Breast cancer:

"We know how pesticides, industrial pollutants, radiation and other factors are linked – part of the social context of breast cancer. Yet, neither government agencies nor societies responsible for dealing with breast cancer acknowledge this context. WHY?"

Professor Ross Hume Hall 'Female Biology, Toxic Chemicals and Preventing Breast Cancer: A Path Not Taken'

an environmental disease

the case for primary prevention

It is our intention that 'Breast cancer: an environmental disease' will:

– challenge a number of prevailing views and attitudes about breast cancer
– establish a 'novel' view of breast cancer as a 'preventable' rather than 'inevitable' disease
– address the under-acknowledged and non-lifestyle factors associated with breast cancer
– provide a right-to-know document, presenting essential information to the general public
– challenge the government to prioritise the primary prevention of breast cancer.

'Breast cancer: an environmental disease' has been produced by the UK Working Group on the Primary Prevention of Breast Cancer as a:

- public interest document – focusing on risk factors for breast cancer which are yet to be acknowledged and made part of the UK's cancer prevention agenda
- UK-oriented document which can be readily adapted for use in other countries
- general resource document – for individuals and groups planning or developing primary prevention campaign work
- general reference document for anyone concerned about breast cancer prevention in particular, or disease prevention in general.

Contents

Some of the causes of breast cancer ... can only be controlled by political and social action aimed at reducing the production, use, transport and disposal of agents that directly or indirectly affect breast cancer risks.

D Davis D Axelrod L Bailey M Gaynor A Sasco 'Rethinking Breast Cancer Risk and the Environment: The Case for the Precautionary Principle' p528 Environmental Health Perspectives 106 (9) September 1998

Endorsements

Taking action to the European level

The European Public Health Alliance Environment Network (EEN) has welcomed the opportunity to support the campaign publication, 'Breast cancer: an environmental disease'. As a first step in putting the spotlight on what is known about the environmental causes of breast cancer, this publication will help women and other health advocates to build scientifically based arguments that they can present to citizens and to their governments.

To help achieve European policy change, EEN intends to work with Women's Environmental Network and Breast Cancer UK to inspire groups in different countries to undertake national campaign work. By sharing information on the links between cancer and environmental causes, EEN aims to bring the arguments for the primary prevention of breast cancer to the European political agenda.

Diana Smith and **Génon Jensen,**
European Public Health Alliance
Environment Network
www.env-health.org

UNISON is proud to be associated with 'Breast cancer: an environmental disease'. Its origins lie in the Ban Lindane Campaign, which started in the UNISON East Midlands Region in 1994 and resulted in the banning of the pesticide Lindane in the UK by 2000. This campaign brought UNISON together with organisations including Pesticide Action Network *(UK)*, Friends of the Earth, Women's Environmental Network, the Soil Association, Green Network and Breast UK.

The Case argued here is one of which we need to make politicians, media and the public in general much more aware. The increasing incidence of breast cancer is unacceptable and we need a deeper understanding of why this has happened. As human beings with finely balanced hormonal systems, we cannot be separated from the environment around us. If we know that environment to be contaminated, then surely we are right to assume that this has consequences for the human body itself.

More than one million UNISON's members are women. The rise in the rate of breast cancer is an important issue for them. We hope that this Case will stimulate debate and lead us towards effective prevention of this disease.

Financial support has been provided by the European Commission through EPHA Environment Network

Part-funded by UNISON's General Political Fund

The CO-OPERATIVE BANK
Customer led, ethically guided

The Co-operative Bank refuses "to invest in any business whose core activity contributes to the manufacture of chemicals which are persistent in the environment and linked to long-term health concerns". This investment decision is supported by 88% of customers, and so we are pleased to have been able to support 'Breast cancer: an environmental disease'.

Man-made chemical contamination of our bodies is a fact of modern life. Up to 300 man-made chemicals have been found in humans but no one knows the long-term impact of these and the risks they may pose.

As advocates of the 'precautionary principle', the Bank welcomes the Case presented here and the valuable contribution it will make to the debate. It is an important first step in developing a truly preventative approach to breast cancer – one that is less reliant on early detection and instead demands that stronger safeguards to human health are immediately put in place.

Kate Daley Campaigns Manager
The Co-operative Bank

Financially supported by The Co-operative Bank

The Scottish Breast Cancer Campaign welcomes this much-needed Case, which draws together the many studies linking environmental pollution with the incidence of breast cancer.

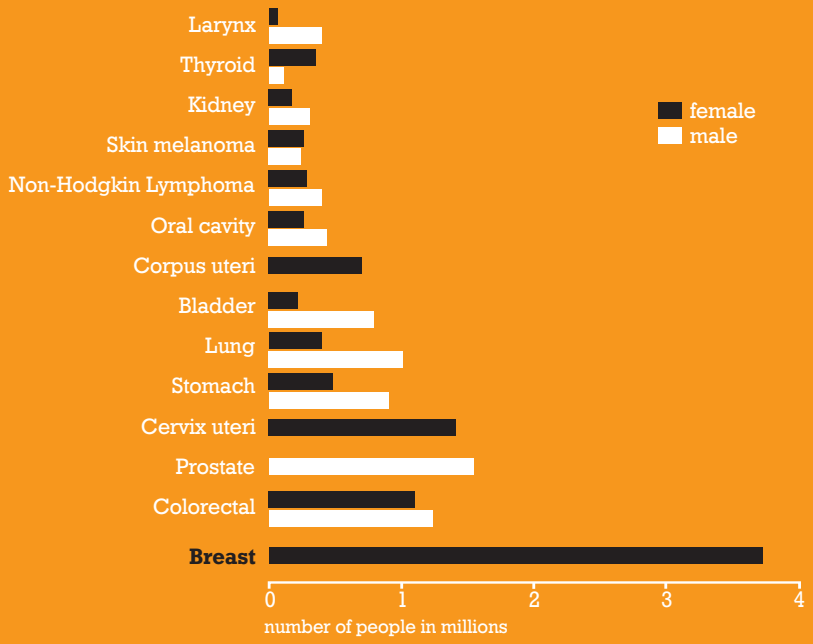
SBCC is confident that this publication will open up the debate on the primary prevention of breast cancer and will lobby government agencies to ensure that it is given the consideration it warrants.

Moira Adams Director
The Scottish Breast Cancer Campaign

Financially supported by Scottish Breast Cancer Campaign

Cancer worldwide 2000

This graph shows the total number of people worldwide who have been diagnosed with the 14 most common cancers during the previous five years, and still living with cancer in the year 2000. >

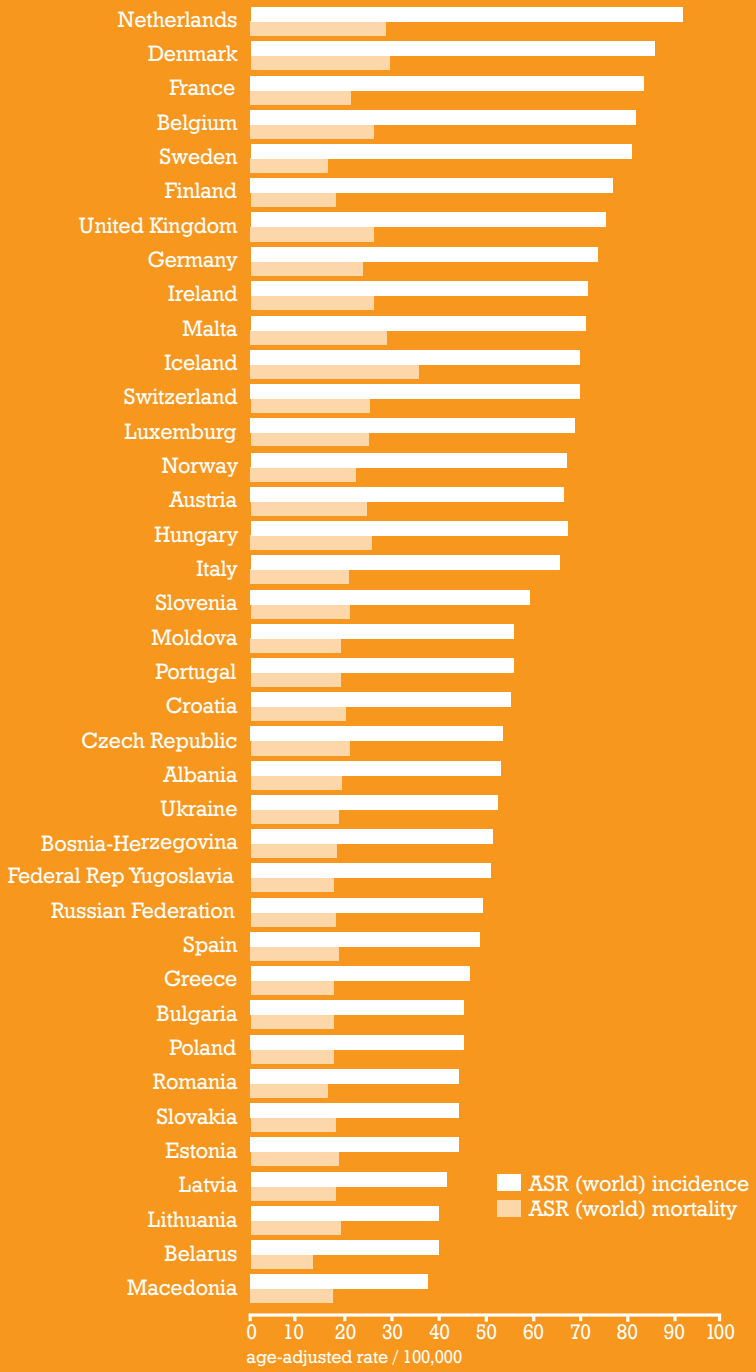


Note: the figures on the bottom line of this graph have been simplified for the purposes of clarity. (Source: the World Health Organization (WHO) International Agency for Research on Cancer: World Cancer Report 2003)

Industrial pollutants were first identified in the 1940s and 1950s as causes of cancer by Wilhelm Hueper, an American doctor working in the chemicals industry. Most of the industrial contaminants affecting the health of present generations did not exist before Hueper's time. Toxicopathologist Dr Vyvyan Howard informs us that, in 2004, 'the average person in the street now has hundreds of groups of completely novel compounds in their bodies that weren't there 60 years ago. We can measure them in adult and foetal tissue. We have changed the chemical environment of the womb.'

Quoted by Felicity Lawrence 'Chemical World'
The Guardian May 15 2004

Breast cancer Europe 2000



< This graph shows the estimated incidence and mortality rates per 100,000 of the population using age-standardised rates (ASRs). ASR allows the comparison of rates in populations that have different age structures and over different periods of time.
(Source: European Network of Cancer Registries fact sheet, December 2002)

Within the European Union, every 2.5 minutes a woman is diagnosed with breast cancer. Every 7.5 minutes a woman dies from the disease.

