



# Reducing cancer through environmental policy change

*"The most valuable approaches to reducing cancer morbidity and mortality lie in avoiding the introduction of carcinogenic agents into the environment and eliminating exposure to carcinogenic agents that are already there"*

New England Journal of Medicine, March 2011<sup>1</sup>

Reducing human exposure to environmental carcinogens and other cancer-related chemicals and physical agents is increasingly recognised as a key approach to cancer prevention today. A recent scientific review by the World Health Organization (WHO) defines the burden of chemicals on health as "considerable" and recommends further public health interventions.<sup>2</sup>

The Health and Environment Alliance (HEAL) welcomes the WHO initiative for a Call to Action on environmental and occupational prevention of cancer.<sup>3</sup> HEAL recommends that more attention be given to the environmental and occupational determinants of cancer, especially the removal from the market of chemicals that are carcinogens, mutagens, toxic to reproduction and disruptive to the endocrine system.

This recommendation is included in the recent official US report entitled "Reducing the Environmental Causes of Cancer" by the President's Panel on Cancer.<sup>4</sup> Integrating these recommendations in the WHO's proposed call to action on primary environmental and occupational cancer prevention would ensure that the call reflects the latest understanding of these previously under-recognised cancer risks.

## What is primary prevention?

Primary prevention is about stopping cancer before it starts. Primary "environmental and occupational" prevention could be defined as reducing if not eliminating involuntary exposure to harmful chemicals by removing carcinogens and other chemicals linked to cancer, such as endocrine disruptors, as well as physical agents, from the environment and the workplace. It is separate from early detection, such as breast cancer screening, which is often included in the term "prevention".

Because primary "environmental and occupational" prevention involves eliminating people's exposure to harmful industrially-manufactured chemicals and physical agents, it is predominantly a matter of government policy and business responsibility.

Nevertheless, educating individuals about harmful environmental and occupational exposures is very important. It can help people make better informed choices about use of daily consumer products that can contribute to cancer risks, and about work exposures. Building citizens' awareness also contributes to generating support for changes in governmental policy and business practices.

## Environmental and occupational risk factors for cancer

Environmental and occupational risks go beyond what are currently the usual suspects, namely: excessive UV exposures, radon, passive smoking, asbestos, PCBs, DDT and a few other well-recognised carcinogens, the naturally occurring aflatoxins, and arsenic in drinking water.

They include synthetic chemicals which are carcinogenic, mutagenic, toxic to reproduction, or endocrine disrupting and occur in the air, water, soil, food, ordinary consumer products and occupational settings. With respect to chemicals in the environment, the exposures that contribute to cancer risks can be daily, chronic, low level, multiple and concurrent. Environmental and occupational risk factors are involuntary and often unwitting. Physical agents, such as electromagnetic fields and extremely low frequency radiation also deserve attention, but are not treated in this briefing for space reasons.

<sup>1</sup> Christiani DC, Combating Environmental Causes of Cancer, New Engl J Med 2011; 364:791-793 March 3, 2011

<sup>2</sup> Pruss-Ustun A, Bertollini R et al, Knowns and unknowns on burden of disease from chemicals; a systematic review, Environmental Health, *Environmental Health* 2011, 10:9doi:10.1186/1476-069X-10-9 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3037292/>

<sup>3</sup> WHO meeting entitled "Environmental and occupational determinations of cancer, Interventions for primary prevention", March 2010 [http://www.who.int/phe/news/events/international\\_conference/en/index.html](http://www.who.int/phe/news/events/international_conference/en/index.html)

<sup>4</sup> US President's Cancer Panel: Environmentally caused cancers are 'grossly underestimated' and 'needlessly devastate American lives.' <http://www.environmentalhealthnews.org/ehs/news/presidents-cancer-panel>

The contribution of these environmental and occupational risks to cancer incidence rates are currently underestimated, and often not sufficiently reflected in prevention work. Traditional methods for calculating the percentage of cancer risks to environmental exposures no longer reflect modern science for reasons explained below. As a result, they misinform policy making and research priorities.

