cancer.

How much physical activity is enough? All physical activity is beneficial, but for cancer prevention up to one hour of moderate activity or 30 minutes of vigorous activity daily gives the greatest benefit.

Carrying too much weight, especially around the middle, is a known cancer risk, especially for breast and colon cancer risk. Men should aim for a waist circumference below 94cm. For women it’s below 80cm. Cancer prevention guidelines reflect the current state of scientific evidence, and change over time as evidence changes. The core of the guidelines though have changed little and can be summed up in single sentence. Eat mostly plant foods close to their natural state, keep active, drink responsibly, stay safe in the sun, and don’t smoke.

For some people, a complete lifestyle overhaul can be a difficult thing to manage in one go. Instead, focus on one change at a time like building more activity into your day and then following this up with eating five different types of vegetables and two of fruits each day with the emphasis on colour as your best guide to variety.

Prevention guidelines shouldn’t be seen as a prescription for restricting your life, but a series of small changes to how you eat and live now that will build the framework for a long, healthy and cancer-free life.

Tim Crowe is Associate Professor in Nutrition, Deakin University.

Cancer is a big killer of Australians, and is responsible for 30% of all deaths each year. The ‘big five’ in order of incidence are prostate, bowel, breast, melanoma and lung cancer. Our love of the sun and smoking mostly explain the last two, but it is food, exercise and other lifestyle choices that explain much of a person’s risk of cancer.

Population-based cancer screening is an organised, systematic and integrated process of testing for signs of cancer or pre-cancerous conditions in asymptomatic populations. In Australia, there are three national population-based screening programs: for breast, cervical and bowel cancers. The three programs – BreastScreen Australia, the National Cervical Screening Program and the National Bowel Cancer Screening Program – are run through partnerships between the Australian Government and state and territory governments. These programs aim to reduce illness and death from these cancers through early detection of cancer and pre-cancerous abnormalities and through effective follow-up treatment.

The programs target specific populations and age groups where evidence shows screening is most effective at reducing cancer-related morbidity and mortality.

**BREASTSCREEN AUSTRALIA**

BreastScreen Australia, established in 1991, led to a rapid increase in the number of breast cancers diagnosed in women. This was due largely to increased detection of breast cancers that were too small to be felt. Screening led to increases in the incidence rate as a result of these cancers being diagnosed earlier than they would have been had they continued to grow until symptoms developed. The mortality rate for breast cancer decreased after BreastScreen Australia was introduced as detection of breast cancer at an earlier stage – when the tumour is often smaller – is associated with increased treatment options and improved treatment outcomes (AIHW 2013a). Additional mortality reductions are attributed to independent treatment advances, including the advent of new systemic therapies.

The program provides free 2-yearly screening mammograms to women aged 40 and over, and actively invites women aged 50–69 to participate.

**Key statistics**

- In the 2-year period 2011-2012, more than 1.4 million women aged 50–69 had a screening mammogram – a participation rate of 55%. Participation rates were highest for women aged 60–64 (60%) and lowest for those aged 50–54 (49%).
- Participation rates were lower among:
  - Aboriginal and Torres Strait Islander women (38%) than non-indigenous women (54%)
  - Women living in very remote areas (46%) than women living in other regions
  - Women who reported speaking a language other than English at home (50%) than women who spoke English at home (55%).
• The ASR of participation for women aged 50-69 was 52% in 1996-1997 when reporting began. This increased to a peak of 57% in 2001-2002 and thereafter remained steady at 55-57%, although the total number of women participating in screening increased (Figure 2.1).

• In 2012, there were 104 invasive breast cancers and 23 ductal carcinomas in situ detected for every 10,000 women screened for the first time. The detection rate was lower among women attending a subsequent screening, with 44 invasive breast cancers and 11 DCISs per 10,000.

NATIONAL CERVICAL SCREENING PROGRAM

The National Cervical Screening Program was established in 1991. It has led to falls in both cervical cancer incidence and mortality due to its ability to detect pre-cancerous abnormalities that may, if left, progress to cancer. With opportunistic cervical screening occurring in Australia since 1960, falls in incidence and mortality of cervical cancer were also evident before this program was introduced (in 1991). The program targets women aged 20-69 for a 2-yearly Papanicolau (Pap) smear, or ‘Pap test’.

Key statistics

• In the 2-year period 2011-2012, more than 3.7 million women aged 20-69 had a screening Pap test – a participation rate of 58% of women in the target population. Participation was highest for women aged 45-49 (64%) and lowest for those aged 20-24 (43%).

• Participation was lower among women living in very remote areas than in other regions, and rose with increasing socioeconomic status – from 52% in areas of lowest socioeconomic status to 64% in areas of highest status.

• The participation rate was 58% in 2011-2012. This has remained relatively stable over time, although the total number of women participating in screening has increased (Figure 2.2).

• In 2012, a high-grade abnormality (pre-cancerous condition) was detected in 16,808 women aged 20-69, at a rate of 8 per 1,000 women screened. Detection presents an opportunity for treatment before possible progression to cancer.

NATIONAL BOWEL CANCER SCREENING PROGRAM

The National Bowel Cancer Screening Program was established in 2006. It is expected to lead to decreases in both cancer incidence and mortality as it has the ability to detect pre-cancerous abnormalities. However, it is likely to take some time for the effect of the program

FIGURE 2.1: PARTICIPATION NUMBER AND AGE-STANDARDISED PARTICIPATION RATE, BREASTSCREEN AUSTRALIA, AUSTRALIA, 1996-1997 TO 2011-2012

Notes

1. The ASR is the number of women aged 50-69 screened in each reporting period as a percentage of the ABS estimated resident population for women aged 50-69, and age-standardised to the Australian population as at 30 June 2001.
2. Data for this figure are in online Table D2.1.

Source: AIHW analysis of BreastScreen Australia data.
on incidence and mortality to become apparent. The bowel cancer screening program currently offers free screening, using a faecal occult blood test (FOBT), to people turning 50, 55, 60 and 65 years of age. The program is scheduled to be expanded from July 2015, with the phasing in of biennial screening for those aged 50 to 74 by 2020.

**Key statistics**

Of those people invited to participate in the National Bowel Cancer Screening Program in 2012-13:

- 321,413 returned a completed bowel cancer screening kit for analysis – a participation rate of 33.4%. Participation was higher among women (35.7%) than men (31.1%).
- 23,671 (7.5%) returned a valid screening test and had a positive screening result and 70.4% of those (16,670) had a follow-up colonoscopy recorded.
- 404 participants (1 in 32) who underwent a colonoscopy were diagnosed with a confirmed or suspected bowel cancer, and 728 (1 in 17) were diagnosed with an advanced adenoma (pre-cancerous tumour).

**WHAT IS MISSING FROM THE PICTURE?**

National cancer data do not include whether a new case of cancer was identified through screening, or if cancers identified through screening are diagnosed at an earlier stage than for those that present naturally.

There is no national mechanism for reporting Aboriginal or Torres Strait Islander identification on pathology forms. As a result, state and territory cervical cytology (Pap test) registers are unable to report indigenous status. Hence, the reporting of cervical screening indicators is not possible nationally for indigenous women.