Stella Kyriakides, President of Europa Donna, the European Breast Cancer Coalition. Sue Claridge, in 'The Beacon' (Breast Cancer Network Australia's magazine) Issue 29, Summer 2004 p10

We have strong scientific evidence about toxic chemicals in the environment that mimic female sex hormones and overload a woman's hormonal system, a known cause of breast cancer. We know how pesticides, industrial pollutants, radiation and other factors are linked – part of the social context of breast cancer. Yet, neither government agencies nor societies responsible for dealing with breast cancer acknowledge this context. WHY?

Professor Ross Hume Hall 'Female Biology, Toxic Chemicals and Preventing Breast Cancer: A Path Not Taken' International Conference on Breast Cancer and the Environment Ontario Canada November 1995

Summary

'Breast cancer: an environmental disease' sets out to

- **challenge a number of prevailing views and attitudes about breast cancer**
- **establish a new view of breast cancer as a 'preventable' rather than 'inevitable' disease**
- **address the under-acknowledged and non-lifestyle factors associated with breast cancer**
- **inform and encourage new ways of thinking about this disease and the many possibilities for its prevention**
- **challenge the government to prioritise the primary prevention of breast cancer.**

Breast cancer is the major cancer affecting women and the most common cancer in the UK. It kills more than one thousand women each month. With a steady rise in new cases year on year, the chance of a woman contracting the disease in her lifetime rose from 1 in 12 to 1 in 9 in the five-year period 1996-2001. Earlier and improved detection accounts for only a limited number of cases in this rising trend. In any one year, breast cancer can affect almost a quarter of a million women in the UK. For example, in 2001 there were 41,000 new diagnoses, 15,000 deaths and 172,000 women living with diagnoses made in the previous ten-year period.
(Sources: Cancer Research UK & Office of National Statistics (ONS) 2003)

The social, psychological and economic impacts on women, their families, friends and colleagues are incalculable, as are the healthcare and support costs borne by society.

Fewer than 50% of breast cancer cases can be attributed to officially recognised, 'established' and 'probable' risk factors which are understood to increase a woman's susceptibility to breast cancer e.g. late onset of menopause, body weight, diet, late-age pregnancy. Only two risk factors – ionizing radiation and inherited genetic damage – are known to directly cause the disease.

However, a vast number of animal, human, laboratory and field studies, dating from the 1930s, continue to provide incontrovertible evidence for the role of man-made environmental agents in human diseases such as breast cancer. These are agents that can be reduced, modified or eliminated.

'Breast cancer: an environmental disease'

- **focuses on exposures to environmental agents that are known or suspected of being implicated in breast cancer**
- **spells out the significance of low-level, long-term and early-life exposures to environmental agents in promoting this disease**
- **brings to public attention the scientifically based information routinely overlooked or dismissed by government, industry and the cancer establishment.**

The main propositions in the Case are that:

- breast cancer is a preventable disease
- cancer can be caused by exposures to numerous and varied cancer-causing and cancer-promoting environmental agents – large-scale prevention could be achieved by eliminating such exposures
- in the light of expanding knowledge about specific environmental factors known or suspected of implication in the incidence of breast cancer, the primary prevention of breast cancer is an attainable goal
- the ultimate responsibility for primary prevention lies with government
- equally important are the responsibilities for human and environmental health borne by science and industry
- on the basis of current knowledge, failure to act to prevent breast cancer is to be complicit in causing death and disease for this and future generations.

Primary prevention: the vital role of citizens

Official disregard for evidence supporting primary prevention makes it clear that the only hope of seeing 'primary prevention' enacted into law and implemented as policy lies with citizens. From a strong basis of knowledge we can:

- demand an end to the production and use of toxic agents associated with breast cancer
- demand safe alternatives for those toxic substances proven to be essential e.g. food preservatives
- insist that government, industry and science demonstrate their joint responsibilities for delivering primary prevention.

As a matter of urgency

- **we need to apply our knowledge to the task**
- **we need to act now to reduce production, release and use of toxic substances**
- **we need to act now to reduce our dependence on toxic substances**
- **we need to prioritise primary prevention.**

Notes: The UK includes England, Scotland, Northern Ireland and Wales. These four countries are represented throughout the document. The content also applies in general to other countries, for example, the Republic of Ireland.
References from American sources are exact and will therefore contain different spelling for key words, for example oestrogen (estrogen), foetal (fetal), behaviour (behavior).
Any text within square brackets has been inserted to clarify meaning.

Section 1
Primary prevention

The objective in primary prevention is to prevent the disease process from starting. (Gray & Fowler 1984)

'Primary prevention' is about eliminating the causes of a disease before it can affect people. It is historically based on common sense and recognition of the proven or suspected cause and effect of diseases. For example, the connection between poor standards of sanitation, drainage, water supply and ventilation, and diseases such as typhus, cholera and consumption, was recognised by the British Parliament's Select Committee on the Health of Towns in 1840. A primary prevention approach to a multi-factorial disease (i.e. one believed to have resulted from the interaction of genetic factors with environmental factors) such as breast cancer would aim to reduce and eliminate, as far as possible, human exposures to all substances or agents that are known to be, or suspected of being, implicated in the disease process.

Barriers to a 'primary prevention' focus

There are a number of attitudes, mindsets and misconceptions standing in the way of a primary prevention focus on breast cancer. These include:

Acceptance

We have been conditioned over time to accept cancer as a fact of life (and death). Statistics tell us that breast cancer affects 1 in 9 women while cancers in general affect 1 in 3 of the population. These frequently reported figures influence the gradual acceptance of breast cancer as both a 'normal' disease and one that must inevitably affect some of us.

The acceptance of breast cancer as a disease we have to put up with is affirmed in a survey conducted by the charity Breast Cancer Care. Asked about the challenges for breast cancer over the next 30 years, the majority of the 80 breast cancer experts participating predicted that 30 years from now breast cancer will still be incurable but it will be a disease women live with, like diabetes or asthma, rather than die from, and that the biggest problem for the NHS will be the sheer number requiring care. ('Health Service Journal' July 2003)

> **When we think of breast cancer we think of it as unpreventable.** Jenni Murray (presenter) 'Woman's Hour' BBC Radio 4 November 3 2000

Confusion

The slogan 'early detection is the best prevention' has attained the status of a 'truth' in the public mind. In fact, early detection, by whatever means, is only detection. Equally persistent has been the promotion of regular mammograms as a 'preventive measure'. Mammography is a tool for detecting breast problems, not for preventing them.

> **Women have been sold the myth that the answer to breast cancer is early detection and treatment.** Dr Cathy Read 'Preventing Breast Cancer: the politics of an epidemic' Harper Collins UK 1995 p8

Fixation
Fixation on treatment and control of the disease by medical science leaves primary prevention in an extremely marginal position on the national agenda.

> **The main error of the biomedical approach is the confusion between disease processes and disease origins. Instead of asking why an illness occurs, and trying to remove the conditions that lead to it, medical researchers try to understand the biological mechanisms through which the disease operates, so that they can interfere with them ... These mechanisms, rather than the true origins, are seen as the causes of disease in current medical thinking and this confusion lies at the very centre of the conceptual problems of contemporary medicine.**
> Fritjof Capra 'The Turning Point – Science, Society and the Rising Culture' Simon & Schuster USA 1982 pp149-150

Vested interests and the status quo
A truth seldom aired is that there is no profit in prevention. The disease of cancer has spawned a major world industry and it is unlikely that such a massive and multi-faceted industry will welcome the prospect of its own demise in the shape of primary prevention.

> **A firm alliance between the established cancer institutions and the chemical, pharmaceutical and nuclear industries has formed the medical-industrial complex ... At its best, this complex provides better diagnosis, new treatments and first-rate health-care facilities. At its worst, the medical-industrial complex blocks an all-embracing programme for preventing cancer ... What is stopping us [from getting serious about prevention] is the almost suffocating hold the medical-industrial complex retains over cancer policy, and the hugely powerful chemical industry's interest in protecting its products.**
> Professor Ross Hume Hall 'The Medical-Industrial Complex' pp62-68 The Ecologist Vol 28 no2 1998

Ignorance
We generally trust advice when it comes to us from government, especially when it is reinforced by the media and cancer charities. Both Scottish and UK government's cancer plans target lifestyle factors (exercise, diet, alcohol consumption and smoking) as the key to cancer prevention. This narrow focus perpetuates ignorance that dietary and environmental contaminants are significant sources of human exposure to carcinogens which are impossible to avoid.

> **A narrow focus on lifestyle – like a narrow focus on genetic mechanisms – obscures cancer's environmental roots. It presumes that the ongoing contamination of our air, food, and water is an immutable fact of the human condition to which we must accommodate ourselves.**
> Dr Sandra Steingraber 'Living Downstream: An Ecologist Looks at Cancer and the Environment' Virago UK 1998 p262

The media is the main source of public information in today's world. It is an all-pervasive global force in society and is becoming an integral part of the public debate about breast cancer. However, the information industry – print and broadcast – is largely controlled by market forces and these exert strong influences on society, especially through advertising. This can compromise editorial decision-making or it can obscure core issues. For example, the survival of a women's magazine or a

TV channel in a very competitive marketplace will depend upon revenue from advertisers selling products – often directed at women – that should arguably be part of the debate on causes of breast cancer. Therefore, it is impossible to get issues like 'primary prevention' taken up by mainstream media. One result, for example, is the widespread misconception that breast cancer is a largely inherited disease.

Genetic screening for women with an inherited 'high risk' of contracting breast cancer still tends to dominate popular media reporting, with the effect that most women estimate the genetic cause of the disease to be far commoner than it is: around 5% of all breast cancers.
Laura Potts 'Stopping Breast Cancer Before it Starts' Health Matters July 2001

Procrastination
There is a widespread tendency (among scientists, industrialists and politicians) to claim the need for more research when challenged by prevention measures based on existing scientific knowledge. In the case of breast cancer prevention this delaying tactic devalues a half-century of scientific endeavour, leaving policy makers forever in the grip of 'paralysis by analysis'.

'We need more study' is the grandfather of all arguments for taking no action.
P Infante & G Pohl 'Living in a chemical world: actions and reactions to industrial carcinogens' pp225-249 Teratogens, Carcinogens, Mutagens 8 1988

A myriad of scientific papers exist concerning adverse effects from exposure to radiation and from exposure to hundreds of chemicals. There is more than enough information to make informed decisions about exposures to these entities.
Dr Janette Sherman 'Life's Delicate Balance: A guide to causes and prevention of breast cancer' Taylor & Francis USA 2000 p235

The invisibility factor
Away from their source of production, there are no identifying clues, such as odour or colour, that might alert us to the many carcinogenic chemicals and sources of harmful radiation in our everyday environment. The invisibility of such health hazards makes it difficult not only to accept their existence but also their hazardous nature.

The reason people don't believe in radiation is, it's out of sight, out of mind.
Dr Alice Stewart 'The Woman Who Knew Too Much' Gayle Greene University of Michigan Press 1999 p213

Many harmful or suspect chemicals (in drinking water) can't be tasted or smelled even at dangerous levels.
Jeffrey Steingarten 'The Man Who Ate Everything' Headline USA 1998 pp61-62

Fear
Fear of cancer feeds our resistance both to learning and even thinking about the disease.

