Estimating the Current and Future Burden of Cancer in Canada: Identifying Opportunities for Prevention

Darren R. Brenner
Assistant Professor
Departments of Oncology and Community Health Sciences
Cumming School of Medicine
University of Calgary
On Behalf of the ComPaRe Study Team
The Burden of Cancer in Canada
The Burden of Cancer in Canada

1 IN 2
Canadians will develop cancer in their lifetime

1 IN 4
Canadians will die from cancer

206,200 Canadians will be diagnosed with cancer in 2017
80,800 Canadians will die of cancer in 2017
30% of deaths in Canada in 2012 were due to cancer

Canadian Cancer Statistics, 2017
The Burden of Cancer in Canada – Scope of the ComPARe Project

- Past Burden
- Current Burden
- Future Burden

Cancer Incidence

Year

1969 2015 2045

Past Burden

Current Burden

Future Burden

Avoidable Burden

Prevention Strategies

Cancer Incidence:

- Past Burden: 1969
- Current Burden: 2015
- Future Burden: 2045

Avoidable Burden:

Prevention Strategies:

Past risk factors include cigarette smoking, unhealthy diet, obesity, and alcohol consumption.
The Burden of Cancer in Canada

Past Trends

Cancer Incidence

Year

1969

2015

2045
Looking Back - Success in Primary Prevention

UV Exposure and Melanoma

Data source: Canadian Cancer Registry, 1969-2012

Males

Females

20-29 years

30-39 years
Looking Back - Success in Primary Prevention

Smoking and Lung Cancer

Data source: Canadian Cancer Registry, 1969-2012
Looking Back - Success in Secondary Prevention

Cervical Cancer

<table>
<thead>
<tr>
<th>Year</th>
<th>Crude rate</th>
<th>Year</th>
<th>Crude rate</th>
<th>Year</th>
<th>Crude rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>8.4</td>
<td>1990</td>
<td>2.5</td>
<td>2000</td>
<td>1.2</td>
</tr>
<tr>
<td>1980</td>
<td>7.8</td>
<td>2000</td>
<td>2.0</td>
<td>2010</td>
<td>1.1</td>
</tr>
</tbody>
</table>

20-29 years

50-59 years

80-89 years
Looking Back - Success in Secondary Prevention

Colorectal Cancer

Males

Females

Crude rate

Year


55-59 years

65-69 years

75-79 years
Looking Back – Opportunities for Prevention

Kidney Cancer

Crude rate

Males

Females

Year


20-39 years  50-59 years  70-79 years

20-39 years  50-59 years  70-79 years
The Scope of the ComPARE Project

Past Trends

Current Burden

Prevention Targets

Cancer Incidence

Year

1969
2015
2045

The ComPARE Project aims to address the rising burden of cancer incidence over time, with a focus on past trends and future prevention targets.
Attributable Risk Framework

\[ PAR = \frac{P_e (RR - 1)}{P_e (RR - 1) + 1} \]

Excess Attributable Cases = \( PAR \times \) Incident Cancer Cases
Exposures of Interest

Tobacco

Dietary Intake

Energy Imbalance

Environment

Hormone Therapies

Infectious Agents

Active

Passive

Fruit/Red/Processed meat

Alcohol

Salt

Calcium/Vitamin D supplements

Overweight/Obesity

Physical inactivity

Abdominal adiposity

Sedentary behaviour

Air pollution

Water disinfection by-products

Ultraviolet radiation

Radon

Oral contraceptives

Hormone replacement therapy

Kaposi Sarcoma

Epstein Barr Virus

Human Papillomavirus

Hepatitis B/C Virus

Helicobacter Pylori

Human T-lymphotropic virus 1

Tobacco

Dietary Intake

Energy Imbalance

Environment

Hormone Therapies

Infectious Agents

Active

Passive

Fruit/Red/Processed meat

Alcohol

Salt

Calcium/Vitamin D supplements

Overweight/Obesity

Physical inactivity

Abdominal adiposity

Sedentary behaviour

Air pollution

Water disinfection by-products

Ultraviolet radiation

Radon

Oral contraceptives

Hormone replacement therapy

Kaposi Sarcoma

Epstein Barr Virus

Human Papillomavirus

Hepatitis B/C Virus

Helicobacter Pylori

Human T-lymphotropic virus 1
Prevention Targets

Based on National or International Guidelines*

- ≥ 150 mins/week
- < 25kg/m²
- No intake
- ≥ 4 servings/day
Current Attributable Burden
31,699 Cancer Cases

Lung Cancer: 18,034
- Male: 9,790
- Female: 8,244

Head and Neck Cancer: 2,484

Bladder Cancer: 2,985

Colorectal Cancer: 2,614

Kidney Cancer: 939

Pancreatic Cancer: 748

Breast Cancer: 1,375

Stomach Cancer: 624

Liver and gallbladder Cancer: 562

Esophageal Cancer: 816

Ovarian and cervical Cancer: 508

Current Attributable Burden: Active and Passive Smoking
Current Attributable Burden - Geographic Variation

Colorectal Cancer Attributable to Obesity  Lung Cancer Attributable to Active Smoking
The Scope of the ComPARE Project

Future Burden

Cancer Incidence

Year

1969  2015  2045
Melanoma

Number of Cases

Calendar Year

ASR per 100,000

*Negative-binomial based ADPC model

Abbey Poirier
Lung Cancer

Number of Cases

Calendar Year

ASR per 100,000

Poisson-based age-cohort model
Kidney

Number of Cases vs Calendar Year

*Negative-binomial based ADPC model

Calendar Year

ASR per 100,000

Number of Cases

ASR per 100,000
The Scope of the ComPARe Project

Cancer Incidence

1969 2015 2045

Year

The future burden of cancer can be minimized through prevention strategies. The ComPARe Project focuses on identifying and implementing effective prevention strategies to reduce the avoidable burden of cancer.
Impact Fraction Framework

- Risk Estimate
- Counterfactual Distribution of Exposure
- Projected Distribution of Exposure
- Projected Cancer Incidence
Preventable Cancers: Alcohol and all associated cancer sites
Preventable Cancers: Excess Body Weight and All Associated Cancer Sites
Preventable Cancers: Excess Body Weight and All Associated Cancer Sites

25% Reduction in Obesity
KT Advisory Committee – Turning Results to Action
Conclusions

• >40% of Cancers in Canada are attributable to “modifiable” factors

• Past prevention initiatives have made a difference

• Project facilitated by high-quality registry data

• Epidemiologic shifts in exposure call for increased efforts in prevention

• WE CAN BEND THE CURVE