Outcome data for the National Bowel Cancer Screening Program – such as follow-up of a positive FOBT result by a primary practitioner, colonoscopy follow-up, histopathology follow-up, and bowel abnormality detected at colonoscopy – are under-reported. The Department of Health is working on a number of steps to improve reporting of outcomes.

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BREAST CANCER SCREENING
A BRIEF GUIDE FROM THE AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE

Breast cancer

Cancer is a group of several hundred diseases in which abnormal cells are not destroyed naturally by the body but instead multiply and spread out of control. Cancers are distinguished from each other by the specific type of cell involved and the place in the body in which the disease began.

Breast cancer most commonly originates in the ducts of the breast (which carry milk from the lobules to the nipple) but can also originate in the lobules (small lobes of the breast that produce milk). More rarely, breast cancer can originate in the connective tissue of the breast.

Worldwide, breast cancer is the most common cancer affecting women, representing one in four of all cancers in women. The incidence of breast cancer differs worldwide, with this disease being far more common in more developed countries compared with developing countries (although as less developed countries become more developed, a shift towards the lifestyles of developed countries brings an increase in cancers that have reproductive, dietary, and hormonal risk factors, of which breast cancer is one) (UICC 2014).

In Australia breast cancer is the most commonly diagnosed cancer in Australian women (excluding basal and squamous cell carcinoma of the skin), comprising 27% of all female cancers, and with an incidence rate of around 115 new cases per 100,000 women; it is second only to lung cancer in cancer deaths in Australian women.

Preventing breast cancer

- The causes of breast cancer are not completely understood, so it is impossible to know if anything specific can prevent it from occurring altogether – however early detection is considered crucial to achieving good outcomes.
- Regular exercise and a healthy diet are recommended for all women because activity and a good diet can help prevent a range of lifestyle-related conditions, including heart disease, diabetes as well as many types of cancer.
- Studies have reviewed the link between breast cancer and diet; there are currently no definite conclusions, however there are clear health benefits for women who maintain a healthy weight, exercise regularly and who have a low intake of saturated fat and alcohol.
- Regular exercise could also reduce your risk of breast cancer by up to one-third. It is particularly important for women who are post-menopausal to avoid being overweight or obese, because excess weight can cause greater oestrogen production, thereby increasing breast cancer risk.
- Women who breastfeed are less likely to develop breast cancer than those who do not, according to a number of studies. The reasons are not conclusive, however it could be attributed to the fact that women do not ovulate as regularly during breastfeeding and their oestrogen levels remain stable.

Information sourced from: Health Direct Australia (2015), Breast cancer prevention.

In Australia breast cancer is the most commonly diagnosed cancer in Australian women (excluding basal and squamous cell carcinoma of the skin), comprising 27% of all female cancers, and with an incidence rate of around 115 new cases per 100,000 women; it is second only to lung cancer in cancer deaths in Australian women.

BreastScreen Australia

In Australia, population-based breast cancer screening is available through BreastScreen Australia, which targets women aged 50-74 for two-yearly screening mammograms (women aged 40-49 and 75 years and over are also eligible). More than 5 in 10 women (54%) aged 50-69 had a mammogram through BreastScreen...
BreastScreen Australia aims to reduce morbidity and mortality from breast cancer by using screening mammograms to detect unsuspected breast cancers in women with no symptoms, thus enabling intervention when the cancer is at an early stage. Finding breast cancer early often means that the cancer is small, which is associated with increased treatment options (NBOCC 2009) and improved survival (AIHW & NBCC 2007).

Screening mammograms work well in older women as breasts become less dense as women get older, particularly after menopause, which is why mammograms become more effective as women get closer to age 50. Incidence of breast cancer is also very high in this age group.

Mammographic screening is not recommended for women younger than 40. This is because breast tissue in premenopausal women tends to be dense, which can make it difficult to correctly identify the presence of breast cancer with mammography. The reduced accuracy of mammography in younger women produces a high risk of false positive and false negative results, which would result in a high number of unnecessary investigations and missed breast cancers. These ‘harms’ would far outweigh the breast cancers that would be able to be detected in younger women, for whom breast cancer is relatively rare.

However, even though screening mammography is not recommended for women under the age of 40, young women can still develop breast cancer. Therefore it is important for women of all ages to be aware of how their breasts normally look and feel and promptly report any new or unusual changes to their general practitioner. For more information on BreastScreen Australia, and for the latest breast cancer screening data, see the latest breast cancer screening report at www.aihw.gov.au/publications/breast-cancer/

REFERENCES


Breast cancer overdiagnosis

- Although mammographic screening is shown to reduce mortality, it can also cause harm.
- A recent BreastScreen Australia review estimated that the program reduces breast cancer mortality by between 21-28%. While this reduction in mortality is significant, mammography can also lead to overdiagnosis.
- Overdiagnosis describes the diagnosis of cancers which would not have caused symptoms or health problems in a patient if left undetected. Overdiagnosis can lead to unnecessary distress and cancer treatments.
- Overdiagnosis occurs because mammography cannot distinguish with full accuracy between potentially fatal and less harmful cancers.

Information sourced from: Cancer Council Australia (2015), Breast cancer screening.

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Eliminating cervical cancer globally

Medical research from the University of Queensland is eliminating cervical cancer globally. Two preventive vaccines developed have the capacity to save an estimated quarter of a million lives annually.

The vaccines are now available in 120 countries and more than 100 million doses of HPV vaccines Gardasil™ and Cervarix™ have been distributed worldwide.

Research conducted by Professor Ian Frazer and the late Dr Jian Zhou on virus-like particles led to the development of the HPV vaccines, for the prevention of cervical cancer and other HPV-related cancers.

Cervical cancer is the second most common cancer in women globally and kills 275,000 women annually. HPV infection is also a common cause of head and neck cancer, and the vaccine is also effective against genital warts.

In addition to developed countries, the vaccine has been made available at low cost to developing countries.

Cervical cancer screening changes

- The Australian Government has accepted the recommendations of the Medical Services Advisory Committee that a primary human papillomavirus (HPV) test should replace the current Pap test for cervical screening.
- The renewed National Cervical Screening Program will invite women aged 25-74 years, both HPV-vaccinated and unvaccinated, to undertake an HPV test every 5 years.
- Women of any age who have symptoms (including pain or bleeding) should have appropriate clinical assessment, which may include a cervical cytology test and an HPV test.
- HPV-vaccinated women will still require cervical screening, as the HPV vaccine does not protect against all the types of HPV that cause cervical cancer.
- The new program commences on 1 May 2017 when the primary HPV screening test becomes available on the Medicare Benefits Schedule.

Information sourced from: Department of Health (2015), *Future changes to cervical screening.*
nations where cervical cancer has the greatest mortality rate.

**Background**

Four out of five people are believed to have been exposed to human papilloma virus (HPV) which is proven to cause genital warts and cervical cancer and is linked to the development of cancers of the anus, penis, mouth and throat. Cervical cancer is the second biggest killer of women worldwide.

Gardasil™ and Cervarix™ are the only vaccines that help protect against four types of HPV. These revolutionary vaccines are based on technology first developed and patented by UQ’s Professor Ian Frazer and the late Dr Jian Zhou, in collaboration with researchers at the National Cancer Institute, Georgetown University, and University of Rochester.

