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The Fraser Institute's Risk Controversy Series publishes a number of short books explaining the science behind today's most pressing public-policy issues, such as global warming, genetic engineering, use of chemicals, and drug approvals. These issues have two common characteristics: they involve complex science and they are controversial, attracting the attention of activists and media. Good policy is based on sound science and sound economics. The purpose of the Risk Controversy Series is to promote good policy by providing Canadians with information from scientists about the complex science involved in many of today's important policy debates. The books in the series are full of valuable information and will provide the interested citizen with a basic understanding of the state of the science, including the many questions that remain unanswered.

**Centre for Studies in Risk, Regulation,
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The Fraser Institute's Centre for Studies in Risk, Regulation, and Environment aims to educate Canadian citizens and policy-makers about the science and economics behind risk controversies. As incomes and living standards have increased, tolerance for the risks associated with everyday activities has decreased.

While this decreased tolerance for risk is not undesirable, it has made us susceptible to unsound science. Concern over smaller and smaller risks, both real and imagined, has led us to demand more regulation without taking account of the costs, including foregone opportunities to reduce more threatening risks. If the costs of policies intended to reduce risks are not accounted for, there is a danger that well-intentioned policies will actually reduce public well-being. To promote more rational decision-making, the Centre for Studies in Risk, Regulation, and Environment will focus on sound science and consider the costs as well as the benefits of policies intended to protect Canadians.

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Misconceptions about the Causes of Cancer

Risk Controversy Series 3

Misconceptions about the Causes of Cancer

Lois Swirsky Gold

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and Bruce N. Ames



The Fraser Institute

Centre for Studies in Risk, Regulation and Environment

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Foreword

Misconceptions about the Causes of Cancer is the third publication in The Centre for Studies in Risk and Regulation's Risk Controversy Series, which will explain the science behind many of today's most pressing public-policy issues. Many current public-policy issues such as global warming, genetic engineering, use of chemicals, and drug approvals have two common characteristics: they involve complex science and they are controversial, attracting the attention of environmental activists and media. The mix of complex science, alarmist hype, and short media clips can bewilder the concerned citizen.

The environmental alarmists

The development and use of new technology has long attracted an "anti" movement. Recent high-profile campaigns include those against globalization, genetic engineering, cell phones, breast implants, greenhouse gases, and plastic softeners used in children's toys. To convince people that the risks from these products or technologies warrant attention, alarmists rely on dramatic pictures, public protests, and slogans to attract media attention and capture the public's imagination. The goal of these campaigns is not to educate people so they can make informed choices for themselves—the goal is to regulate or, preferably, to

eliminate the offending product or technology. While the personal motivations of alarmists vary, their campaigns have three common characteristics. First, there is an underlying suspicion of economic development. Many prominent environmentalists, for example, say that economic growth is the enemy of the environment and among anti-globalization crusaders, “multinational corporation” is a dirty word. Second, the benefits of the products, technologies, or life-styles that are attacked are ignored while the risks are emphasized and often exaggerated. Some anti-technology groups will insist that a product or technology be proven to pose no risk at all before it is brought to market—this is sometimes called the precautionary principle. This may sound sensible but it is, in fact, an absurd demand: nothing, including many products that we use and activities we enjoy daily, is completely safe. Even the simple act of eating an apple poses some risk—one could choke on the apple or the apple might damage a tooth. Finally, environmental activist groups have a tendency to focus only on arguments that support their claims, while often dismissing legitimate scientific debates and ignoring uncertainty: they claim, for example, that there is a consensus among scientists that global warming is caused largely by human activity and that something must therefore be done to control greenhouse gas emissions. As the first publication in this series showed, no such consensus exists.

The media

Many of us rely exclusively on the media for information on topics of current interest as, understandably, we do not have time to conduct our own, more thorough literature reviews and investigations. For business and political news as well as for human-interest stories, newspaper, radio, and television media do a good job of keeping us informed. But, these topics are relatively straight-forward to cover as they involve familiar people, terms, and places. Stories involv-

ing complex science are harder to do. Journalists covering these stories often do not have a scientific background and, even with a scientific background, it is difficult to condense and simplify scientific issues for viewers or readers. Finally, journalists work on tight deadlines, often having less than a day to research and write a story. Tight deadlines also make it tempting to rely on activists who are eager to provide information and colorful quotations.

Relying on media for information about a complex scientific issue can also give one an unbalanced view of the question because bad news is a better story than good news. In his book, *A Moment on the Earth*, Gregg Easterbrook, a reporter who has covered environmental issues for *Newsweek*, *The New Republic*, and *The New York Times Magazine*, explains the asymmetry in the way the media cover environmental stories.