Nothing in life is to be feared. It is only to be understood.
Marie Curie

Cancer is not a single disease. It is a type of disease. There are over 200 different cancers, and each occurs in its own way. What they have in common is that they all start in the same way – with a change in the normal make-up of a cell ... Cells are constantly at work in our bodies, dividing and multiplying to repair damaged skin, maintain hair growth and perform a hundred other everyday tasks. (NHS 2001)

'Damage to the genetic machinery of individual cells can trigger a series of miscalculations, altering a cell's normal function. When a gene is damaged by radiation or chemicals, or receives misinformation from a chemical messenger, and the mistaken signal is not corrected, the result is inappropriate or uncontrolled growth. This is the basis of cancer. We have learned that even irritation, as from chronic formaldehyde exposure, results in increased cell-turnover, the need for repair, and the potential for interference with repair ... Some alterations may be reversed by a cell's innate repair mechanism; some alterations may go unnoticed; but other alterations become permanent and life-threatening, as when a cancer begins.'
(Sherman 2000)

The susceptibility factor in cancer

The timing and duration of exposures to potential cancer-causing agents are additional crucial factors in the cancer process. In a healthy adult, damaged or altered cells are constantly being repaired or removed from the body by the immune system. An immune system that is weakened (by illness, trauma, chemical and radiation exposure or age), or is under-developed (as in the very young), can compromise the repair process. Some of the substances (known from laboratory and animal tests) which damage or disrupt cells or cell functions are arsenic, asbestos, benzene, cigarette smoke, oestrogens, organochlorines, dioxins and radiation. Some directly damage the cell e.g. formaldehyde, others aid cancer progression e.g. oestrogens. (Sources: Pepper et al/Parnell/Cornell University Breast Cancer Program)

Cancer in young people

Once a disease almost exclusively associated with old-age, cancer now affects all age groups, as shown by rising rates in young people. The Automated Childhood Cancer Information System (ACCIS) project, an epidemiological study of cancer incidence in children and adolescents in Europe since the 1970s, provides **'clear evidence of an increase of cancer incidence in childhood and adolescence during past decades, and of the acceleration of this trend.'**
(Steliarove-Foucher The Lancet 2004)

Carcinogens

'Experts agree that most cancers are caused by our bodies or parts of them being exposed to certain substances over long periods of time. These cancer causing substances are called carcinogens.' (NHS 2001)

Chemical carcinogens

> **The chemical agents of cancer have become entrenched in our world in two ways: first, and ironically, through man's search for a better and easier way of life; second, because the manufacture and sale of such chemicals has become an accepted part of our economy and our way of life.** (Carson 1962)

The main source of human exposures to carcinogens today is man-made chemical compounds.

By 1985 it could be stated as a fact that **'nearly all of the synthetic [man-made] chemicals regularly used in industry today did not exist 40 years ago [in the 1940s]. Of the 45,000 toxic chemicals listed by the US National Institute of Safety and Health (NIOSH) in 1980, 2,500 were identified as carcinogens, 2,700 as mutagens [causing genetic change] and 300 as teratogens [causing malformation of an embryo]. Less than 7,000 had been adequately tested.'** (Grossart 1985)

This is old, not new knowledge. Yet it was only during the last 15 years of the 20th century that medical science began to associate the unprecedented growth rates of many diseases with modern chemicals. While in the same 15-year period some chemical compounds were banned or reduced (in number and use) through tighter regulations, man-made chemicals continued to be developed and marketed in an ever-widening range of products and applications. The universal application of man-made chemicals in every sphere of modern life has made exposure to them an unavoidable, lifelong reality for each one of us. The vast majority of industrial chemicals have never been tested for their potential to cause or promote cancer.

Chemicals and breast cancer

Synthetic chemicals are in some cases proven to harm – and in other cases suspected of being harmful – to human health for a range of reasons:

- the majority are based on carbon, and for this reason, **'are particularly dangerous to us because being based on carbon, the chemistry of all life, they readily enter human tissues and seriously disrupt the body's complex processes and complex chemical reactions.'** (Harte et al 'Toxics A-Z' 1991)
- many of those which have been tested are known or suspected carcinogens
- the increasing numbers found to disrupt the function of the endocrine (hormone) system. This group has particular significance for hormone-related cancers such as breast cancer
- some are both carcinogenic and hormone-disruptive e.g. atrazine, an agricultural pesticide widely used in the UK
- the increasing numbers found to 'persist' (remain a long time in the environment) as a result of being designed to be 'stable compounds' which are therefore not broken down in the environment by micro-organisms and in the human body by metabolic processes
- the increasing numbers found to be 'bioaccumulative' (build-up in the body, mostly in fatty tissue). Chemical compounds that accumulate in living tissues increase in number and concentration as they move up through the food chain. It follows therefore, that humans, at the top of the food chain, will have the highest concentrations
- the capacity of many to cross the blood-brain and placental barriers
- the increased risk of toxicity resulting from the combined effects of synthetic chemicals on the body.

There are **'adverse effects observable in the pattern of human disease, both in foetal malformations and the increase in the incidence of cancer – particularly in young people – and we can observe that those changes have taken place over the same period of time as the introduction of these novel chemicals.'** (Howard 2004)

Several hundred chemicals are found in a wide range of commercial products and conditions we unknowingly encounter in our daily lives. Often overlooked by regulators is the variation in effects on a population from similar exposures, as recorded by biochemist and cancer researcher Ross Hume Hall: **'Individuals vary greatly in their susceptibility to toxic chemicals, and the differences between men and women can be punishingly large ... Women thus can fall victim to legal limits of residues of pesticides and waste chemicals in their supermarket grapes or in their apple juice. Even at their best, EPA [Environmental Protection Agency, USA] regulations disregard the susceptibility to cancer of 50 per cent of the population.'** (The Ecologist 1998)

Assured by periodic statements from government and industry about the safety of regulated chemicals, and lacking the information to challenge such assurances, most of us are quite unaware that **'little has been done to prevent exposure to carcinogenic chemicals in the environment, despite ample evidence that chemical pollution of our air, water, food and the workplace is the major cause of cancer.'** (Epstein 1990)

Physical carcinogens

The best known example is high-energy radiation, including nuclear radiation and X-rays.

Radiation

Because ionising radiation is of sufficiently high energy to disrupt electrons from atoms it is the most dangerous type of radiation for all living organisms.

'The harmful effects of atomic or ionizing radiation have been known since the early discoveries of Roentgen, Becquerel and Madame Curie, but the present impacts and mechanisms of nuclear pollution are still not fully understood. Radiation penetrates biological matter and acts on the cells and their constituent parts by causing chemical, molecular or physical damage often resulting in cell death or genetic mutation. Unlike most toxic chemicals, with radiation there appears to be no level of dose below which damage cannot be caused.' (Markham 1994)

Examples of some sources of ionizing radiation that we live with:

- **'natural sources – the sun (UV rays), uranium and radon, and building materials containing these elements**
- **industrial sources – fallout from man-made nuclear explosions and power station accidents**
- **medical sources – X-rays**
- **domestic sources – cathode ray tubes (computers and TVs), some smoke alarms and fluorescent dials**
- **our bodies – radioactive elements e.g. potassium (natural) and strontium-90 (man-made nuclear fission product [stored in our bones]).'** (Harland 1995)

Electromagnetic field non-ionising radiation
Electromagnetic Fields (EMFs) are long-wave forms of non-ionising radiation. EMF emissions in the environment come from natural sources e.g. the sun, the earth's magnetic field and from manufactured sources e.g. high-voltage power lines, power transmission stations and electrical appliances such as computers, electric blankets, hairdryers, TV sets and microwave ovens.

'Risks posed by EMFs depend on the distance from source and duration of exposure. For instance, transmission lines located only 200 to 300 feet away expose people to fewer EMFs than many common domestic appliances ... Substantial evidence ... strongly suggests the carcinogenicity of EMFs ... at least eighteen occupational studies link EMF exposure to leukemia, five to brain cancer and thirteen to other cancers, including breast cancer.'
(Epstein Steinman LeVert 1997)

EMFs and melatonin
EMFs interfere with the normal production of melatonin, a hormone of particular significance when studying the causes of breast cancer. Melatonin is **'a hormone made by the pineal gland deep within the brain ... [it] is only secreted at night and is an important regulator of the body's 24 hour clock. It also regulates various hormones, including oestrogen. Laboratory tests have shown that melatonin also suppresses the growth of human breast cancer cells.'** (Read 1995)

Working or sleeping in a situation of near-constant and bright, artificial 'light at night' (LAN) may interfere with the normal production and work of melatonin. Many scientists consider regular exposure to LAN an added risk for breast cancer since it can affect regulatory control of oestrogen (the hormone most strongly associated with breast cancer) as a result of LAN impact on the pineal gland. **'Sleep interruption, especially in women working the graveyard shift, is associated with an increased risk of breast cancer.'**
(O'Neill Risks 24)

There can be no doubt that a major cause of cancer today is our involuntary exposure to carcinogens from an ever-increasing number of sources in our environment, from higher-than-normal levels of background radiation in our homes to hazardous chemicals in products. Although our knowledge of cancer is incomplete, we do have sufficient understanding of the processes involved to know that cancer incidence can be reduced.

For more than 100 years breast cancer has been recognised as a hormonally related disease that is influenced by environmental factors.

Breast cancer was a relatively rare condition until the mid-20th century, when incidence in industrialised countries began to rise significantly.

Breast cancer is a 'multi-factorial' disease, a term **'describing a condition that is believed to have resulted from the interaction of genetic factors, with environmental factor, or factors.'** (Oxford Medical Dictionary) We tend to think of breast cancer as one type of cancer, when in fact there are many different types of breast cancer. **'Breast cancer is as diverse as the breast itself, appearing in many different guises.'** (Plotkin1996)

Risk factors

> **Risk is not a cause of illness. Risk is the result of exposure to a hazard, as in the formula HAZARD + EXPOSURE = RISK. Clearly, if either hazard or exposure is missing from the equation, there is no risk.** (Sherman 2000)

'With the notable exception of ionising radiation and inherited genetic damage, none of the established risk factors for breast cancer directly cause the disease ... Most ... can be linked with increased lifetime exposure to oestrogen, other hormones, and higher exposures early in life.' (Davis Axelrod Sasco Bailey Gaynor 1998)

Some important points about breast cancer risk factors:

- most cannot be altered e.g. age
- some breast cancer risk factors relate to early-life exposures and changes e.g. radiation exposure, early menstruation
- many are events over which women have little or no control e.g. onset of menopause.

In theory, the only risk factors over which women have some control are diet, body weight, alcohol consumption and use of synthetic hormones e.g. HRT. The reality is that these choices are moderated by many other factors – economic, social, cultural, pathological and psychological – affecting women's lives.