The prescription-only vaccine is distributed in Australia and New Zealand by Melbourne-based pharmaceutical manufacturer CSL and distributed worldwide by US drug maker Merck & Co. The vaccine is administered via three doses over six months.

The efficacy of the vaccine is astonishingly high. In girls and young women aged 9 to 26, Gardasil™ has been proven to protect against two types of HPV that cause about 75 per cent of cervical cancer cases, and two more types that cause about 90 per cent of genital warts cases. It also protects against approximately 70 per cent of vaginal cancer cases and up to 50 per cent of vulva cancer cases.

In boys and young men aged 9 to 26, Gardasil™ helps protect against approximately 90 per cent of genital warts cases.

In Australia, Gardasil™ was first made available, free of charge, to teenage girls in 2007. In 2012, the Australian government announced the extension of the Gardasil™ vaccination program to include teenage boys.

The President of the Australian Medical Association, Dr Steve Hambleton, has described Gardasil™ as “one of the most potent vaccines that we have”.

In 2006, Professor Ian Frazer was named Australian of the Year, with the Board of the National Australia Day Council stating his research “has the potential to eradicate cervical cancer within a generation.”

Now available in 120 countries, more than 100 million doses of HPV vaccines Gardasil™ and Cervarix™ have been distributed worldwide.

But while young women in the developed world have easy access to these potentially life-saving vaccines, many women in poorer countries are less fortunate. Most of the 250,000 deaths from cervical cancer each year occur in the developing world, where Pap smears to screen for the disease are not widely available.

Professor Frazer and colleagues are determined to address this inequity, and have worked with the Gates Foundation and World Health Organization to make the drug more affordable to girls and young women in the developing world.

Apart from its impact on women’s health worldwide, Gardasil™ has also been a huge economic success. The vaccine was one of the first Australian pharmaceutical successes to result in a fair share of economic flow back into Australia.

In July 2013, Professor Frazer became chief executive of the Translational Research Institute (TRI), the first institute in Australia to take medical breakthroughs from research and trial to manufacture. TRI aims to keep the economic gains from breakthroughs such as Gardasil™ in Australia. TRI is supported by UQ, QUT, Princess Alexandra Hospital and Mater Research.

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**BOWEL CANCER SCREENING**

**SCREENING EVERY 1-2 YEARS FROM AGE 50 COULD SAVE YOUR LIFE, EXPLAINS BOWEL CANCER AUSTRALIA**

Bowel cancer screening involves a test for bowel cancer in people who do not have any obvious symptoms of the disease.

Bowel cancer can develop without any early warning signs. The cancer can grow on the inside wall of the bowel for several years before spreading to other parts of the body.

Often very small amounts of blood, invisible to the naked eye, leak from these growths and pass into bowel movements before any symptoms are noticed.

A bowel cancer screening test called a Faecal Immunochemical Test (FIT) can detect these small amounts of blood in bowel movements.

The test looks for blood in your bowel movement, but not for bowel cancer itself.

Screening using a faecal immunochemical test is one of the most effective ways to reduce the risk of bowel cancer as it can help detect pre-cancerous polyps for removal during colonoscopy or cancer in its earliest stages when it is easier to treat and cure.

The faecal immunochemical test involves placing small samples of toilet water or stool on a special card and mailing them to a pathology laboratory for analysis. The results are then sent back to you and your GP.

A negative result means blood has not been detected in your samples and it is recommended that you repeat a bowel cancer screening test every 1 to 2 years. However, this does not mean that you do not have, or can never develop, bowel cancer, since some bowel cancers do not bleed or only bleed on and off. In between times, if you develop any symptoms of bowel cancer, see your GP immediately.

A positive result means blood has been detected in your samples. If blood is detected, you should contact your GP immediately to discuss the result and obtain a referral for further investigation via colonoscopy within 30 days.

The presence of blood may be due to conditions other than cancer, such as polyps, haemorrhoids, or inflammation of the bowel, but the cause of bleeding needs to be investigated by colonoscopy. During the procedure, any polyps can be identified and removed or a diagnosis of bowel cancer confirmed.

Research shows that regular screening with a faecal immunochemical test can reduce the risk of dying from bowel cancer.

Research shows that regular screening with a faecal immunochemical test can reduce the risk of dying from bowel cancer.

**SCREENING TESTS HAVE RISKS**

Decisions about screening tests can be difficult. Not all screening tests are helpful and most have risks. Before having any screening test, you may want to discuss the test with your GP or pharmacist. It is important to know the risks of the test and whether it has been proven to reduce the risk of dying from cancer.

**False-negative test results can occur**

Screening test results may appear to be normal even though bowel cancer is present. A person who receives a false-negative test result (one that shows there is no cancer when there really is) may delay seeking medical care even if there are symptoms.

**False-positive test results can occur**

Screening test results may appear to be abnormal even though no cancer is present. A false-positive test result (one that shows there is cancer when there really isn’t) can cause anxiety and is usually followed by more tests (such as biopsy), which also have risks.

Research shows that regular screening with a faecal immunochemical test can reduce the risk of dying from bowel cancer.

Bowel Cancer Australia encourages all Australians from age 50, who do not have symptoms or a family history of bowel cancer, to undertake bowel cancer screening every 1 to 2 years using a Faecal Immunochemical Test (FIT).

Talk to your GP or pharmacist today about BowelScreen Australia® or purchase a test online or by phoning 1800 555 494.

BOWEL CANCER FACTS

**Definition**

Bowel cancer is a cancer which occurs in any part of the large bowel (consisting of both the colon and rectum). Bowel cancer is sometimes referred to as colorectal cancer and may also be labelled as colon cancer or rectal cancer, depending on its origin. Cancer of the small bowel is very rare and is usually referred to as ‘small bowel cancer’ or ‘small intestine cancer’.

Bowel cancer grows from the inner lining of the bowel, called the mucosa, and typically develops from growths on the bowel wall called polyps. Most polyps are benign, however some become cancerous (malignant) over time.

If untreated, bowel cancer can grow into the deeper layers of the bowel wall, from where it can spread to the lymph nodes (also referred to as glands). If the cancer spreads further, it can affect other organs, such as the lungs or liver. This is known as metastasis, a term which refers to the spread of a cancer (or other disease) from one organ or part of the body to another not directly connected with it.

In the majority of cases, bowel cancer develops slowly and remains in the bowel for months or even years before spreading.

**Prevalence**

- Bowel cancer is the second most common cancer affecting Australians (after skin cancers), with about 17,000 people being diagnosed with it each year.
- Around one in 19 men and one in 28 women will develop bowel cancer before the age of 75.
- Bowel cancer is most common in people over 50, however it can occur at any age. The average age at diagnosis is 69 years, but around 7% of bowel cancers are found in people under the age of 50.

**Symptoms**

Bowel cancer often has no symptoms in its early stages, but some people with bowel cancer do experience persistent symptoms, which can include:

- Change in bowel habit (e.g. diarrhoea, constipation, or smaller, more frequent bowel movements)
- Change in appearance of bowel movements (e.g. stools narrower or contain mucus)
- Feeling bloated or full in the rectum or bowel
- Feeling that the bowel has not voided completely after a movement
- Blood on toilet paper or in stools
- Weight loss which is unexplained
- Weakness, fatigue
- Pain in the rectum or anus
- Lump in the rectum or anus
- Pain or swelling in the abdominal area
- Anaemia, which can cause tiredness and weakness.

