Cancer Control in 2020
Challenges NOW for Behavioural Research

Bruce Armstrong
Professor of Public Health
The University of Sydney
Primary Prevention: Unfinished business

Global Burden of Disease and Risk Factors

Editors
Alan D. Lopez, Collin D. Mathers, Majid Ezzati, Dean T. Jamison, and Christopher J. L. Murray

A co-publication of The World Bank and Oxford University Press 2006
Cancer risk factors were identified that were:

• Likely to be among the leading causes of the disease burden globally
• Not too specific (eg, broccoli) or too broad (eg, diet)
• High likelihood of causality
• Reasonably complete data available on exposure and level of associated risk
• Potentially modifiable
## Attributable cancer burden in high income countries

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>% of cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>29%</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>5%</td>
</tr>
<tr>
<td>Overweight and obesity</td>
<td>4%</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>3%</td>
</tr>
<tr>
<td>Low fruit and vegetable intake</td>
<td>3%</td>
</tr>
<tr>
<td>Unsafe sex</td>
<td>1%</td>
</tr>
<tr>
<td>Urban air pollution</td>
<td>1%</td>
</tr>
<tr>
<td>Contaminated injections in health care</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>All the above</td>
<td>37%</td>
</tr>
</tbody>
</table>
What about sun exposure?

≈1.3%* of the total burden of cancer in high income countries

*Underestimated a little due to mismatch between numerator and denominator

## Dominant risk factors for whole disease burden

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>% of total disease burden (DALYS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>7.8</td>
</tr>
<tr>
<td>High body weight</td>
<td>7.5</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>6.6</td>
</tr>
<tr>
<td>Alcohol drinking</td>
<td>2.3</td>
</tr>
<tr>
<td>Low fruit and vegetable intake</td>
<td>2.1</td>
</tr>
</tbody>
</table>

### Our present performance

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Performance</th>
</tr>
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<tbody>
<tr>
<td>Smoking</td>
<td>![Green]</td>
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<tr>
<td>Alcohol use</td>
<td>![Orange]</td>
</tr>
<tr>
<td>Overweight and obesity</td>
<td>![Red]</td>
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<td>![Green]</td>
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<td>![Red]</td>
</tr>
</tbody>
</table>
Prevalence of daily alcohol drinking
Australians 14+ years of age

Apparent consumption of alcohol in Australia

% 16-24 years indulging in “risk drinking” – NSW 2002-2007

Males

Per cent

Females

Per cent

New South Wales Population Health Survey 2007 (HOIST). Centre for Epidemiology and Research, NSW Department of Health.
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</table>
Trends in adult overweight and obesity

Article: Overweight and obesity. Australian Social Trends 2007. ABC Cat # 4012.0 Canberra 2007
Trends in overweight and obesity in NSW school children K-10

Trends in overweight and obesity in Australian children 2-17

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</table>
Apparent consumption of fruit and vegetables in Australia

ABS. Apparent consumption of foodstuffs and nutrients, Australia. ABS Cat. No. 4306.0. Canberra: ABS.
% 16-24 years with recommended vegetable intake—NSW 2002-2007

New South Wales Population Health Survey 2007 (HOIST). Centre for Epidemiology and Research, NSW Department of Health.
% 16-24 years with recommended fruit intake—NSW 2002-2007

New South Wales Population Health Survey 2007 (HOIST). Centre for Epidemiology and Research, NSW Department of Health.
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</table>
Trends in new HIV infections

Number of new infections

Total
Males
Females


National Centre in HIV Epidemiology and Clinical Research, Australian HIV Surveillance Report 2008

School of Public Health
The University of Sydney
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Sun protection behaviour in NSW secondary school students