'Lifestyle' risk factors

> **Individual behavior and lifestyle certainly play important roles, but today's trend appears to be that individuals are considered not only responsible for but also guilty of causing their disease.**
> (Tomatis & Huff 2001)

Lifestyle factors constitute only part of the overall risk picture for breast cancer, approximately 5%. Government and media fixation on lifestyle factors as key both to breast cancer risk and prevention leaves the problem entirely with women themselves. It makes sense to follow a healthy lifestyle but that is no guarantee that you will not get cancer. A woman cannot protect herself absolutely from environmental factors beyond her control. And as those factors proliferate, her risk increases, no matter how many vegetables she eats, how many drinks she declines, or pounds she loses.

Today, breast, ovarian and endometrial uterine cancers are clinically categorized as 'hormone-dependent' cancers. (Kelsey & Whittemore 1994)

Hormones are the key chemicals involved both in the development and the function of the breast. Breast development which precedes menstruation by individually variable times, and the changes in breast tissue which begin with the first menstrual cycle, will depend on a complex interplay of hormones, mainly oestrogen, progesterone, prolactin and other growth factors. **'The breast is fairly quiescent from infancy until puberty, then, under the influence of sex steroid hormones, remarkable changes occur ... From here on in, the activity of the breast is firmly locked into our hormonal cycles.'** (Read 1995)

Oestrogen and breast cancer

Throughout the life cycle, the hormonal environment plays a critical role in the development of breast cancer. (Brody & Rudel 2003)

Oestrogen, the primary female sex hormone, has been associated with breast cancer since the 19th century when Scottish surgeon, George Beatson, observed that removal of the ovaries (the main source of oestrogen production) reduced incidence of the disease in women.

'Estrogen may be implicated in breast cancer because of
1) its role in stimulating breast cell division
2) its work during the critical periods of breast growth and development
3) its effect on other hormones that stimulate breast cell division, and
4) its support of the growth of estrogen-responsive tumors.'
(Cornell University fact sheet 9)

A woman's lifetime exposure to oestrogen is influenced by her age at three stages in her reproductive history:
- onset of menstruation (menarche)
- first full-term pregnancy
- onset of menopause.

'A study of breast cancer risk based on oestrogen levels in 15,000 women found that women with higher oestrogen levels were more likely to go on to develop breast cancer.'
(Toniolo et al 1993)

'Because total estrogen exposure is the single most important risk factor for breast cancer, estrogenic chemicals, which would add to this lifelong exposure, are an obvious suspect when searching for the cause of rising rates (of breast cancer) over the past half century.'
(Colborn et al 1996)

Hormone disruptors and mimics

Strong toxicologic evidence points to a large number of ubiquitous pollutants that are plausibly linked

to breast cancer because they mimic or disrupt hormones known to affect breast cancer risk. (Brody & Rudel 2003)

Man-made chemical compounds with the ability to mimic hormones produced by the body and to interfere with the hormonal messaging systems that direct and regulate our biological development and function are variously known as xenoestrogens, xenohormones, environmental oestrogens, hormone disruptors, hormone mimics or hormonally active agents (HAAs), and endocrine disrupting chemicals (EDCs).

Authors of 'Our Stolen Future' describe EDCs as **'thugs on the biological information highway that sabotage vital communication. They mug the messengers or impersonate them. They jam signals. They scramble messages. They sow disinformation. They wreak all manner of havoc. Because hormone messages orchestrate many critical aspects of development, from sexual differentiation to brain organization, hormone-disrupting chemicals pose a particular hazard before birth and early in life.'** (Colborn et al 1996)

'EDCs are found in a large number of frequently used products such as weedkillers, foods, petrol, insect sprays, cosmetics, shampoos, disinfectants, plastic linings of food cans, plastic bottles and some medicines. Another main source of hormone disrupting chemicals are dioxin emissions from waste incineration plants. In most Western European countries 95% of dioxins which humans absorb, enter our bodies in the form of food, particularly milk products and fish oil.' (van Dooren 1997)

Synthetic oestrogens are also found **'in pesticides, in the growth hormones fed to chickens, cows and other animals, and in the contraceptive pill and Hormone Replacement Therapy prescribed to women.'** (Hoult 1996)

Man-made hormone mimics differ in fundamental ways from oestrogens produced by plants and humans. One important difference is the long-evolved ability of the body to break down and excrete the natural oestrogens, whereas **'many of the man-made compounds resist normal breakdown and accumulate in the body, exposing humans and animals to low-level but long-term exposure. This pattern of chronic hormone exposure is unprecedented in our evolutionary experience.'** (Colborn et al 1996)

Being fat-soluble compounds, most EDCs are not excreted by normal body processes but are stored in body fat, thus impacting on cells in the body over many years.

It is known that man-made EDCs can:
- cross the placenta
- disrupt the development of the foetus
- have serious effects that might not be evident until decades later

and that the human body can mistake a man-made chemical for a hormone. (Colborn et al 1996)

Timing of exposure

Biologist and foetal toxicologist Dr Sandra Steingraber defines life periods when hormonal disturbances pose the greatest risks as 'windows of vulnerability'. These occur:
- **'when the foetus is developing in the womb and minute changes in hormone levels switch on the development of each organ system**
- **when newborn babies still have incomplete immune systems and no blood-brain barrier**
- **when puberty, triggered by hormonal changes measured in low parts per billion, leads to rapid cell division and DNA replication**
- **in old age when the body's defence mechanisms weaken.'**

(Steingraber/Lawrence Guardian 2004)

Bioaccumulation

A characteristic common to most EDCs is that they build up (bioaccumulate) in fatty tissues where they remain

potentially active for long periods of time. It is therefore not surprising that **'a growing number of experts aware of the rise in oestrogen-mimicking chemicals are beginning to suspect that it is not so much the fat that predisposes a woman to breast cancer but the toxins which have accumulated in the fat that then build up in her body.'** (Kenton 1995)

The bioaccumulation of toxins in fat cells inevitably produces toxic effects in the body. UK scientist Peter O'Neill points out that such toxic effects **'may result after a relatively long time period either through levels rising above a threshold that induces adverse effects or because some stress event causes the chemical to be released from the fat.'** (O'Neill 1993)

Low-level effects

The relative strength of EDCs is much lower than the strength of hormones produced by humans. For this reason some scientists claim that EDCs cannot pose any significant threats to human health. However, reproductive biologist Fred vom Saal points out that **'vanishingly small amounts of free [natural] estrogen are capable of altering the course of development in the womb. Given this exquisite sensitivity, even small amounts of a weak estrogen mimic – a chemical that is one thousand times less potent than the estradiol made by the body itself – may nevertheless spell big trouble.'** (Colborn et al 1996)

'Natural estrogens operate at extremely low concentrations, measured in parts per trillion. In contrast, these so-called weak estrogens are present in blood and body fat in concentrations of parts per billion or parts per million – levels sometimes thousands to millions of times greater than natural estrogens. So even though the contaminant levels may seem miniscule, they are not necessarily inconsequential.' (Colborn et al 1996)

EDCs acting in combination

Studies show that **'hormone-disrupting chemicals can act together and that small, seemingly insignificant quantities of individual chemicals can have a major cumulative effect'** (Colborn et al 1996) and that **'multiple estrogenic chemicals can act together to produce an effect even when each individual component of the mixture is below a threshold for effect.'** (Brody & Rudel 2003)

Improved understanding of the number of ways in which EDCs affect breast cancer has developed from animal and laboratory tests and reveals that **'[their] ability to bind to the oestrogen receptor (on a cell) appears to be a relatively common phenomenon. Once there, the mimics may act as agonists [aids] or antagonists [blocks], jamming these switches on or off. However, there are other ways in which chemicals can affect the hormone system. Some chemicals are anti-androgenic, blocking the androgen [male hormone] receptor. Some may interfere with the synthesis or metabolism of hormones, or with their transport in the body.'** (Chemistry & Industry 1996)

Because of the importance of hormones in developing and maintaining human health through all stages of life, man-made chemicals that can mimic and, therefore, interfere with the normal functions of hormones pose a serious threat to public health now and for the future.

> **Hormones of the wrong kind, hormones too soon in a girl's life, hormones for too many years in a woman's life, too many chemicals with hormonal action, and too great a total hormonal load. Another key is the kind of hormones, the foreign chemicals.** (Sherman 2000)

How are we exposed?

Diet

Food is a major source of human exposure to synthetic (man-made) chemicals, many of which are bioaccumulative, carcinogenic and disruptive to the hormonal system. Scientists have known about the connection between dietary contaminants and cancers for many years because **'both animal studies from the 1960s and human studies from the 1970s confirm the fact that these dietary contaminants cause cancer. Some studies show that carcinogens concentrate in breast tissue, while other studies prove the point in a different way by showing higher concentrations of these carcinogens in the blood of breast cancer patients.'** (Epstein et al 1998)

Toxicopathologist Dr Vyvyan Howard, a member of the government's advisory committee on pesticides, is concerned about the potential health effects of multiple pesticide residues on food and believes **'there is sufficient evidence already that the pesticide cocktail effect is producing changes. Exposure to chemicals that disrupt hormones in the womb could be the cause of the decreased age of puberty in girls and early onset of puberty is linked to a greater chance of developing breast cancer later in life.'** (Watson The Scotsman 2004)

The widely promoted view that high intake of dietary fat constitutes a risk for breast cancer is challenged by a large-scale 1987 study, based on the eating habits of nearly 90,000 nurses, which concluded that **'there is no association between dietary fat and breast cancer. However, US diets are contaminated with a wide range of carcinogens that concentrate in fatty foods and whose presence is not disclosed to the consumer.'** (Willett et al 1987 Epstein 1990)

Occupation

> **The prevention of cancers attributable to occupational and environmental exposures is primarily achieved by regulatory action. Relevant measures include replacement of carcinogens with alternative chemicals or processes, improved ventilation ... A significant reduction in occupational cancers attributable to implementation of preventive measures has been demonstrated in many instances. However, there remains a burden of past exposure.** (United Nations 2003)

A review of more than 100 studies in occupational cancer, conducted over the past 25 years, concludes that **'few high-quality studies directed specifically towards women have been carried out to allow the unambiguous identification of occupational risk factors for breast cancer.'** (Labreche & Goldberg 1997) Existing data about occupational risks for breast cancer may be limited, but when considered alongside long-term observations of health workers and employee health records, it does provide clear evidence of **elevated incidence** in certain occupations.

Occupational studies provide fairly consistent evidence for **elevated risks** associated with exposures to specific substances. For example, nurses represent one group with elevated risk because their work involves substantial exposure to chemicals.

Higher potential risk is associated with occupational exposures to solvents such as formaldehyde, methylene chloride and carbon tetrachloride, and to benzene, pesticides, styrene, acid mists, and some metals. Often-overlooked white collar jobs involve chemical exposures common to indoor work areas, such as:

- solvents in inks, cleaning materials, dyes, air sprays
- pesticides for control of insects, moulds
- second-hand tobacco smoke
- flame retardants in furnishings, fabrics and electrical office equipment e.g. copiers, computers.