It should be noted, not everyone with these types of symptoms has bowel cancer. Other conditions can also cause these changes e.g. haemorrhoids, diverticulitis, tears in the anal canal, and some foods or medications.

Short-term changes in the functioning of the bowel are common and usually do not indicate a serious problem – however, if any of the these symptoms persist for more than four weeks, it is recommended that you see a doctor for a check-up.

**Risk factors**

The exact cause of bowel cancer is still unknown, however, some factors are known to increase the chance of developing it.

Risk factors include:

- Age (over 50)
- Large number of polyps in the bowel
- Increased risk from bowel diseases such as Crohn’s disease or ulcerative colitis
- Lifestyle factors can increase the risk – overweight, having a diet which is high in red/processed meats, regular alcohol consumption, smoking
- Other diseases can increase the risk – recurrence of bowel cancer; ovarian or endometrial cancer
- Strong family history
- Rare genetic disorders.

**Protective factors**

The following may help protect against bowel cancer:

- Being physically active
- Maintaining healthy weight
- Eating a high-fibre diet.

Information sourced from: Cancer Council Victoria (2015), Bowel cancer.
WHAT YOU NEED TO KNOW ABOUT PROSTATE CANCER

Advice reproduced courtesy of the Prostate Cancer Foundation of Australia

WHAT IS PROSTATE CANCER?
Prostate cancer occurs when abnormal cells develop in the prostate. These abnormal cells can continue to multiply in an uncontrolled way and sometimes spread outside the prostate into nearby or distant parts of the body.

Prostate cancer is generally a slow-growing disease and the majority of men with low-grade prostate cancer live for many years without symptoms and without it spreading and becoming life-threatening. However, high-grade disease spreads quickly and can be lethal. Appropriate management is key.

WHAT IS THE PROSTATE?
Only men have a prostate. It is a small gland that sits below the bladder near the rectum. It surrounds the urethra, the passage in the penis through which urine and semen pass. The prostate gland is part of the male reproductive system. It produces most of the fluid that makes up semen that enriches sperm. The prostate needs the male hormone testosterone to grow and develop.

The prostate is often described as being the size of a walnut and it is normal for it to grow as men age. Sometimes this can cause problems, such as difficulty urinating. These problems are common in older men and not always symptoms or signs of cancer.

WHAT ARE THE SYMPTOMS?
In the early stages, there may be no symptoms. In the later stages, some symptoms of prostate cancer might include:
- Feeling the frequent or sudden need to urinate
- Finding it difficult to urinate (for example, trouble starting or not being able to urinate when the feeling is there or poor urine flow)
- Discomfort when urinating
- Finding blood in urine or semen
- Pain in the lower back, upper thighs or hips.

These symptoms may not mean you have prostate cancer, but if you experience any of them, go and see your doctor.

WHAT ARE THE RISK FACTORS?
Factors that are most strongly linked to an increased chance of developing prostate cancer:
- Age: Prostate cancer is an age-dependent disease, which means the chance of developing it increases with age. The risk of getting prostate cancer by the age of 75 is 1 in 7 men. By the age of 85, this increases to 1 in 5.
- Family history: If you have a first-degree male relative with prostate cancer, you have a higher chance of developing it than men with no such history. The risk increases again if more than one male relative has prostate cancer. Risks are also higher for men whose male relatives were diagnosed when young.

OTHER FACTORS THAT MAY INCREASE THE RISK OF DEVELOPING PROSTATE CANCER:
- Genetics: Genes are found in every cell of the body. They control the way the cells in the body grow and behave. Every person has a set of many thousands of genes inherited from both parents. Changes to genes can increase the risk of prostate cancer being passed from parent to child. Although prostate cancer can’t be inherited, a man can inherit genes that can increase the risk.
- Diet: There is some evidence to suggest that eating a lot of processed meat or food that is high in fat can increase the risk of developing prostate cancer.

Men over age 50, or 40 with a family history of prostate cancer, should talk to their doctor about testing for prostate cancer using the PSA test and DRE as part of their annual health check-up. Men should make an individual informed decision about testing based on the latest available evidence on the benefits and potential harms of testing and subsequent treatment for prostate cancer.

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- **Lifestyle**: There is evidence to show that environment and lifestyle can affect the risk of developing prostate cancer. For example, Asia has the lowest rate of prostate cancer, but when a man from an Asian country migrates to a Western country, his risk of developing prostate cancer increases. This suggests that external factors, like environment and lifestyle, can change a man’s level of risk of developing prostate cancer.

**HOW IS PROSTATE CANCER DETECTED AND DIAGNOSED?**

A doctor will usually do a blood test and/or physical examination to check the health of the prostate.

- **Blood test (Prostate Specific Antigen (PSA) test)**: The result shows whether there is an increase in this specific protein. Depending on the result, you might need further investigation by a specialist. A high PSA test result does not necessarily mean cancer. Prostate diseases other than cancer can also cause a higher than normal PSA level.

- **Digital Rectal Examination (DRE)**: Because of where the prostate is located, the doctor inserts a gloved, lubricated finger into the rectum to check the size of the prostate and assess if there are any abnormalities. A normal DRE result does not rule out prostate cancer.

**DIAGNOSIS**

If your tests show you may be at risk of prostate cancer, the next step is a biopsy. A biopsy is the only way a firm diagnosis of prostate cancer can be made. A urologist removes small samples of tissue from your prostate, using very thin, hollow needles guided by an ultrasound. The prostate is either accessed through the rectum (transrectal) or the perineum (transperineal), which is the area between the anus and the scrotum. A biopsy is usually done as an out-patient procedure and the doctor will likely advise a course of antibiotics afterwards to reduce the chance of infection. The tissue is sent to a pathologist to identify whether the cells are malignant (cancerous) or benign (not cancerous).

**REDUCING THE RISK OF DEVELOPING PROSTATE CANCER**

There is no evidence that the following protective factors can stop prostate cancer from developing, but they can improve your overall health and possibly reduce the risk of prostate cancer:

- **Diet**: Eat meals that are nutritious. Refer to the Australian Guide to Healthy Eating. What is good for the heart is good for the prostate.

- **Physical activity/exercise**: There is some evidence to show that physical activity and regular exercise can be protective factors for cancer. Try to exercise at least 30 minutes of a day.

**FURTHER INFORMATION**

- www.pcfa.org.au
- www.canceraustralia.gov.au
- www.cancer.org.au
- www.andrologyaustralia.org
- www.healthyactive.gov.au

**THREE FACTS ABOUT PROSTATE CANCER**

1. In Australia, prostate cancer is the most commonly diagnosed cancer in men.
2. More than 3,000 men die of prostate cancer in Australia every year.
3. More men die of prostate cancer than women die of breast cancer.