Males
- Wear a hat
  - 1993: 62.9
  - 1996: 63.8
  - 1999: 58.4
  - 2002: 51.8
  - 2005: 46.8
- Wear maximum protection sunscreen
  - 1993: 53.6
  - 1996: 48.4
  - 1999: 46.1
  - 2002: 35.0
  - 2005: 36.4
- Stay mainly in shade
  - 1993: 20.3
  - 1996: 27.5
  - 1999: 33.1
  - 2002: 26.8
  - 2005: 24.1

Females
- Wear a hat
  - 1993: 34.8
  - 1996: 37.1
  - 1999: 32.0
  - 2002: 29.5
  - 2005: 24.0
- Wear maximum protection sunscreen
  - 1993: 71.5
  - 1996: 69.8
  - 1999: 59.3
  - 2002: 46.3
  - 2005: 48.7
- Stay mainly in shade
  - 1993: 23.9
  - 1996: 33.2
  - 1999: 33.1
  - 2002: 29.4
  - 2005: 26.1

From “The NSW School Students’ Health Behaviours Survey 2005” and “The Health of the People of NSW: Report of the Chief Health Officer 2006”
Trends in SunSmart behaviour and sunburn

Challenging questions for primary prevention
What hope is there for reduced alcohol consumption?

- Might increased social marketing have paradoxical effects?
- Will it be heard through the volume of alcohol advertising?
- Present trends favour increased alcohol availability, can we reverse the trend?
- How can we use the new NHMRC guidelines?
Does this scare you?

Rudd's plan to show young binge drinkers the dangers

Mark Davis Political Correspondent
March 11, 2008

KEVIN Rudd wants to "scare the living daylights" out of binge-drinking teenagers with a graphic Grim Reaper-style advertising campaign warning of the health risks of excessive alcohol consumption.
What hope is there for reduced alcohol consumption?

- Might increased social marketing have paradoxical effects?
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- Present trends favour increased alcohol availability, can we reverse the trend?
Anti-boozing ads aimed at parents

Parents will be the target of a TV ad campaign that highlights how hard drinking in the home could cause teenagers to become alcohol abusers. The $3.5 million campaign, paid for by the alcohol industry and the Federal Government, avoids the finger-wagging attitude of many social marketing campaigns and for the first time aims the message at parents.

The Health Minister, Nicola Roxon, has denied her own Grim Reaper-style ad campaign - which the Prime Minister said would "scare the living daylights" out of binge-drinking teenagers - had fallen behind schedule...

DrinkWise's chief executive, Mike McAvoy, denied his message would be drowned out by the volume of alcohol advertising.
Environment change or behaviour change and body mass?

• Can we make an impact on body mass trends through traditional health education and social marketing?

• What environmental changes might be needed and how do we make them?
  – Availability and prominence of healthy food choices
  – Food advertising and promotion
  – Options for active living – urban environment and transport

• How do we avoid victimising the overweight and obese?
How do we address socioeconomic inequality?
What prospects for increasing food and vegetable intake?

• Social marketing effective but, perhaps, struggling
• Industry has responded – can it do more?
• What will climate change’s impact be?
  – Increased demand for biofuels
  – Land-use competition
  – Increased food prices
  – Reduced meat production – maybe
• How can we respond to these impacts?
Can we expect safer sex?

• The present trend is not confined to homosexual men. Why is it happening?
• What impact might HPV vaccination have?
  – Could it lead to less safe sex?
  – What impact will it have on cervical screening in vaccinated women?
Why are we losing the battle on sun exposure?

• Is there a limit to the acceptability of the message?

• Have contradictory messages about vitamin D had an impact? If so, what do we do about this contradiction?