In terms of exposure to toxic chemicals, the highest potential health risks for women are to be found in industries that are the largest users of chemicals. These are chemical, micro-electronics and textile manufacturers – the last two being major employers of women.

Because of the intensity of their potential exposure to toxic substances implicated in breast cancer, women working in the microelectronics industry producing components for expanding technologies in communications e.g. computers and cell phones, represent both **high incidence** and **high risk** categories for this cancer. The semiconductor (silicon chip) sector of the industry uses toxic metals, solvents, resins, gases, plasmas and acids in processes requiring hundreds of different chemicals, some of which are known or suspected carcinogens and EDCs.

Although studies of occupational health risks drawn from women's work histories and experiences are urgently needed, associations can be drawn from existing data to provide enough evidence:
- of increased risk of breast cancer for women experiencing specific occupational exposures
- on which to base precautionary-based regulations to protect women from workplace hazards.

Professor Karen Messing is one of many researchers in the field of occupational health calling for greater attention to the differences in response to occupational exposures between men and women.

> **Biological differences between the sexes may affect responses to workplace toxins. For example, bone, fat, and immune system metabolism as well as cardiovascular and endocrine function are all known to differ by sex. Little, however, is known about the implications of these differences for the effects of toxic exposures.** (Messing 2003)

When are we exposed?

> **Because cancer is a multi-causal disease that unfolds over a period of decades, exposures during young adulthood, adolescence, childhood – and even prior to birth – are relevant to our present cancer risks.** (Steingraber 1998)

Human exposures to carcinogens and endocrine disruptors can occur at any stage of human development from conception to death. As well as differing from males – body weight, body mass, fat-to-muscle ratios, reproductive functions and hormones – women are particularly vulnerable to biological damage from exposures:
- during periods of illness or trauma
- during pregnancy
- during the foetal development, early childhood and pubertal stages of life
- in the period from puberty to first pregnancy
- in the period after menopause
- in old age.

The foetal stage

Numerous studies show that:
- the foetus is exceptionally vulnerable to the effects of toxins from both the internal and external environment
- exposures, particularly to EDCs and carcinogens, at the foetal stage affect subsequent susceptibility to breast cancer, and to many other disease and developmental effects in later life.

Infancy to pre-puberty

In April 2004 the Ontario College of Family Physicians (OCFP), representing more than 6,700 family doctors, published a comprehensive review of pesticide research.

This report identifies children as the group at greatest risk of serious illness and disease because of their constant exposure to low levels of pesticides in their food and their environment – the latter is as a result of the widespread use of pesticides in homes, gardens and public spaces. Early development is further explained as a period of high-risk because, relative to their size, **'children are exposed to more toxic chemicals in food, air and water than adults because they breathe twice as much air, eat three to four times more food, and drink as much as seven times more water.'** (WWF 2003)

Scientific knowledge about the exceptional vulnerability of children to lifelong, irreversible effects from exposures to environmental contaminants has made no impact on a regulatory system in which exposure levels deemed 'safe' for adults are still assumed to be equally safe for children.

Breast milk

More than 350 man-made contaminants have been found in human breast milk. Any chemicals stored in human body fat can potentially transfer to the newborn infant during breast feeding. Dr Sandra Steingraber, an internationally renowned scientist with personal experience of cancer, describes human breast milk as **'the most chemically-contaminated food on the planet.'** She chose to breastfeed both her children, in the knowledge that despite the presence of toxins, **'breast milk is absolutely the best food for human infants. The data on the health benefits of breast milk are absolutely unanimous that babies who are breastfed are healthier, they die less often in their first year of life and they enjoy health benefits for a lifetime.'** Use of formula milk as a substitute for breast milk is not a solution to contaminants in breast milk because it is also likely to be chemically contaminated.

> **If you pollute when you *do not know* if there is any safe dose, you are performing improper experimentation on people without their informed consent ... If you pollute when you *do know* that there is no safe dose with respect to causing extra cases of deadly cancers, then you are committing premeditated random murder.** John Gofman MD PhD Professor of molecular and cell biology and physician University of Berkeley USA 1998

Critical periods in female development

Radiation risks for girls during three critical periods have consistently been confirmed by studies showing that **'females exposed to radiation prior to puberty have a much greater risk of developing breast cancer than do older women subject to the same level of exposure ... Radiation during the critical periods when breast cells are first forming prenatally or during early adolescence induces proportionally more neoplastic [abnormal] transformation of cells and is thereby more carcinogenic than exposures later in life.'** (Davis Axelrod Sasco Bailey Gaynor 1998)

'Breast cells are not fully mature in girls and young women prior to their first full-term pregnancy. Breast cells which are not fully mature bind carcinogens more strongly than, and are not as efficient at repairing DNA damage as, mature breast cells.' (Clark Levine Snedecker 2003)

Where are we exposed?

> **Except for the original blueprint of our chromosomes, all the material that is us – from bone to blood to breast tissue – has come to us from the environment.** (Steingraber 1998)

In every man-made and natural environment occupied by humans today we are exposed to toxins, many of which are carcinogens and endocrine disruptors – in the water we drink, the air we breathe, the food we eat, the places

we play in, the houses we live in, the machines we use, the cars we drive, the places we work in and from the ways we dispose of waste (landfills, incinerators).

'Metabolic [bodily absorption and breakdown] pathways for naturally occurring chemicals have been developed over millennia. This is not the case for the majority of man-made chemical compounds. These persistent toxic substances:

- **remain in the biophysical environment for long periods of time**
- **become widely dispersed**
- **bioconcentrate in plants and animals, including humans.**

The ecosystem is unable to break many of these toxic man-made substances down because they have been developed precisely not to be readily metabolized and detoxified.'
(Ontario Task Force Report 1995)

Medical oncologist Professor Dominique Belpomme reports that in France, **'between 70% and 80% of cancers are now due to environmental pollution from chemicals such as polycyclic aromatic hydrocarbons [PAHs], polyvinyl chloride [PVC], some heavy metals, nitrates, dioxins, some food additives and pesticides.'** (Pesticide Action Network *(UK)* 2004)

Living with environmental hazards

We can encounter synthetic chemicals when we rock our babies, relax on our sofas, watch TV, or enjoy a delicious dinner. All of us have an intimate relationship with synthetic chemicals, whether we want to or not – chemicals that invisibly surround us in our products, our air, our water, food and land – chemicals that are getting into our bodies even if we try to avoid them. (DiGangi 2004)

The most common-sense approach, according to Helen Lynn, Campaigns and Health Co-ordinator, Women's Environmental Network is that, **'at least until the laws allowing such toxic substances into our homes are changed, we'd be better off ... cleaning our homes with lemon juice, vinegar and bicarbonate of soda, choosing furnishings, cosmetics and toiletries that are as natural as possible and demanding products that are not just fit for their immediate purpose but are safe in all respects.'** (The Guardian 2004)

Cosmetics

Many of the 5,000 chemicals used in cosmetics and toiletries have not been properly safety-tested. Some can trigger allergic reactions or chemical sensitivity, others are suspected EDCs and have been linked to reproductive disorders, effects on the immune system and cancer. One family of widely used cosmetics ingredients used as preservatives – parabens – have been found in a small study sample of human breast tumours. Parabens have since been removed from most brands of deodorants and antiperspirants but are still used in many other cosmetics products where they have the ability to penetrate the skin. ('Concentrations of parabens in human breast tumours' Darbre et al pp5-13 Journal of Applied Toxicology Vol 24 issue 1 2004 www.annieappleseedproject.org/deodorantissue.html)

Exposure to environmental carcinogens causes cancer, and it is therefore obvious that measures of primary prevention aimed at avoiding or drastically reducing exposures will be the most efficient way to prevent environmentally associated cancers. (Tomatis & Huff 2001)

Air

In the UK **'most of us spend an average of 90% of our lives indoors, the highest proportion of this being in winter, when indoor air pollution is at its worst. We are thus much more likely to breathe in and absorb into our bodies any gas, vapour or airborne particle that escapes into the air indoors. Without adequate ventilation, we are in danger of concentrating our own home-produced pollutants to the point where our health may be threatened.'** (Harland 1993)

Studies of household dust show that indoor air can be contaminated by:

- a build-up of chemicals released from use of cosmetic, personal care, cleaning, art and craft products
- vapours off-gassing from fabrics (curtains, cushions, upholstery), floor coverings, electrical goods (TVs and computers), interior decorating materials (paint, varnishes)
- sources of combustion such as gas, oil, wood, coal, kerosene and tobacco products
- central heating and cooling systems
- pollutants in air outside the home e.g. traffic fumes, pesticides.

Soil

> **The lesson of history is that, even in temperate Europe, soil is all too vulnerable to foolish and greedy farming practices.** (Humphrys 2001)

Little is known about the quality, condition and general state of the soil in Britain today. What is known is that depleted, contaminated or undernourished soil is unable to sustain life. Problems for health and environment are created by synthetic chemicals and materials that have been designed to persist in unaltered states in the environment. Whereas micro-organisms aid the gradual breakdown of natural compounds, the majority of synthetic compounds remain unaffected and unchanged **'because micro-organisms lack the enzymes necessary for their disintegration.'** (Fellenberg 2000)

Conventional farming practice uses a non-selective approach to pest and disease control. Broad-scale application of more than 2,000 synthetic compounds registered as pesticides tends to destroy not only the target but many other life forms both above and below ground, including the micro-organisms crucial to soil quality.

Water

The quality of the water we drink and use to prepare and cook our food is vital to our health. As domestic water supplies are now controlled by private water companies there can be considerable variation in water quality. The quality of the water supplied to our homes will depend on many factors. As well as the main constituents of natural water – oxygen, carbon dioxide and salts – there are **'additives such as chlorine and aluminium nitrate that are designed to kill bacteria and settle contaminants. After this comes the increasing list of pollutants that are contaminating the sources of mains supply water, whether from ground water, rivers, lakes or reservoirs.'** (Harland 1993)

Carcinogens are formed as a by-product of the disinfection process in water treatment. **'Chlorine is, by far, the most common disinfectant used to treat drinking water; but other oxidants, such as chloramines, chlorine dioxide, and even ozone are also used. However, each of these disinfectants can also produce disinfectant by-products, which may be carcinogenic or otherwise deleterious.'** (Pepper et al 1996)

Workplace

A National Health Service (NHS) publication informs us that many jobs today involve regular contact with known carcinogens, for example, **'benzene in rubber manufacture, wood dust from hardwood furniture, vinyl chloride used to make PVC, cutting oils used by metal workers – these are just a few.'** It further informs us that **'the Health and Safety at Work Act (1974) obliges employers to inform employees of the presence of toxic**

substances in the workplace and to take reasonable steps to protect workers from exposures,' and that **'union safety representatives have the right to see industry data sheets on chemicals used in the workplace.'** (Health Promotion England 2001)

Yet we learn from a WWF report that **'workplace exposure is responsible for an estimated 6,000 cancer deaths a year ... Although Health and Safety legislation exists to control hazardous chemicals, evidence and experience indicates gaps in the regime.'** (WWF 2003) The commonest cancer in women is not recognised as an occupational disease and is therefore not included in occupational health and safety guidelines. Thus, women cannot expect to be informed, either by their employers or their safety representatives, about workplace risks associated with breast cancer.