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**Detecting prostate cancer**

- Prostate cancer is the second largest cause of cancer mortality in male Australians (after lung cancer).
- Overall, apart from non-melanoma skin cancer, prostate cancer is the most common cancer diagnosed in Australians.
- Prostate cancer is more common in older men and men with a family history of the disease.
- Early detection and treatment can substantially improve the chance of surviving prostate cancer. Unfortunately, no tests are currently available with sufficient accuracy to enable population screening of men for early signs of prostate cancer.
- Two tests are commonly used to aid early detection of prostate cancer: the prostate specific antigen (PSA) blood test, and the digital rectal examination. Neither test is accurate enough to distinguish potentially fatal cancers from benign tumours; both tests can also miss harmful cancers.
- Some studies suggest PSA reduces mortality on a population basis, however the test also detects large numbers of cancers that would have caused no symptoms or harm in the patient; this is known as overdiagnosis.
- Overdiagnosis can lead to unnecessary prostate cancer treatments that have side-effects which can include urinary incontinence, bowel problems and impotence.
- Men concerned about prostate cancer should talk to their doctor in order to make an informed choice regarding the potential risks and benefits of having a test to find early signs of prostate cancer.

Information sourced from: Cancer Council Australia (2015), Prostate cancer detection.

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**Nutrition**

Enjoy a wide variety of foods from the five food groups everyday. Healthy eating is easy! For more information visit: www.eatforhealth.gov.au

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SUN SAFETY MYTHS AND FACTS

HANDY SKIN PROTECTION ADVICE FROM THE QUEENSLAND GOVERNMENT

Myth: Sunscreen provides enough sun protection
Fact: Sunscreen doesn’t provide enough sun protection for your skin.

It’s important to use broadspectrum SPF30 or higher sunscreen because it filters ultraviolet radiation (UVR) and protects you from reflected UVR from surfaces like water, sand and concrete. Sunscreen wears off and needs to be reapplied every 2 hours.

However, sunscreen is not a suit of armour and should be used with the other ways of protecting yourself.

Myth: Skin cancer is a less serious form of cancer because it can easily be cut out
Fact: Skin cancer is very serious and treatment isn’t always as easy as removing a mole.

Melanoma is the most dangerous form of skin cancer. It can travel to other parts of your body, making it difficult to treat.

Know your skin, check it regularly and talk to your doctor about any concerns.

Myth: Skin cancer only affects fair-skinned people
Fact: Skin cancer affects people with all skin types. Did you know Bob Marley (a Jamaican singer) died from an untreated melanoma that spread to his brain?

Skin cancer is less common in people with darker skin, but it is often found at a more advanced stage.

Skin cancer facts

Skin cancer occurs when skin cells are damaged, most typically by overexposure to ultraviolet radiation from the sun.

Types of skin cancer

The three main types of skin cancer are:
- Melanoma – the most dangerous form of skin cancer
- Basal cell carcinoma
- Squamous cell carcinoma.

Non-melanoma skin cancer is the most common form of skin cancer, affecting men at almost twice the rate of women. Melanoma is the third most common cancer in both Australian women and men.

Incidence

According to the Cancer Council of Australia:
- Skin cancers account for around 80% of all newly diagnosed cancers each year in Australia
- Between 95-99% of skin cancers are caused by sun exposure
- General practitioners provide over 1 million patient consultations for skin cancer each year
- The skin cancer rate in Australia is one of the highest in the world, at 2-3 times the rates in Canada, US and UK
- 2 in 3 Australians will be diagnosed with skin cancer by the age of 70.

Mortality

In 2013, 2,209 people died from skin cancer in Australia. Most deaths were due to melanoma – 1,617, compared with 592 deaths from non-melanoma skin cancers. The five-year relative survival rate for melanoma is 89% for Australian men and 94% for Australian women.

Symptoms and diagnosis

The earlier a skin cancer is identified and treated, the better the chance of avoiding surgery, disfigurement or death.

Look out for:
- Crusty, non-healing sores
- Small lumps – red, pale or pearly in colour
- Any new spots, freckles or moles changing in colour, thickness or shape over a period of weeks to months (especially those dark brown to black, red or blue-black in colour).

If you notice any changes, consult your doctor, who may then perform a biopsy or refer you to a specialist if skin cancer is suspected.

Prevention

Protect your skin through a combination of sun protection measures:

- Slip on some sun-protective clothing to cover as much skin as possible
- Slop on broad spectrum, water resistant SPF30+ sunscreen. Put it on 20 minutes before you go outdoors and every two hours afterwards. Sunscreen should never be used to extend the time you spend in the sun.
- Slap on a hat which protects your face, head, neck and ears
- Seek shade
- Slide on some sunglasses (make sure they meet Australian Standards).

Extra caution is required in the middle of the day when ultraviolet levels are at their most intense.

Information sourced from: Cancer Council Australia (2016), Skin cancer.

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Myth: Skin cancer only happens to older people  
Fact: Skin cancer can affect you at any age. Anyone can get skin cancer. High sun exposure in the first 10 years of life more than doubles your risk of developing melanoma. The good news is that in recent years melanoma incidence rates have been decreasing among young people aged 15 to 29 years due to increased awareness and improved childhood sun protection practices.

Myth: Skin cancer is caused by sunburn  
Fact: You don’t need to get sunburnt to develop skin cancer. Skin cancer occurs when skin cells are damaged, from over exposure to UVR from the sun. We’re exposed to UVR every time we go outdoors, and even short sun exposure adds up over time to skin damage. Sunburn increases your risk even more because the damage to the skin cells can be more severe.

Myth: You only need sun protection on hot, sunny days  
Fact: You need to use sun protection methods every day. It doesn’t matter if it’s sunny, cloudy, or raining – UVR is always there during daylight. So in Queensland you need to protect yourself in 5 ways every day.

Myth: You only need sun protection between 10am and 2pm  
Fact: In Queensland you need to use sun protection methods whenever you are outside, as the level of UVR can be high enough to damage your skin from as early as 8am. Protect yourself in 5 ways whenever the ultraviolet index is 3 or above.

Check the UV Index near you at www.bom.gov.au

Myth: Tanning lotions and spray tans protect your skin from UVR  
Fact: Fake tanning lotions and spray tans don’t protect your skin from UVR because they do not contain sun protection factor (SPF). If you have a fake tan, you still need to protect yourself in 5 ways whenever you are outside.

Myth: You need sun exposure for vitamin D  
Fact: It’s unsafe to seek extra sun to top-up vitamin D levels. Most people get enough UV exposure to maintain vitamin D levels through their usual outdoor activities. Talk to your doctor if you’re concerned about your vitamin D level.


THE RATE OF AUSTRALIANS DYING FROM CANCER IS ON A STEADY, DOWNHILL TRAJECTORY, THANKS TO POWERFUL ADVANCES MADE IN PREVENTION, DIAGNOSIS AND TREATMENT OF THE DISEASE. NEW DATA FROM THE AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE SHOWS A PROMISING OUTLOOK FOR THOSE DIAGNOSED WITH CANCER.

Deaths from all cancers combined fell from 199 per 100,000 people in 1968, to 167 per 100,000 in 2012 – a decline of 2.6 deaths per 100,000 people per year.

“This confirms that we are steadily making improvements in most cancers, in terms of survival,” said Professor Timothy Hughes, Cancer Theme Leader at SAHMRI.

“And it’s coming from better prevention, better screening and better therapy.”