In the autumn of 1992, I was struck by this headline in the *New York Times*: “Air Found Cleaner in US Cities.” The accompanying story said that in the past five years air quality had improved sufficiently that nearly half the cities once violating federal smog standards no longer did so. I was also struck by how the *Times* treated the article—as a small box buried on page A24. I checked the nation’s other important news organizations and learned that none had given the finding prominence. Surely any news that air quality was in decline would have received front-page attention (p. xiii).

Despite dramatic overall improvements in air quality in Canada over the past 30 years, stories about air quality in Canada also focus on the bad news. Both the *Globe and Mail* and the *National Post* emphasized reports that air quality was deteriorating. Eighty-nine percent of the *Globe and Mail*’s coverage of air quality and 81 percent of the *National Post*’s stories in 2000 focused on poor air quality (Miljan,

Air Quality Improving—But You'd Never Know It from the *Globe & Post*, *Fraser Forum*, April 2001: 17–18).

That bad news makes a better story than good news is a more generally observable phenomenon. According to the Pew Research Center for the People and the Press, each of the top 10 stories of public interest in the United States during 1999 were about bad news. With the exception of the outcome of the American election, the birth of septuplets in Iowa, and the summer Olympics, the same is true for the top 10 stories in each year from 1996 through 1998 (Pew Research Center for the People and the Press 2000, digital document: www.people-press.org/yearendrpt.htm).

While it is tempting to blame the media for over-simplifying complicated scientific ideas and presenting only the bad news, we must remember that they are catering to the desires of their readers and viewers. Most of us rely on newspapers, radio, and television because we want simple, interesting stories. We also find bad news more interesting than good news. Who would buy a paper that had “Millions of Airplanes land safely in Canada each Year” as its headline? But, many of us are drawn to headlines that promise a story giving gory details of a plane crash.

The Risk Controversy Series

Good policy is based on sound science and sound economics. The purpose of the Risk Controversy Series is to promote good policy by providing Canadians with information from scientists about the complex science involved in many of today's important policy debates. While these reports are not as short or as easy to read as a news story, they are full of valuable information and will provide the interested citizen with a basic understanding of the state of the science, including the many questions that remain unanswered.

*Laura Jones, Adjunct Scholar
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Misconceptions about the causes of cancer

Summary

The major avoidable causes of cancer are: (1) smoking, which accounts for 27% of cancer deaths in Canada and 80% to 90% of deaths from lung cancer; (2) dietary imbalances (e.g., lack of sufficient amounts of dietary fruits and vegetables), which account for about another third; (3) chronic infections, mostly in developing countries; and (4) hormonal factors, which are influenced primarily by life-style.

There is no cancer epidemic except for lung cancer due to smoking. (Cancer is actually many diseases, and the causes differ for cancers at different target sites.) Since 1971, overall cancer mortality rates in Canada (excluding lung cancer) have declined 17% in women and 5% in men. Regulatory policy that focuses on traces of synthetic chemicals is based on misconceptions about animal cancer tests. Current research indicates that it is not rare for substances to cause cancer in laboratory rodents in the standard high-dose experiments. Half of all chemicals tested, whether occurring naturally or produced synthetically, are “carcinogens”; there are high-dose effects in rodent cancer tests that are not relevant to low-dose human exposures and which may contribute to the high proportion of chemicals that test positive.

The focus of regulatory policy is on synthetic chemicals, but 99.9% of the chemicals humans ingest are natural.

For example, more than 1000 naturally occurring chemicals have been described in coffee: 30 have been tested and 21 have been found to be carcinogenic in rodents in high-dose tests. Plants in the human diet contain thousands of natural “pesticides” produced by plants to protect themselves from insects and other predators: 72 have been tested and 38 have been found to give cancer to rodents. Thus, exposure to synthetic rodent carcinogens is small compared to the natural background of rodent carcinogens. High-dose rodent cancer tests need to be re-evaluated by viewing results from this perspective.

There is no convincing evidence that synthetic chemical pollutants are important as a cause of human cancer. Regulations targeted to eliminate low levels of synthetic chemicals are enormously expensive: the United States Environmental Protection Agency (EPA) has estimated that environmental regulations cost \$140 billion per year in the United States. Others have estimated that the median toxic control program costs 146 times more per hypothetical life-year saved than the median medical intervention. Attempting to reduce low hypothetical risks has other costs as well: if reducing synthetic pesticides makes fruits and vegetables more expensive, thereby decreasing consumption, then the cancer rate will likely increase. The prevention of cancer will come from knowledge obtained from biomedical research, education of the public, and life-style changes made by individuals. A re-examination of priorities in cancer prevention, both public and private, seems called for.

In this study, we highlight nine misconceptions about pollution, pesticides, and the causes of cancer. We briefly present the scientific evidence that undermines each misconception. The nine misconceptions are listed in **Contents** (p. v–vi) and an extensive bibliography is provided in **References and further reading** (p. 99). Phrases in the text typeset like this, *carcinogenic potency*, are defined in the **Glossary** (p. 91).