The increased jeopardy for women

Women can encounter repeated low-level exposures to specific carcinogenic or endocrine-disrupting substances:

- in places of work outside the home
- inside the home from foods, insecticides, cleaning products, surface materials and treatments, internal air quality, furnishings, and from building, interior decorating and hobby materials
- outside the home from garden and pest sprays, fertilizers, weed killers
- from long-term use of pharmaceutical drugs, cosmetics, personal care products and hormone-based medications.

These substances, through accumulation in body fat, could produce higher levels of toxicity than levels resulting from single or intermittent exposures to the same substance.

Common carcinogens and endocrine disruptors (EDCs)

Most of us are unknowingly and unavoidably exposed to carcinogens and EDCs from the following sources and consumer products on a daily basis. We absorb these substances into our bodies through the respiratory tract, the gastro-intestinal tract and through the skin.

Key:

C	Carcinogen
EDC	Endocrine Disrupting Chemical
B	Bioaccumulative
P	Persistent in the environment

Industrial chemicals

Alkylphenol ethoxylates (APEs) EDC/B/P: APEs are used as surfactants to lower the surface tension of fluids so they can foam or penetrate solids. They are used in the manufacture of textiles and paper, and are found in paints, industrial detergents, pesticides, herbicides, plastics, insulating foams, cosmetics, nappies and sanitary towels (as wetting agents), shampoos, hair-colour products, shaving gels and spermicides.

Atrazine C/EDC/B: Atrazine is a pesticide approved for use in the UK, where it is used extensively on food crops. It is one of 20 pesticides commonly found in drinking water, and residues have been found on radishes and carrots.

Benzene C: A colourless, volatile, carcinogenic liquid derived from petroleum (crude oil) and coal tar. It is in the top 20 highest-by-volume industrial products. Benzene is used industrially as a fuel (gasoline) and a solvent, and is used in the manufacture of many other products – styrene, plastics, resins, synthetic fibres, some rubbers, lubricants, dyes, detergents, drugs and pesticides. It is an ingredient in waxes, resins, oils and paints.

Bisphenol-A (BPA) EDC/B/P: Used in the manufacture of polycarbonate plastics (used to make food and beverage containers) and epoxy resins; also used in a wide range of products e.g. white dental fillings, nail polish, food packaging, lenses (eye and safety glasses), water filters, adhesives, water pipe linings and flooring. BPA is an ingredient in resins used for lining cans of food and has been found to leach into certain food products e.g. peas, mixed vegetables, mushrooms.

Chloroform C/EDC/B: Chloroform is used industrially as an extracting agent and solvent, as the working fluid in industrial refrigeration systems and in the manufacture of cosmetics, dyes, drugs, fluorocarbons, glues and pesticides. Chloroform is an ingredient in medicinal/pharmaceutical products such as cough syrups, liniments, mouthwashes and toothpastes, and in domestic cleaning products containing bleach. Because chloroform is widely distributed in air and water, we are exposed to it in air emissions from pulp/paper and chemicals and drugs manufacture, vehicle exhausts, tobacco smoke, burning of plastics, and evaporation from polluted waterways. We are also exposed through water sources such as tap water, showers and swimming pools.

Ethylene Oxide (EO) C/EDC: Ethylene Oxide is an important industrial chemical used mainly in the manufacture of other chemicals and chemical products such as anti-freeze, polyester, solvents, detergents, and polyurethane foam. It is also used as a fumigant (foods and spices), as a sterilizer (medical and dental), and for pest control (textiles, books, furniture, product packaging). It is found in breast implants (as result of sterilizing process), food residues, pest control products, cosmetics and food packaging. General environmental exposures come from food residues, tobacco smoke and air emissions from combustion of materials containing EO. It was banned from use as a pesticide in 1991.

Formaldehyde C: Used as preservative, germicide, disinfectant, fungicide, defoamer, tissue fixative, fumigant (glasshouses), fabric finish, soil sterilant (mushroom houses), silage additive, and bactericide (kills bacteria). Formaldehyde is found in household cleaners, cosmetics (nail varnish), personal care products (soaps, deodorants), plastic foams (cushion fillings, insulation), fabrics (leather, furnishings, clothing, tea bags), building products (plywood, particle board, flooring), decorating products (paints, sealants, pigments) and furniture. Exposure to formaldehyde in the general environment comes from vehicle exhausts, smoke (tobacco, coal, wood), dust and vapours off-gassing (being released) from construction, insulation and interior decorating materials, fashion and furnishing fabrics.

Organochlorines (Ocs) C/EDC/B/P: Chlorine is a naturally occurring substance. Chlorine is combined with hydrogen and carbon to form organochlorines. Its manipulation and use in forming artificial chemical products has had devastating effects on the environment that we are only just beginning to understand. Ocs are used in a vast range of everyday products from pesticides to plastics, detergents, cosmetics, bleaches and shampoos.

Parabens (Alkyl Parahydroxy Benzoates) EDC/B: A group of chemicals used as preservatives in most cosmetics, personal care products (deodorants, shampoos, toothpastes, moisturisers) and some foods and drinks (pie fillings, beers, jams, pickles).

Phthalates C/EDC/B: Phthalates are a group of chemicals used extensively in industry. Because they are classified as 'inert' there is no product-labelling requirement for them. Their main use is in plastics manufacture, to soften and make flexible rigid plastics like PVC. Phthalates are also used in the manufacture of lubricating oils, detergents and solvents, and in intravenous tubing and other polyvinyl chloride (PVC) plastics.

They are found as ingredients of inks, paints, adhesives, and are used in cosmetic products as carriers for perfumes, skin moisturisers and skin penetration enhancers, to denature alcohol, and as volatile ingredients in hairsprays, nail polish and perfumes. Phthalates in packaging materials such as paper, board, cellophane and plastic can leach from food packaging into food contents. In 1999 the EU banned six phthalates from use in children's toys which are intended to be placed in the mouth by children under three years of age. Two of these phthalates, DEHP and DBP, were also banned in cosmetics from mid-2005 (EU Directive).

The phthalate DEHP is mainly used in the manufacture of PVC products e.g. disposable medical products (intravenous tubing, oxygen therapy systems) because it is cheap, flexible and clear. Because it does not bind with the plastic, DEHP can leach out of a PVC product. The general population is exposed to DEHP in air, food, and water as a result of off-gassing from products and emissions from industrial facilities. Human exposure to DEHP begins in the womb when DEHP crosses the placenta.

Polycyclic Musk Compounds (synthetic musks) C: A group of petrochemicals used as fragrances to substitute natural musk in cosmetics, personal care products and detergents. Musk xylene is a carcinogen, and the most acutely toxic compound in the group.

Styrene C/EDC/B/P: Raw materials for styrene production are derived from the petrol and coal-tar industries. One of the most widely used industrial chemicals, styrene is used as a starting material in the manufacture of a wide range of plastics – polystyrene foam, synthetic rubber, plastic food wrap, photographic film, car parts, PVC piping, insulated cups, plastic bottles, spectacle lenses.

Styrene is used in adhesives, inks, cooking utensils, floor waxes and polishes, copier paper and toner, decorating materials (varnishes, putty, paints), metal cleaners, asphalt, petrol products and carpet backing. We are exposed to styrene in the general environment by emissions from vehicle exhausts, tobacco smoke, incinerators and industrial sites, and by vapours from plastic and plastic foam products (off-gassing).

Pesticides

Pesticides constitute one of the largest groups of toxic, man-made chemicals to which we are routinely and inescapably exposed. 'Pesticide' (officially referred to as a 'plant protection product' since 2003) is a generic term for a group of chemical compounds that are formulated specifically to kill or alter the growth rates of living organisms.

Most pesticides are fat-soluble, and many have been shown to be carcinogenic and hormonally active. The concerns of scientists such as Rachel Carson about the potential harm to human health from pesticides were widely refuted and discredited by industry and science in the 1960s. She warned then that new synthetic insecticides **'have immense power not merely to poison but to enter into the most vital processes of the body ... They destroy the very enzymes whose function is to protect the body from harm; they block the oxidation processes from which the body receives its energy; they prevent the normal functioning of various organs; and they may initiate in certain cells the slow and irreversible change that leads to malignancy.'** (Carson 1962)

More than 40 years later, Marion Moses, scientist and founder of the Pesticide Education Center in San Francisco, wrote: **'The toxic impact of pesticides on women's health is only now emerging from decades of scientific and regulatory neglect ... Long-term, low-level exposures (to pesticides) that do not cause acute illness are linked to chronic diseases, cancer in children and adults, adverse reproductive outcomes, Parkinson's and other neurological diseases, among others.'** (Jacobs & Dinham 2003)

The deliberate and routine release of carcinogens into the environment is as unthinkable as the practice of slavery. (Steingraber 1997)

Ethics and environmental hazards

The rationale for banning, reducing or eliminating man-made carcinogens and endocrine-disrupting chemicals from our environment is an ethical one. The release of such agents into the air we breathe, their presence in the food chain and the potential for their absorption in human blood, bone, body tissue and organs are the most compelling reasons for making ethically based decisions to safeguard both environmental and human health.

The fact that
- more than 300 man-made chemicals can be found in humans, and that
- children are born with a toxic burden from the womb

leads to questions about how our regulatory system allows this to happen.

'Despite the implicit and potential hazards, chemical-manufacturing companies are not required to show that their products are safe before they are marketed.' (WWF 2003)

The scientific community and ethics of prevention

Despite growing recognition in the scientific community of the impact of specific environmental factors on health, few from that community are seen or heard expressing interest in primary prevention or concern about its neglect.

'Independent, honest scientists are absolutely necessary in a present-day democracy, whether they are working within the Government, paid by the taxpayer, or in the commercial sector. Important decisions impacting on public health and safety, the environment, as well as the social and economic benefit to civil society, all hinge on the honesty of scientists and the reliability of scientific advice given ... there must be open debate when scientists disagree with one another ... conducted in terms comprehensible to the general public, so that the public can participate in making decisions.' (Dr Mae-Wan Ho)

One example of the importance of independence in assessing health risks was a review of studies on selected chemicals (alachlor, atrazine, formaldehyde and perchloroethylene) that **'exposed industry bias in findings where 60% of studies conducted by non-industry researchers found these chemicals hazardous, while only 14% of industry-sponsored studies did so.'** (Fagin et al 1997)

> **It smells, doesn't it? When those who are assessing the danger of the (nuclear) industry are in the pay of the industry. It's like the fox guarding the hen house.** (Stewart/Greene 1999)

The particular obligation for chemists

'One of the most basic philosophical reasons that chemists must try to make the work they do and the substances they use as environmentally benign as possible is that we can. With knowledge of how to manipulate and transform chemicals, coupled with the basic hazard data that can be accessed readily from a variety of

sources, chemists have it in their power to reduce or eliminate the risk posed to themselves and society in general by the chemical enterprise.' (Anastas & Warner 1998)

The precautionary principle

> **It is a truth very certain that when it is not in our power to determine what is true, we ought to follow what is most probable.** (Descartes)

The precautionary principle is embodied in the very tradition of public health. A significant example was the control of cholera in the 19th century through improvement of public sanitation systems before scientific evidence could show any causal link between cholera and poor sanitation. To use the precautionary principle is to use the ethical and common sense approach to prevention by taking action to prevent illness and death in the face of incomplete evidence. The two tests that underpin the precautionary principle are:

- scientific uncertainty
- reasonable suspicion of harm.