The downward cancer mortality rate was higher for males than females. Male deaths decreased by 4.1 per 100,000 per year, between 1995 and 2012, compared to 1.8 deaths per 100,000 females per year.

One reason is the base rate of cancer deaths in women was lower than that of men, as men are generally more likely to be diagnosed with cancer than women.

Education and Research Director at the Cancer Council WA, Terry Slevin, said the declining trend was “significant”. But he added projection estimates may in some cases

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**FIGURE 1: TREND IN NUMBER AND AGE-STANDARDISED RATE OF DEATHS DUE TO CANCER, TREND 1968-2012 AND PROJECTED 2013 TO 2025: MALES, ALL CANCERS COMBINED**

1. All cancers combined includes ICD-10 codes C00-C96, D45, D46, D47.1, D47.3.
2. Projected estimates are based on mortality data for all cancers combined from 1994, and ABS population projections.
3. Rates are age-standardised to the Australian population as at 30 June 2001, and are expressed per 100,000 males.

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be conservative, arguing successful efforts in prevention of certain cancers would see their mortality rates driven down even further than the report’s figures.

He said lung cancer – the most common cause of cancer death in Australia – was one example where anti-smoking campaigns would contribute to mortality rates declining from 42.4 male deaths per 100,000 in 2013 to 33 in 2015.

“Another example is colorectal (bowel) cancer. While they’ve projected a substantial reduction in regards to mortality in men, their projection of the reduction in women is far more modest. If we can boost their participation rate in the National Bowel Screening Program, which is currently lower than it should be, I think we can see those figures driven down,” he said.

While the rate has dropped, a rise in population levels and ageing has caused, and will cause, the total number of cancer deaths to rise.

In addition to this, Ian Olver, Chair of Translational Cancer Research at the University of South Australia said changing risk factors for cancer, such as obesity, could lead to even further increases in cancer numbers.

Between 2012 and 2025, the total number of deaths from cancer is predicted to increase from an estimated 25,580 to 32,010 among males, and from 19,450 to 24,250 among females. The numbers will undoubtedly put further strain on health services.

“We’re going to have more people living with the disease as a chronic illness as more people are diagnosed with cancer but fewer die from it. So it’s not only the acute cost of treating cancer, it’s the cost of maintaining services for an increasing number of people who will survive longer with consequences that could be both psychological and physical,” said Ian Olver.

And although overall death rates are falling, the prognosis for some cancers is not as positive. Mortality rates for liver and prostate cancer, for instance, are projected to rise.

Liver cancer deaths were at 8.5 per 100,000 males in 2013 and 3.5 per 100,000 females. The report projects this will increase to 11.3 males in 2015 and 4.7 females.

And the prognosis for ovarian cancer mortality will decline only marginally – from 6.9 per 100,000 women in 2013, to 6.5 in 2025.

“I think there’s been increasing resources put into those cancers but there are specific reasons why they are challenging. In the case of ovarian cancer, it’s proved very difficult to identify early disease because it tends to spread in the early stage when it’s not terribly symptomatic and symptoms are not specific,” said Professor Hughes.

“It’s cause for reassurance that the things we’re doing are giving us steady improvements but some cancers are being left behind and need to be focused on.”

Sasha Petrova is Editor at The Conversation.
WORKSHEETS AND ACTIVITIES

The Exploring Issues section comprises a range of ready-to-use worksheets featuring activities which relate to facts and views raised in this book.

The exercises presented in these worksheets are suitable for use by students at middle secondary school level and beyond. Some of the activities may be explored either individually or as a group.

As the information in this book is compiled from a number of different sources, readers are prompted to consider the origin of the text and to critically evaluate the questions presented.

Is the information cited from a primary or secondary source? Are you being presented with facts or opinions?

Is there any evidence of a particular bias or agenda? What are your own views after having explored the issues?

CONTENTS

BRAINSTORM  54
WRITTEN ACTIVITIES  55
MULTIPLE CHOICE  56
Brainstorm, individually or as a group, to find out what you know about cancer prevention.

1. According to the *World Cancer Report 2014*, cancer is now the world’s biggest killer. Why are the number of deaths for cancer going up?

2. What is cancer?

3. What causes cancer?

4. What lifestyle choices can you make to reduce your cancer risk?
Complete the following activity on a separate sheet of paper if more space is required.

A risk factor is any factor associated with an increased likelihood of a person developing a health disorder or health condition, such as cancer. Understanding what causes cancer is essential in setting processes and policies designed to successfully prevent, detect and treat the disease. It should be noted that exposure to a risk factor does not mean that a person will develop cancer. Many people are exposed to at least one cancer risk factor but will never get cancer.

AIHW, Cancer in Australia: an overview 2014.

Research and identify which cancers may be caused by exposure to the following risk factors:

**Tobacco smoking/exposure:**

**Alcohol consumption:**

**Diet:**

**Obesity and physical inactivity:**

**Chronic infections:**

**Family history and genetic susceptibility:**

**Occupational exposures:**

**Sunlight:**

**Environmental pollution:**
Complete the following multiple choice questionnaire by circling or matching your preferred responses. The answers are at the end of this page.

1. Which of the following are known risk factors for cancer? (circle all that apply)
   a. Smoking/exposure to tobacco smoke
   b. Alcohol consumption
   c. Dieting
   d. Obesity
   e. Physical activity
   f. Chronic infections
   g. Family history
   h. Occupational exposures
   i. Sunlight
   j. Environmental pollution

2. Match the following terms to their correct definition:
   a. Absolute risk
   b. Cancer
   c. Cancer control
   d. Cancer prevention
   e. Lifestyle factors
   f. Relative risk
   g. Screening
   h. Therapy
   i. Tumour

   1. Uncontrolled growth of cells that may result in abnormal blood cells or grow into a lump called a tumour.
   2. Risk of developing a cancer over a certain period of time.
   3. All actions that reduce the burden of cancer in the community.
   4. Risk one group of people has of developing a cancer compared to another group.
   5. Factors that help give a holistic picture of your health and wellbeing: what you eat and drink, how much you exercise, your occupation and its risks, relationships, stress and pressures in your life, and whether you smoke.
   6. Organised program to identify disease in people before any symptoms appear.
   7. Action taken to lower the risk of getting cancer. This can include maintaining a healthy lifestyle, avoiding exposure to known cancer-causing substances, and taking medicines or vaccines that can prevent cancer from developing.
   8. Abnormal growth of tissue, which may be localised (benign) or invade adjacent tissues (malignant) or distant tissues (metastatic).
   9. Another word for treatment; in relation to cancer this includes chemotherapy, radiotherapy, hormone therapy and surgery.