### A. Cancer continues to rise

Cancer rates in Europe are continuing to rise - at huge cost to our individual and family lives, our productivity and our health services, and society overall. Over the past 50 years, the incidence of cancer has increased, despite some reductions in mortality rates due to improved treatments. Today in Europe, one man in 2 and one woman in 3 is or will be affected by cancer. One in four will die from cancer.<sup>5</sup>

Breast cancer rates have reached epidemic proportions in Europe. In France, the number of cases of breast cancer increased by an astronomical 97% between 1980 and 2000, according to a French national agency report.<sup>6</sup> New figures in the UK show that one in eight British women can expect a breast cancer diagnosis during her lifetime.<sup>7</sup>

Testicular cancer is the most common cancer in young men. Its incidence has doubled in many western countries every 25 years over the past 60 years.<sup>8</sup>

Cancer rates in children are also rising. The average childhood cancer incidence has increased by 1% per year over the past 30 years in Europe.<sup>9</sup>

The ageing of European populations can usually not explain the increase in cancer incidence, because the rates are typically age-adjusted. Aside from known risk factors, the rest of cancer incidence - around 52% for men and 55% for women according to a French estimate - must be attributed to environmental causes, including the natural environment, work and indoor environments or food.<sup>10</sup>

Over the years, WHO has made significant progress on public health interventions related to tobacco and alcohol. So much so in Europe that smoking and alcohol consumption is stagnating or declining in many countries, and can therefore not be blamed for the rising rates of a variety of cancers taking place today.<sup>11</sup>

The worrying trends in childhood cancer incidence also show that risk factors associated with life style, such as alcohol, tobacco, diet and exercise, are limited in their impact. Childhood cancers, such as leukaemia and brain tumours, may indicate that prenatal exposure to environmental cancer-related chemicals is playing a role. Around 280 industrial chemicals have been detected in umbilical-cord blood.<sup>12</sup>

### B. Environmental pollution as the cause - the science

Concurrently with our rising cancer incidence over the past five decades, our societies have witnessed a rapid increase in the use of pesticides and fertilisers in agriculture, biocides in non agricultural applications, and synthetic chemicals in consumer and industrial goods. The number of synthetic chemicals currently present on the European and American markets is estimated at around 80,000 to 100,000.

The World Health Organization's specialist research agency on cancer, IARC, has acknowledged the importance of both probable and possible carcinogens in the everyday environment. The 2008 IARC World Cancer Report noted (emphases added):

"Also important is the potential cancer burden from exposure to hundreds of probable and possible human carcinogens that have been identified and from thousands of new chemicals that have not been tested for their cancer potential. Little is known about risks from **combinations of exposures** at levels found in the environment or from exposures during **critical time windows of development** or in **susceptible populations**."

Cancers may have **multiple causes**, so that environmental factors may contribute to cancers that are attributed to occupational or lifestyle factors. The known interactions between radon and smoking or between asbestos and smoking support the idea that individual cancers may have multiple causes. Finally, it is important to remember that environmental pollution is not only a cancer problem. Much environmental pollution can be prevented, and reducing environmental

<sup>5</sup> Major and chronic diseases, EU website [http://ec.europa.eu/health/major\\_chronic\\_diseases/diseases/cancer/index\\_en.htm](http://ec.europa.eu/health/major_chronic_diseases/diseases/cancer/index_en.htm)

<sup>6</sup> "Evolution de l'incidence et de la mortalité de 1978 2000", 2004, Institut de veille sanitaire (InVs), France.

<sup>7</sup> Cancer Research UK, 4 February 2011 <http://www.bbc.co.uk/news/health-12356489>

<sup>8</sup> [Men under threat: A referenced briefing on the decline in male reproductive health and the potential role of exposure to chemicals during in-utero development](http://www.chemicalshealthmonitor.org/spip.php?rubrique11) Written by CHEM Trust, <http://www.chemicalshealthmonitor.org/spip.php?rubrique11>

<sup>9</sup> IARC study shows increasing cancer rates in children in Europe, Press release 155, 10 December 2004.