• Have we failed to help people to understand the daily and seasonal patterns of ambient UV irradiance sufficiently to manage their exposure?
The challenge response tool kit

- Measure, monitor and report on behaviour
- Acquire evidence supporting behavioural intervention
- Design, test and evaluate behavioural interventions
- Advocate for changes to “environmental” factors influencing behaviour
- Advocate for an evidence-based approach to intervention
- Work with policy makers and practitioners in putting evidence into action
The End
Genetic susceptibility
Genetic variation and cancer risk

• High risk genetic variants (eg BRCA1 & 2)
  – Comparatively rare
  – Substantial increase in risk in variant carriers
  – Underlie multiple case families
  – Cases often younger than “average” and may experience multiple cancers

• Low risk genetic variants (eg MTHFR C677T)
  – Comparatively common
  – Small increases in risk
  – Rarely underlie increased familial risk
  – Early age at onset and cancer multiplicity not visibly evident
The pace of discovery

• High risk genetic variants
  – Still being discovered but the pace has slowed

• Low risk variants
  – Discovery almost a daily occurrence and the pace is increasing
Does identification of carriers of *high risk variants* contribute to cancer control?

• Yes, if there is an intervention that can prevent cancer or improve cancer outcome AND there is evidence to support its efficacy and net benefit

• If there isn’t, it is still necessary to manage
  – Potential carrier concerns
  – Wider family concerns
Every variant isn’t the same variant!

- Identification of variants outside the multiple-case family context can produce great uncertainty about their significance.
The tests are here

Welcome to MyriadTests

Myriadtests.com is designed to help patients and healthcare professionals understand how genetic testing helps reduce the risk of cancer and improve overall cancer care. There are ways to reduce your risk or overcome cancer in your lifetime. If a risk of cancer runs in your family, hereditary cancer testing may be an important step for you. Likewise, pharmacogenetic testing may also help reduce the risk of a severe side effect to the chemotherapy being used to treat your cancer. We encourage you to explore our Web site to learn more about our products.

For more information about our predictive tests for cancer risk, please click on the Hereditary Cancer Testing link.

For more information about our predictive tests for toxicity to 5-FU—based chemotherapeutics, please click on the Pharmacogenetic Testing link.
It’s easy

The best time to beat cancer is before you ever get it.
When it comes to breaking the cycle of inherited cancer, knowledge is power and hope.

Could you have inherited a risk for cancer?

Could you pass a risk for cancer on to your children?

Are you at risk?
Take a quick quiz.

Should you be tested if you’ve already had cancer?

Inherited Cancers | Genetic Testing | Payment/Privacy | Resources | About Myriad

Information for Healthcare Professionals

Hereditary Cancer Quiz
Find a Doctor.
Cancer History Guide
What about low risk variants?
'Smoking gene' boosts addiction, cancer risk

Anyone who smokes knows how hard it is to quit. Now researchers think they know why.

Scientists working in Iceland, France and America have found a single gene that makes you more likely to smoke more cigarettes a day, and more prone to developing cancer.

Researcher Dr Christopher Amos, a Professor of Epidemiology at the MD Anderson Cancer Centre in Houston, says the gene has an unfortunate double effect.

"The consensus among the three groups is very strong that this is a definite effect, and that it clearly identifies a common variant that is associated with lung cancer risk," he said.

"So it's really the first time that we've been able to identify a specific part of the genome that relates to lung cancer.

"Specifically we found that people that have one variant in this region have about a 30 per cent increased risk in lung cancer, and if they have two variants their risk increases by about 80 per cent."
The data

- Three papers published on 2\textsuperscript{nd} and 3\textsuperscript{rd} April
- All reported associations of smoking or lung cancer with common genetic variants at chromosome 15q25
- This region codes for the nicotinic acetylcholine receptor
- This receptor binds to nicotine and some nicotine metabolites.
<table>
<thead>
<tr>
<th>Study and genotype</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hung et al 2008</strong></td>
<td></td>
</tr>
<tr>
<td>One variant allele</td>
<td>1.21 (1.11-1.31)</td>
</tr>
<tr>
<td>Two variant alleles</td>
<td>1.77 (1.58-2.00)</td>
</tr>
<tr>
<td><strong>Amos et al 2008</strong></td>
<td></td>
</tr>
<tr>
<td>One variant allele</td>
<td>1.29 (1.16-1.44)</td>
</tr>
<tr>
<td>Two variant alleles</td>
<td>1.88 (1.57-2.17)</td>
</tr>
</tbody>
</table>
What might this mean?