Who decides?

Final decisions regarding the protection of environmental and public health are bound to be political decisions because **'weighing the relative importance of protecting public health and economic interests in the face of uncertainty is a public policy judgement, not a scientific one.'** (National Academy Press 1999) The importance of establishing the precautionary principle as the universal standard in both old and new policies pertaining to health and environment cannot be over-estimated.

> **If the prospect of enough profit comes in through the door, precaution often flies out of the window.** (Humphrys 2001)

Human rights and primary prevention

The right to know (RTK)

> **Access to information is the cornerstone of democracy all over the world. It allows people to make informed decisions about their lives.** (International Centre Against Censorship 1997)

The need to be informed about anything that has the potential to affect our health is regarded as a right. The internationally recognised term 'right to know' refers to the right of people to have access to information that is of concern to them. The right of workers to know about hazards in the workplace is written into occupational health and safety laws i.e. the Health and Safety at Work Act 1974. There is no equivalent right to know outside the workplace. Extension of this right to the general community is fundamental to attaining reduction and prevention of any disease.

RTK consumer and community information

We have to persist in claiming this right because **'governments of every persuasion use censorship to conceal their policies on the environment, and to silence protestors. The dumping of toxic waste, exploitation of agricultural land by multinational companies and the long-term effects of chemicals and nuclear accidents are often shrouded in secrecy.'** (Defending Free Speech Article 19 International Centre Against Censorship London 1997)

The right to live and work in a clean environment

> **Every family should be able to obtain water, food and air free from chemical and radiological contamination.** (Sherman 2000)

International endorsement and promotion of this right is found in:

- the 1998 Aarhus Convention: **'Every person has the right to live in an environment adequate to maintain his or her health and wellbeing.'** **www.europa.eu.int/comm/environment/aarhus**
- the United Nations Commission on Human Rights proclamation made in 2001 that everyone has the right to live in a world free from toxic pollution and environmental degradation.

(Environmental News Service (ENS) New York 2001)

Section 7
International progress on primary prevention

Policies and projects relating to breast cancer prevention from other countries, at both national and regional levels, provide some inspiring models for the UK.

Examples of inspiring policies and projects relating to breast cancer prevention include:

REACH (Registration, Evaluation and Authorisation of Chemicals)
This proposed 'new EU chemicals legislation' aims to overhaul and modernise the EU's regulatory system for chemicals and to increase protection of human health and environment from exposure to chemicals.
www.europarl.org.uk

Sweden: Pollution Reduction Programme
www.internat.naturvardsverket.se/

Denmark: The Danish Chemicals Strategy
www.mst.dk

USA: The Environmental Oncology Center
www.upci.upmc.edu

The Silent Spring Institute **www.silentspring.org**

Canada: The Toronto Cancer Prevention Coalition
www.city.toronto.on.ca

Some of the causes of breast cancer and related diseases can only be controlled by political and social action ... (Davis et al 1998)

Current breast cancer prevention options

Medical prevention is electively available to women perceived to be in the 'high-risk' category for breast cancer. The choices are:

- **oophorectomy** – removal of ovaries (by surgery) or destruction of ovaries (by drugs or radiation) to eliminate a main source of oestrogen production
- **bilateral mastectomy** – the surgical removal of both breasts.

Chemoprevention (prevention through the use of drugs) Designed to reduce or block the action of the hormone oestrogen, Tamoxifen and similar oestrogen-inhibiting drugs are currently used as a preventive measure for women perceived to be in high-risk categories either for disease onset or for disease recurrence.

UK government's Cancer Prevention Plans – the National Cancer Plan (NCP) 2000 and The Scottish Cancer Plan (SCP) 2001 – aim to reduce cancer death rates by 20% in people under the age of 75 by 2010. A large-scale public education campaign is targeting lifestyle changes (exercise, diet, alcohol consumption and smoking) regarded by both governments as key factors in cancer prevention. Ignoring the links between environmental and occupational exposures to carcinogens and EDCs as major and preventable factors in breast cancer, the government's prevention campaigns:

- take no account of the vast amount of international scientific work establishing the association between breast cancer and environmental exposures to man-made carcinogens and EDCs
- include no public warnings about man-made carcinogens and EDCs encountered in everyday life
- propose no strategies for the primary prevention of breast cancer e.g. banning production and use of man-made carcinogens and EDCs.

Primary prevention: how well-informed are decision makers?

The UK parliamentary system is served well by informational support from:

- regular internal publications e.g. POST Technical Report 108 'Hormone Mimicking Chemicals' 1998; parliamentary proceedings (Hansard)
- reports and briefings from government committees e.g. All-Party Parliamentary Group (APPG)* on Breast Cancer.

Government also seeks and hears policy and planning advice from key people in academic institutions, from professional bodies such as The Royal Society and the British Medical Association, and organisations like the Pesticide Action Network *(UK)*. Perhaps most significant, in terms of future change, is the information reaching national parliaments from the European Union (EU) – a newly expanded federation of 25 member states including the UK.

* APPGs have no power either to make or alter laws but they do serve as sources of expert advice and information to others in government and can therefore influence both government thinking and decisions on topics such as breast cancer prevention.

All of this points to the probability that most politicians are exposed to evidence that shows:

- the relationship between environment and health
- the environmental origins of most cancers
- cancer (and breast cancer) as a largely preventable disease
- the existence of scientific evidence supporting primary prevention actions and policies.

It would seem reasonable to assume therefore, that the majority of government members, their advisers and civil servants in related departments (health, industry, environment, public health), must be equally aware of the 'ethical' decisions and policy choices confronting government.

Who is responsible for breast cancer prevention?

> **Some of the causes of breast cancer and related diseases can only be controlled by political and social action aimed at reducing the production, use, transport and disposal of agents that directly or indirectly affect breast cancer risks ... The public and private sectors could, for example, devise policies to prevent, restrict, or reduce exposures to agents in the household, workplace, and general environment that extend the duration and onset of breast growth or alter the hormonal environment.** Davis et al 1998

Responsibility for putting in place the legislative and regulatory measures for preventing the cancer which each year affects almost a quarter of a million British women lies first and foremost with government.

Science and industry bear responsibility for any adverse impacts of their actions and products on wildlife, people and environment. And trade unions have responsibility for ensuring that the health and safety of people at work are protected in accord with workplace regulations.

Science

Few scientists would disagree with the two means for attaining prevention in the following statement:
'The most effective means of reducing (cancer) risk are,
1) avoidance of tobacco use, consumption of appropriate diets, and
2) limiting exposure to occupational and other environmental carcinogens.'
(World Cancer Research Fund & American Institute for Cancer Research 1997)

Yet the second of the two remains consistently under-acknowledged as a preventive measure by the very community which once, among its most eminent cancer researchers, **'shared the belief that malignant diseases can be reduced significantly by determined efforts to identify environmental causes and to eliminate them or reduce their impact.'** (Rachel Carson 1962)

Any future hope for science leading and influencing primary prevention policies lies with those scientists who publicly acknowledge the association between environmental pollution and escalating cancer rates, and who take up new challenges in research and development e.g. green chemistry and endocrine disruption. For example Dr Nicholas Leadbeater and his research group at King's College, London, are working in areas of organic and inorganic synthesis and are interested in new ways to make molecules and cleaner ways to do chemistry and to minimise waste: **'We want to make a product with no waste and no by-products and hence less chance of polluting the environment.'**
(Royal Society Summer Science Exhibition London July 2002)

Hope rests also with those who are unequivocal about the task facing all governments. For example, Professor Dominique Belpomme, medical oncologist at the University of Paris, believes: **'Public health policies must now focus on the relationship between environment and health. Realistic primary prevention policies should be introduced with the aim of avoiding the deleterious factors which we introduce into the environment.'** (PAN Europe Pesticides News 2004)

There is a need for:
- independent scientists to express their concerns in public forums
- government to heed the voices and warnings of independent scientists.

Independent scientific opinion, free from the constraints of vested interests, will be crucial to the process of developing primary prevention strategies.

> **Science is a continuous endeavour. But it will only help to stem the breast cancer epidemic if its findings are put to use by government and others who make public policy.** (Read 1995)

Industry

Industry manufactures, produces, transports and markets products in a great variety. Most are produced to enhance and improve our daily lives. However, many chemically based, chemically treated and radiation-emitting products are proven and potential threats both to health and environment. Industry is the major source of toxic substances creating hazardous conditions in the environment. But to what extent is industry responsible for human and environmental health?

In theory, all industry sectors, from laboratory to mine, from manufacture to market, have legally mandated responsibility for preventing adverse effects on human and environmental health as a result of their decisions, activities and products. In reality it is the business of industry to profit from its products. Key figures in the UK cancer establishment have said: **'The pharmaceutical industry will always fund areas that are in their best direct interests. Cancer prevention is not currently one of these ... People value treatment more than prevention so that is where the profit now lies.'** (Dalgleish Richards Sikora 2004)

History shows that industry:
- **'has aggressively pursued short-term economic goals, recklessly uncaring or unmindful of harm to workers, local communities, and the environment. So far, industry has shifted responsibility for the damage it has caused and has externalized these costs onto society at large.'** (Epstein 1990)
- **'neither plans nor accounts for the social and economic costs of its products and processes on the environment and on people. Corporate accounting does not calculate the real value of economic and human loss of the toxins they add to our lives.'** (Chernomas & Donner 2004)

Even when proposed changes are informed by science and endorsed by government, co-operation from industry sectors with a record of persistent and powerful opposition to change – and of judging change in terms of real or perceived industry benefit – is highly unlikely without government leadership and legislative reform.

> **'Industry' is not a homogenous entity ... A general observation is that market leaders, at least initially, are against new legislation as any change threatens their position, but that innovative, dynamic companies frequently embrace new legislation as a way to acquire a greater market share.** (International Chemical Secretariat April 2004)

The need to reduce levels of chemical and radiation pollution is creating opportunities for new partnerships between science and industry. Whether by design or default, scientists and industries responding to such opportunities will benefit future generations and the quality of the environment that supports future life.