<sup>10</sup> Cancer and the environment website, Generations Futures and HEAL, March 2011 English version forthcoming. [http://www.mdrfg.org/cancer\\_envi/](http://www.mdrfg.org/cancer_envi/)

<sup>11</sup> Cancer and the environment website, Generations Futures and HEAL, March 2011 English version forthcoming. [http://www.mdrfg.org/cancer\\_envi/](http://www.mdrfg.org/cancer_envi/)

<sup>12</sup> Body Burden. The Pollution in Newborns. Environmental Working Group, 2005. <http://www.ewg.org/reports/bodyburden2/execsumm.php>

pollution can contribute to reductions in diseases other than cancer and to increases in aesthetics and in the overall quality of life."<sup>13</sup>

A comprehensive review of epidemiological studies on the effects of pesticides on health was undertaken by an association of doctors in 2004. The Ontario Family Physicians selected the best of all studies published between 1992 and 2003 and found that almost 88% of the selected studies showed a link between exposure to pesticides and an increased risk of developing 10 different cancers.<sup>14</sup>

In 2005, Richard Clapp and colleagues (University of Massachusetts at Lowell) published the 'Environmental and Occupational Causes of Cancer: A Review of Recent Scientific Literature.' A number of environmental and occupational links with certain types of cancer were identified.<sup>15</sup>

- **Metals** such as arsenic and cancers of the bladder, lung, and skin.
- **Chlorination byproducts** such as trihalomethanes and bladder cancer.
- **Natural fibers** such as asbestos and cancers of the larynx, lung, mesothelioma, and stomach.
- **Petrochemicals and combustion products**, including motor vehicle exhaust and polycyclic aromatic hydrocarbons, and cancers of the bladder, lung, and skin.
- **Pesticide** exposures and cancers of the brain, Wilms tumor, leukemia, and non-Hodgkin's lymphoma.
- **Reactive chemicals** such as vinyl chloride and liver cancer and soft tissue sarcoma.
- **Metalworking fluids and mineral oils** with cancers of the bladder, larynx, nasal passages, rectum, skin, and stomach.
- **Ionizing radiation** and cancers of the bladder, bone, brain, breast, liver, lung, ovary, skin, and thyroid, as well as leukemia, multiple myeloma, and sarcomas.
- **Solvents** such as benzene and leukemia and non-Hodgkin's lymphoma; tetrachloroethylene and bladder cancer; and trichloroethylene and Hodgkin's disease, leukemia, and kidney and liver cancers.

More recently, CHEMTrust has published a review entitled 'A review of the role pesticides play in some cancers'<sup>16</sup>. Cohort or case controlled studies show a link between pesticides and leukaemia, neuroblastomas, Wilms tumour (kidney cancer), soft tissue sarcomas, Ewing's sarcoma, non Hodgkin's lymphoma and brain cancers, colon, rectal and testicular cancer. Children are more sensitive to risk than adults because they are both proportionally more exposed and physiologically more susceptible to carcinogens and endocrine disrupting chemicals and pesticides.

### C. The role of chemicals

Reducing human exposure to environmental carcinogens and other cancer related chemicals is increasingly recognised as a key approach to primary cancer prevention today. Cancers are highly complex multifactorial, multistage diseases, and exposures to different risk factors can interact with each other, such that diet, lifestyle, viruses, genetics and environmental and occupational exposures all play a role.

**Carcinogens** can initiate the first stage of carcinogenesis by gene mutations (genotoxic substances). However, other chemicals, which are not defined as carcinogens can nevertheless induce or promote cancer development. These include Bisphenol A (BPA), phthalates, and formaldehyde, which are likely to promote mutations or disrupt hormones.

Exposure to **endocrine disruptors** could explain the increased incidence of hormonally-dependent cancers such as breast, prostate and testicular cancer.

Following his review of "Breast cancer and exposure to hormonally active chemicals" in 2008, Professor Andreas Kortenkamp, a leading scientist on several EU research projects on endocrine disrupting chemicals and a signatory of the Prague Declaration on endocrine disrupting chemicals, concluded:

"Good laboratory and epidemiological evidence exists suggesting that man-made chemicals which mimic oestrogen contribute to breast cancer." He said that the risk of breast cancer will not be reduced until preventable causes, particularly exposure to chemicals, is addressed.<sup>17</sup>

<sup>13</sup> IARC World Cancer Report 2008 <http://www.iarc.fr/en/Publications/PDFs-online/World-Cancer-Report>

<sup>14</sup> Sanborn, M. et al, Systematic Review of Pesticide Human Health Effects, Ontario College of Family Physicians, Toronto. Available at: [www.ocfp.on.ca](http://www.ocfp.on.ca)