3. Circle true or false for the following:
   a. Over 8 million people died from cancer globally in 2012. True False
   b. Lung, liver, stomach, colorectal and breast cancers cause the most cancer deaths globally. True False
   c. Tobacco use is the biggest cancer risk factor globally, accounting for 70% of lung cancer deaths. True False
   d. Skin cancer is the most commonly reported type of cancer in Australia. True False
   e. Of people with cancer in Australia, nearly two-thirds had skin cancer. True False
   f. The mortality rate due to cancer has increased in Australia by 20% between 1982 to 2014. True False
   g. Although diet can influence your cancer risk, there is little evidence that special foods can cure existing cancers. True False

MULTIPLE CHOICE ANSWERS

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Cancer occurs when mutations in a cell’s DNA cause it to replicate without control, invading other tissues. Some cancer-causing mutations can be inherited; others induced, by infection with bacteria or viruses; or by environmental factors such as smoking, sun exposure and eating red meat (Jeyaratnam, E and Petrova, S, Interactive body map: what really gives you cancer?). (p.14)

It should be noted that exposure to a risk factor does not mean that a person will develop cancer. Many people are exposed to at least one cancer risk factor but will never get cancer (Australian Institute of Health and Welfare, Cancer in Australia: an overview 2014). (pp. 21-22)

High-fat, low-fibre diets may increase the risk of many cancers including bowel, lung, prostate and uterine cancers. You can reduce your risk of developing cancer by eating a wide variety of nutritious foods as described in the Australian Guide to Healthy Eating (Better Health Channel, Cancer and food). (p.23)

There is now convincing scientific evidence that eating processed meat increases bowel cancer risk. Processed meats include any meat that has been preserved by curing, salting or smoking, or by adding chemical preservatives. These include hot dogs, ham, bacon, and some sausages and burgers (ibid). (p.23)

Claims that particular foods, vitamins or micronutrients can kill cancer cells should be viewed with scepticism. To date, there is little scientific proof that a particular food or supplement can cure cancer or destroy cancer cells (ibid). (p.25)

The number of cancer deaths could be reduced significantly by choosing a healthy lifestyle. Whether you have been diagnosed with cancer or you have never had cancer, there are a number of things you can do to decrease your cancer risk (Cancer Council South Australia, Cut your cancer risk). (p.31)

Almost 40,000 Australian cancer cases could be prevented each year through changes in lifestyle, according to a ground-breaking study of cancer incidence and preventable causes in Australia conducted by QIMR Berghofer Medical Research Institute and funded by Cancer Council Australia (Cancer Council, Numbers are in: 37,000 Australians can avoid a cancer diagnosis each year). (p.35)

Cancer is a big killer of Australians, and is responsible for 30% of all deaths each year. The ‘big five’ in order of incidence are prostate, bowel, breast, melanoma and lung cancer. Our love of the sun and smoking mostly explain the last two, but it is food, exercise and other lifestyle choices that explain much of a person’s risk of cancer (Crowe, T, Six foods that increase or decrease your risk of cancer). (p.36)

Population-based cancer screening is an organised, systematic and integrated process of testing for signs of cancer or pre-cancerous conditions in asymptomatic populations. In Australia, there are three national population-based screening programs: for breast, cervical and bowel cancers (Australian Institute of Health and Welfare, Cancer in Australia: an overview 2014). (p.38)

In Australia breast cancer is the most commonly diagnosed cancer in Australian women, comprising 27% of all female cancers (Australian Institute of Health and Welfare, Breast cancer screening). (p.41)

The rate of Australians dying from cancer is on a steady, downhill trajectory, thanks to powerful advances made in prevention, diagnosis and treatment of the disease (Petrova, S, Promising prognosis as cancer deaths continue to fall). (p.51)
Advanced cancer
Cancer that is unlikely to be cured, which has spread past the site of origin to other organs.

Anti-cancer treatments
Medicines or procedures used to reduce or destroy cancer and cancer cells. Treatments include surgery, chemotherapy and radiotherapy.

Cancer
Uncontrolled growth of cells that may result in abnormal blood cells or grow into a lump called a tumour. These cells may spread throughout the lymphatic system or bloodstream to form secondary or metastatic tumours.

Cancer control
All actions that reduce the burden of cancer in the community. It includes every aspect of care, from prevention and early detection to curative treatment and palliative care, all underpinned by the best scientific evidence available.

Cancer prevention
Action taken to lower the risk of getting cancer. This can include maintaining a healthy lifestyle, avoiding exposure to known cancer-causing substances, and taking medicines or vaccines that can prevent cancer from developing. At least 1 in 3 cancer cases are preventable – more than 13,000 cancer deaths each year are due to smoking, sun exposure, poor diet, alcohol, inadequate exercise or being overweight.

Cancer survivor
A person who has finished their active cancer treatment, and is free from any signs of cancer.

Carcinogens
A substance known to cause and/or promote cancer.

Carcinoma
A cancer that starts in the tissue lining of the skin and internal organs of the body.

Causes of cancer
A number of chemical, physical and biological agents can trigger the mistakes in the cell blueprint that cause cancer. Known as carcinogens, they include tobacco, ultraviolet radiation and asbestos. A number of cancers share risk factors: 1 in 9 cancers, and 1 in 5 cancer deaths, are due to smoking; about 3% of cancers are related to alcohol consumption; many cancers occur as a direct result of diet, from infectious agents or exposure to radiation (e.g. ultraviolet causing skin cancers); and some cancers result from inherited ‘faulty’ genes. Not all cancers are associated to the risk factors mentioned above; cancer can also develop without any specific causes.

Cells
The basic building blocks of the body. A human is made of billions of cells that are adapted for different functions.

Chemotherapy
The use of cytotoxic drugs to treat cancer by killing cancer cells or slowing their growth. May be given in combination or with other treatments.

Genes
The microscopic units that determine how the body's cells grow and behave. Genes are found in every cell of the body and are inherited from both parents.

Invasive cancer
Cancer that has spread deep into tissues at the primary site, and/or to other parts of the body.

Lifestyle factors
Factors that help give a holistic (well-rounded) picture of your health and wellbeing. Include what you eat and drink, how much you exercise, your occupation and its risks, relationships, stress and pressures in your life, and whether you smoke.

Malignant cancer
Malignant cells can spread (metastasise) and eventually cause death if they cannot be treated.

Metastasis
A cancer that has spread from a primary cancer in another part of the body. Also known as secondary cancer.

Oncology
The study, diagnosis and treatment of cancer.

Primary cancer
The original cancer. Cells from the primary cancer may break away and be carried to other parts of the body, where secondary cancers may form.

Radiotherapy
The use of radiation, usually x-rays or gamma rays, to kill cancer cells or injure them so they cannot grow and multiply. Also called radiation therapy.

Recurrence
Return of disease after a period of improvement (remission).

Risk factor
A substance or condition that increases an individual’s chances of developing a particular type of cancer.

Screening
An organised program to identify disease in people before any symptoms appear.

Survival rate
Proportion of patients diagnosed with the same disease who are still alive after a particular period of time.

Symptoms
Changes in the body that a patient feels or sees, which are caused by an illness or treatment, e.g. pain, tiredness, rash or a stomach ache.

Therapy
Another word for treatment, and includes chemotherapy, radiotherapy, hormone therapy and surgery.