Trade Unions

Trade unions could:

- take seriously the health of women members and workers by listening to and recording women's views on the health risks and safety issues they experience in their places of work
- take account of adverse health impacts of women's multi-occupational work patterns
- identify and take remedial action on workplace and occupational factors which affect women's health as distinct from effects on male employees
- document and disseminate information about workplace hazards/risks for breast cancer.

Government

> **Implications of accepting that the cancer epidemic may essentially be preventable will pose some difficult problems for politicians and decision-makers, who will have to consider adopting policies that may damage the economy in the short term in order to reap health benefits which will only become apparent several decades in the future.**
> (Hens Howard Van Larebeke 2004)

Empowered by the people and obligated by law, it is the duty of government:

- to protect public health and the environment from man-made materials and practices that damage or have the potential to damage either of these
- to control industry behaviour in order to prevent adverse effects on health and environment
- to safeguard the population against science and industry-produced hazards, particularly those with irreversible effects such as cancer.

As a consequence of government's failure to adopt effective preventive measures, citizens find themselves caught between two extremes:

- government policy promoting lifestyle changes as key to prevention
- industries producing and marketing carcinogenic 'lifestyle' products.

Prevention economics

In two reports prepared for the UK Treasury by Sir Derek Wanless on future health spending (April 2002, February 2004), he warns that **'the huge sums invested in NHS modernisation will be wasted if the health service is hit by high levels of preventable illness over the next 20 years.'** ('Putting Health First' King's Fund 2004) Both in economic and social terms, prevention is the common sense approach to sustainable, long-term health service provision.

Directions for responsible government

Deep public mistrust stemming from a recent history of government failures to protect public health (e.g. BSE and CJD) makes more urgent the need for resolute government action on many issues related to the primary prevention of breast cancer. For example, a responsible government would:

- make the goal 'pollution prevention' instead of 'pollution control'
- adopt 'the polluter pays' policy
- introduce a toxics reduction programme
- actively promote the development and use of safe alternatives to hazardous substances
- integrate health and environment in policies
- get serious about occupational factors affecting the health of women
- honour the commitment made to implement the precautionary principle

- take stringent measures to protect vulnerable people, particularly children
- extend regulatory requirements to all chemical compounds, old and new
- bring the UK's outdated regulations into line with advances in the field of toxicology
- extend the application of regulations to the whole community
- incorporate lay knowledge in the regulatory process
- prioritise primary prevention of breast cancer
- give breast cancer prevention the highest priority by setting up a working group:
  - made up of professionals experienced in occupational and environmental cancers, independent scientists committed to cancer prevention, representatives of public interest (employee, consumer, citizen) groups and breast cancer, environment, union and workplace organisations
  - dedicated to the development of comprehensive primary prevention policies and strategies.

This group would be given a proportion of annual health expenditure for the implementation of the policies and strategies it recommends.

Reducing human exposures to carcinogens and EDCs will require:

- a massive rethinking and reordering of priorities by science, industry and government
- a political and cultural shift where protection of public and environmental health takes priority over protection of industry, trade and the economy
- interaction and co-operation between independent organisations and institutions.

Above all, future policies for protecting and benefiting human, environmental and economic health will require a return to the basic principles of common sense and a valuing of life and the environment which sustains it.

The cancer industry

The 'cancer industry' is a generic term for the ever-expanding industry which has grown up around the disease of cancer. It is a vast industry incorporating all services, products, materials and technologies required for the orthodox management of the disease.

Given its:

- traditional preoccupation with control and management of the disease
- current preoccupation with new therapies (drug and gene) to meet future demands
- huge (research and financial) investment in therapies for a burgeoning future market
- awareness that profits for society from 'primary prevention' represent a loss of industry profits,

there would appear to be little hope for the 'primary prevention' of breast cancer becoming a priority for the cancer industry.

Evidence for this situation can be found in the long-prevailing silence from the industry on environmental and occupational factors in breast cancer (and other cancers of the reproductive system). Silence from this source in particular deprives citizens of control over their health and their lives by depriving them of basic right to know information. This is the silence that allows industries to go on:

- producing carcinogens and carcinogenic products
- using carcinogens and carcinogenic products.

Cancer charities

As major fundraisers for research and major providers of public information and patient support services in the UK, cancer charities work in close association with the cancer industry. Primary prevention is not their objective. At this time (2005) the few that are addressing 'prevention' e.g. Breakthrough and World Cancer Research Fund (WCRF) are endorsing and promoting the lifestyle focus of government campaigns, both in their literature and prevention-related research.

A cancer-industry view of its future

Authors of a report predicting a continuing rise in cancer rates expect cancer will increasingly be managed with lifelong drug treatment and lifelong monitoring, as in diabetes and asthma. The direct cost for managing the medical care of one cancer patient was approximately £20,000 in 2004. If we are heading into a 'positive chemotherapy future' then, **'by 2025 this figure could easily rise to £100,000 per patient per year – a total of perhaps £1 million over a lifetime. We are starting to spend vast amounts of UK tax on the National Health Service (NHS) taking the total healthcare budget up to £80 billion per year. We could consume a lot more than this in the future just on treating cancer. The explosion of new therapies in cancer care is going to continue and pricing of these drugs will remain high. If effective drugs emerge from the research and development pipeline, the cancer drug market will be worth US$300 billion globally by 2025.'** (Sikora 'Cancer 2025: the future of cancer care' 2004)

A thriving enterprise with a guaranteed future, 'cancer' is a growth industry in every sense of the word. It would be extremely unlikely that this particular industry would champion a case which has the potential to undermine its very existence.

Citizens

Information is the key

Without essential information (and adequate resources) citizens cannot take, or be expected to take, either individual or collective responsibility for disease prevention. Without information we have no choice but to remain:

- vulnerable to exposure
- ignorant about risk
- powerless to choose.

Sources of information

Where industry and government have failed in their responsibilities regarding provision of public information about human and environmental health hazards, comparatively less well-resourced citizens have taken on that responsibility themselves. Dedicating a huge effort in time and energy, national, regional and local non-profit, non-governmental organisations endeavour to fill important gaps in public and consumer information by:

- producing information (print and electronic)
- conducting awareness-raising campaigns.

Citizen action

Some recent breast cancer related actions taken by citizens include:

- **The Ban Lindane Campaign:** A coalition of union and campaigning organisations succeeded in having a pesticide linked to breast cancer incidence banned from garden and agricultural use in 2000.
- **'Think Before You Pink' Campaign:** The public service union (UNISON) and Women's Environmental Network (WEN) directed a postcard campaign (October 2004) at major cosmetics companies. It questioned their support of the corporate-driven 'Pink Ribbon Campaign' (which promised a percentage of sales for research) while producing and selling products containing carcinogens and EDCs, and reminded target companies that 'safer alternatives are available. It's time for companies to phase out these chemicals'.
- **A Bio-monitoring Survey:** 'Bio-monitoring' is the scientific testing of biological samples e.g. blood or urine, to identify the presence and levels of certain substances in the body. In partnership with the National Federation of Women's Institutes (NFWI) and The Co-operative Bank, WWF conducted a bio-monitoring survey in 2003. The aim of the survey was to raise awareness about the presence of specific man-made chemicals in everyday products and situations and the extent to which these contaminate people.

The Paris Appeal

In May 2004 a documented appeal was made to national decision makers, international organisations, the United

Nations (UN) and the European Union (EU) to apply the precautionary principle to chemicals which constitute a danger to health and to support the proposed new EU chemicals legislation (REACH).

The Paris Appeal has already been signed by numerous international scientists, Nobel Prize winners, 400 non-government organisations and 90,000 EU citizens. It has also been signed by two million doctors representing the Standing Committee of European Doctors (CPME). **www.artac.info**

The Human Rights Act

Incorporated into the UK legal system since 2000, the Human Rights Act provides the appropriate framework for citizens deciding to take the 'civil action' path to gain public attention and progress for primary prevention or for related issues such as 'right to know' (RTK).

With no sign of leadership from government regarding primary prevention, and little evidence of a move towards safer, carcinogen-free developments from industry, it is clearly the responsibility of informed citizens to draw attention to, and gain support for, the primary prevention of breast cancer from those who influence policy, and from policy makers at all levels of government.

Little has been done to prevent exposure to carcinogenic chemicals in the environment, despite ample evidence that chemical pollution of our air, water, food and the workplace is the major cause of cancer. On the contrary, government, industry and a small coterie of scientists have combined to stymie efforts to introduce preventive measures, such as strict pollution control standards. But cancer remains a preventable disease. It is up to citizens to push for action. (Epstein 1990)

Public opinion, when it is truly aroused, can be unstoppable. (John Humphrys)

Information and campaign links

Alliance for Safe Alternatives www.safealternatives.org
Association for Research and Treatment against Cancer www.artac.info
Breast Cancer Fund www.breastcancerfund.org
Center for Green Chemistry www.greenchemistry.uml.edu
Chemical Reaction www.chemicalreaction.org
Communities against Toxics www.communities-against-toxics.org.uk
Environmental Working Group www.ewg.org
EPHA Environment Network (EEN) www.env-health.org
European Consumers' Organisation (BEUC) www.beuc.org
Friends of the Earth (FoE) / Scotland (FoES) www.foe.co.uk and www.foe-scotland.org.uk
Green Network www.green-network.organics.org
Greenpeace www.greenpeace.org.uk
Hazards Campaign www.hazardscampaign.org.uk
hazards magazine www.hazards.org
Health Care Without Harm www.noharm.org
Institute of Science in Society www.i-sis.org.uk
London Hazards Centre www.lhc.org.uk
Our Stolen Future www.ourstolenfuture.org
Pesticide Action Network *(UK)* www.pan-uk.org
Soil Association www.soilassociation.org
The Campaign for Safe Cosmetics www.safecosmetics.org
Women's Environmental Network (WEN) www.wen.org.uk
Women in Europe for a Common Future www.wecf.org
WWF – Chemicals and Health Campaign site www.wwf.org.uk/chemicals

Give the people the facts, and let them decide. (Abraham Lincoln)

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This summary document and a full version of it can be downloaded at **www.nomorebreastcancer.org.uk**
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As it is the nature of science that scientific certainty never exists, the proper use of science and scientific findings is precisely to enable us to act with precaution. (Dr Mae-Wan Ho)

One breast cancer patient's view on primary prevention:

The ultimate priority for (cancer) patients is for the medical profession to look more closely at primary prevention. I don't mean screening or eating more fruit and vegetables. I mean spending more time and money on finding out why one in three of us in this country will develop cancer at some point during our lives.

Primary prevention is far too low down on the political agenda and for patients that's unacceptable. For us it is not just gaining access to the best treatments available. It is about not getting cancer in the first place.

Jane Stephenson, Chair UK Breast Cancer Coalition

Dedicated to the memory of all women who have died from breast cancer

UK Working Group on the Primary Prevention of Breast Cancer:

Breast (Cancer) UK
Breast Cancer Research Ethics and Advocacy Strategy

Women's Environmental Network

UNISON
the public service union

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