• Association with smoking
  – Predict ease of smoking cessation and, perhaps, which cessation methods might work
  – Lead to a pharmaceutical that modifies nicotinic acetylcholine receptor function and increases ease of smoking cessation
  – Predict people who would find it hard to give up smoking if they start and use it to warn them off (and vice versa)
Is it already here?

How can we help you?

> Smokers who want to quit, click here.
> Organisations who want to offer the NicoTest™ to their employees, click here.
> To find a pharmacy in your area that offers the NicoTest™, click here.

Smokers Cost More

Smokers cost their employers 28 lost productive days each year. Click here to calculate how much smokers cost your organisation.

Success with the NicoTest

Double your probability of successfully quitting (when compared to the NHS stop smoking service).

Do you want to give up smoking?

Quit now with the NicoTest™!

Whilst most smokers know that smoking is not good for them, few recognise that it is:

- The world’s biggest killer
- The direct cause of 60 major illnesses
- The cause of psychological and emotional problems (including depression)

...and a significant ongoing expense for smokers.

NicoTest™ doubles quit rates

Independent results demonstrate that the NicoTest™ almost doubles success rates. The graph below shows that NicoTest™ has a validated quit rate of 65% versus 35% at the NHS stop smoking service.

[Graph showing comparative quit analysis: NicoTest vs NHS]
Association with lung cancer

- Little use in predicting risk on its own
- Might form one component of a risk prediction model
- Might be useful in predicting risk if there were a gene and environment interaction
- Prediction of high risk, particularly with smoking, might be used to motivate smoking cessation
- Mechanism of effect might be useful in identifying or designing a chemopreventive intervention
Challenges now

- Use the opportunity of high risk gene variants to understand and address the psychosocial issues in familial/genetic risk
- Be aware of the issues that are coming with low risk gene variants
- Be clear on the evidence that is or would be needed before genetic information is used as the basis for behavioural interventions
- Build an informed community
Researchers develop test for ovarian cancer

Posted Sun Mar 2, 2008 11:14am AEDT

Medical researchers say they have developed one of the first early detection tests for ovarian cancer.

Most women suffering from ovarian cancer only learn of their condition when the cancer is in its advanced stages.

Professor Greg Rice from the Women’s Cancer Foundation says the test has about a 94 per cent accuracy rate.

However he says it must be at least 99 per cent accurate to attract government subsidies.

Professor Rice says the test measures five blood components.

“It’s a different type of blood test - it measures five substances in blood, and has a better diagnostic accuracy, particularly for early stage ovarian cancer,” he said.

“It will probably be in the range of $100 to $200, so yes that's pricey, in one sense.

“If it identifies that you are at risk of ovarian cancer, is it costly? No.”

The test will be available within six months.
Effects

- Create expectations
- Often/usually not adequately evaluated before they are marketed
- Will probably lack specificity
- Overdiagnosis probably a problem
Challenges now

- Be clear about the evidence required for introduction into use
- Build an informed (and sceptical) community
- Facilitate and promote informed choice for anybody making a cancer screening choice
Cancer Survivorship

Reaching and maintaining optimum health after a diagnosis of cancer
2020 issues in cancer survivorship

- Longer survival
- Overdiagnosis
- Recurrence risk
  - Targetted therapies
- Reducing recurrence risk
  - Exercise, body weight management, diet
  - Other
- Subsequent primary cancers
- Use of complementary & alternative medicine
Use of any kind of CAM in South Australia

MacLennan AH et al. Medical Journal of Australia 2006; 184: 27-31
Challenges now

- Option to take leadership
- Move beyond prevention and control of psychological morbidity
- Shift thinking – cancer patient to cancer survivor
- Think in terms of survivorship planning
- Differentiate according to recurrence risk
- Trial methods of recurrence risk reduction
- Understand role and contribution of CAM