Tumour
An abnormal growth of tissue. It may be localised (benign) or invade adjacent tissues (malignant) or distant tissues (metastatic).
WEB LINKS

Websites with further information on the topic

Australian Institute of Health and Welfare  www.aihw.gov.au
Better Health Channel  www.betterhealth.vic.gov.au
Cancer Australia  https://canceraustralia.gov.au
Cancer Council ACT  www.actcancer.org
Cancer Council Australia  www.cancer.org.au
Cancer Council Northern Territory  http://nt.cancer.org.au
Cancer Council NSW  www.cancer council.com.au
Cancer Council QLD  www.cancerqld.org.au
Cancer Council South Australia  www.cancersa.org.au
Cancer Council Tasmania  www.cancertas.org.au
Cancer Council Victoria  www.cancervic.org.au
Cancer Council Western Australia  www.cancerwa.asn.au
Cancer Institute NSW  www.cancerinstitute.org.au
Cancer Prevention and Support Association  www.cancerprevention.org.au
Cancer Screening (Department of Health)  www.cancerscreening.gov.au
Department of Health (Australian Government)  www.health.gov.au
World Health Organization (Cancer page)  www.who.int/cancer/

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- The Conversation
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- Australian Institute of Health and Welfare.

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INDEX

A
alcohol 3, 4, 7, 14, 21, 25, 34, 35, 36
Australian Guide to Healthy Eating 23, 24

B
beverages see food
bladder 8, 9, 11, 12, 13, 16, 17, 21, 22
blood 21, 22
Body Mass Index (BMI) 33
body weight
healthy 4, 33
obesity 2, 5, 21, 33, 35
overweight 18, 33, 35
bone marrow 21, 22
bowel 6, 12, 13, 14, 16, 17, 18, 19, 20, 23-
24, 25, 27-28, 34-35, 39-40, 45, 46, 52
screening 35, 39-40, 45
brain 8, 9
breast 6, 8, 9, 10, 11, 12, 13, 15, 18, 19,
20, 21, 22, 24, 34, 35, 39-40, 45-46
overdiagnosis 42
screening 35, 38-40, 41-42

C
cancer
avoidance 6, 35
causes 2, 3, 14-20, 21-22, 23-26,
27-28, 29-30
cost, economic 1, 5, 6
deaths 1, 4-5, 6, 7, 8-9, 51-52
definition 3
detection, early 7, 34, 38-40
diagnoses 1, 5, 6, 7, 8, 10, 12, 13
health promotion 6-7
prevalence 1-2, 4-5, 6-7, 8-9, 10-11
age groups 5, 10, 11
female 5, 8, 9, 10, 11, 13, 14, 15,
16, 17, 18, 19, 20, 37, 51, 52
global increase 4, 6-7
male 5, 8, 9, 10, 11, 12, 15, 16,
17, 18, 19, 20, 37, 51
prevention 1-2, 4-5, 6-7, 31-52
risk 2, 12-13, 14-20
absolute 12-13, 14-20, 27-28
behaviours 7
factors 3, 5, 14-20, 21-22, 35
reduction 30, 31, 35, 36-37
relative 12-13, 14-20, 27
screening 1, 34-35, 38-40, 41-42,
43-44, 45, 46
sites 10-11
survivors 9, 10
treatment 1, 7
cardiovascular disease 1, 4-5
cervical 6, 7, 8, 9, 13, 19, 21, 22, 34, 35, 39
screening 35, 39, 40, 43, 44
vaccines 43-44
colorectal (colon and rectum) 8, 9, 10, 11,
21, 22, 24
contraceptive pill, combined oral 20
diagnostic tests 35
family history 22
family history
alcohol
nutrition 23
health promotion 30
healthy
heart disease
primary prevention 32
risk 2, 12-13, 14-20
plausible mechanisms 4
screening 35, 38-40, 41-42
survivors 9, 10

D
developmental disorders 6-7
diabetes 1, 4-5
dietary fibre 16
fat intake 24
fats, intake 24
fibre 16
fruits and vegetables 15, 16, 24, 25,
33, 36
garlic 32
genetics 3, 22, 29-30
health benefits 3
human papillomavirus (HPV) 7, 19, 20
infections 3, 6, 22, 35
leukaemia 8, 9, 17, 21
lymphoma 8, 9, 22
mainstream media 23

E
early detection 7, 34, 38-40
early detection
infection
reduction 30,
26
screening 35, 38-40, 41-42
endometrium 13, 18, 20, 21, 24
environmental pollutants 7, 22
epidemiology 1
etiology 1
family history 22
family history
alcohol
nutrition 23
health promotion 30
healthy
heart disease
primary prevention 32
risk 2, 12-13, 14-20
plausible mechanisms 4
screening 35, 38-40, 41-42
survivors 9, 10

F
family history 22
foods 14-16, 23-26, 27-28, 36-37
dairy products 37
fats, intake 24
fibre 16
fruits and vegetables 15, 16, 24, 25,
33, 36
garlic 32
health benefits 3
human papillomavirus (HPV) 7, 19, 20
infections 3, 6, 22, 35
leukaemia 8, 9, 17, 21
lymphoma 8, 9, 22
mainstream media 23

G
gallbladder 21, 22, 24
genome 3, 22, 29-30
H
helicobacter pylori 19
hepatitis 7, 19, 20
HIV 20
hormone replacement therapy (HRT) 20
human papillomavirus (HPV) 7, 19, 44
test 43
vaccine 35, 43-44

I
indigenous Australians 9
infections 3, 6, 22, 35

K
kidney 8, 9, 11, 12, 13, 16, 17, 18, 19,
21, 22, 24

L
larynx 15, 17, 21
leukaemia 8, 9, 17, 21, 22
life expectancy 1
lifestyle 4, 5, 16-18, 30, 31, 35
liver 6, 7, 8, 9, 11, 12, 13, 15, 19, 20, 21,
22, 52
lung 1, 4, 6, 8, 9, 11, 12, 13, 15, 16, 17,
21, 22, 24, 52

M
medication and treatment, risks 20, 22
mesothelioma 8, 9, 11, 22
myelodysplastic syndromes 8, 9
myeloma 8, 9

N
nasal cavity/sinuses 21, 22
non-Hodgkin’s lymphoma 9, 11, 20

O
occupational exposures 7, 22
oesophagus 8, 9, 15, 16, 17, 18, 19, 21,
22, 24
oral cavity 15, 16, 17, 19, 21, 22
ovary 8, 9, 13, 16, 18, 20, 21, 22, 52

P
pancreas 8, 9, 12, 13, 16, 17, 18, 19,
21, 22
Pap test 43, 44
pharynx 15, 16, 17, 19, 21, 22
physical activity 5, 17, 21, 32, 35
prostate 5, 8, 9, 10, 11, 12, 21, 22, 24,
35, 37, 47-48
Digital Rectal Examination (DRE) 48
overdiagnosis 48
Prostate Specific Antigen (PSA) test 48

R
radiation 3, 22
reproductive and hormonal factors 22

S
skin cancer 32, 49-50
basal cell carcinoma 49
melanoma 5, 8, 9, 10, 11, 12, 13, 17,
22, 49
non-melanoma 9, 22, 49
squamous cell carcinoma 49
stomach 6, 8, 9, 12, 13, 15, 16, 17, 19,
21, 22
sun see also ultraviolet radiation
exposure 17, 22, 32, 50
safety 2, 32, 49-50

T
thyroid 8, 11, 22
tobacco smoking 2, 3, 4, 5, 7, 16, 21,
31-32, 35, 52

U
ultraviolet radiation (UVR) 3, 17, 22, 32,
35, 49 see also sun
uterus 8, 9, 11, 21

V
vaccination campaigns 6-7

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