<sup>15</sup> Clapp, R. et al, Environmental and Occupational Causes of Cancer: A Review of Recent Scientific Literature published by Lowell Center for Sustainable Production, 2005. <http://www.sustainableproduction.org/downloads/Causes%20of%20Cancer.pdf>

<sup>16</sup> A review of the role pesticides play in some cancers, Gwynne Lyons and Andrew Watterson, CHEMTrust, 2010. <http://www.chemtrust.org.uk/documents/CHEM%20Trust%20Report%20-%20Pesticides%20&%20Cancer%20July%202010.pdf>

<sup>17</sup> Scientists deliver wake-up call: "Reduce chemical exposure to reduce breast cancer", HEAL and CHEMTrust press release, 2 April 2008. [http://www.env-health.org/IMG/pdf/Press\\_release\\_final\\_.pdf](http://www.env-health.org/IMG/pdf/Press_release_final_.pdf) See "What will new EU chemicals legislation deliver for public health?" Briefing from HEAL's Chemicals Health Monitor project, available in seven languages at <http://www.chemicalshealthmonitor.org/spip.php?article148>

March 2011. Health and Environment Alliance (HEAL). Reducing cancer through environmental policy change. [www.env-health.org](http://www.env-health.org) [lisette@env-health.org](mailto:lisette@env-health.org)

A scientific review the following year showed exposure to environmental chemicals may be linked to testicular cancer and other male reproductive health problems which are risk factors for male cancers. The chemical cocktail in the everyday environment may be blocking testosterone and leading to Testicular Dysgenesis Syndrome, a cluster of conditions including rising rates of undescended testicles in babies, malformation of the penis, lower sperm counts in young men and testicular cancer.<sup>18</sup>

Any evidence of the relationship between cancer and exposure to chemicals is likely to yield underestimates for several reasons. First, research that is usually limited to single substance effects when low dose, long term exposure of many different chemicals may present the real problem. Second, the relationship is difficult to study because of the long time lag between exposure and development of the disease. Thirdly, relevant exposure may have occurred in the womb, and this area of research is sparse.

#### **D. What needs to happen?**

The Health and Environment Alliance (HEAL) welcomes WHO's "Call to Action" on primary prevention of environmental and occupational determinants of cancer.

We call for a shift away from the current dominant focus on individual behaviour change to a broader spectrum which also highlight government opportunities and business responsibilities to prevent cancer via primary environmental and occupational prevention measures. In particular, we would like greater attention to be given to the findings of the US President's Cancer Panel.<sup>19</sup>

HEAL would like to see cancer prevention linked more strongly to environmental, product, and worker safety policy making and implementation.

#### **Set targets and act on existing legislation**

The European Union is a recognised global leader in addressing chemical safety. Chemicals such as DDT and Atrazine have been banned for many years. Recent responses to scientific evidence on chemicals and cancer include EU chemicals legislation known as REACH in 2006<sup>20</sup> and a revised set pesticides laws two years later.<sup>21</sup> A workers' carcinogens directive that mandates companies to substitute away from carcinogens also exists.

These are important steps in the right direction but implementation is very slow and many carcinogens and endocrine disrupting chemicals remain in everyday use.

To realise the full potential of these recent laws to reduce cancer incidence, HEAL would like to see specific targets and deadlines set by the EU and by national authorities, and international agreements so that peoples' exposures to confirmed or suspected cancer-related chemicals are reduced by at least half by 2020. Specific targets and deadlines would ensure that companies dedicate more effort and resources to finding safer substitutes than is currently the case, as well as ensuring that governments make verifiable progress over clear time periods.

#### **Integrate environmental aspects into cancer plans**

Cancer action plans should be improved to take into account the various environmental risk factors, including the known or suspected causes or promoters of cancer, and also reinforce reduction deadlines and targets for cancer-related chemicals, so that they can be quickly eliminated.

HEAL has brought together 21 groups, including the European Respiratory Society and the International Society of Doctors for the Environment, who have supported the need for the EU's "Action against Cancer: European Partnership" to adequately address this dimension of primary environmental and occupational prevention of cancer.<sup>22</sup> Although this is not a current priority in the Partnership, we hope that the research work group will soon come to be at the forefront of guiding and supporting research into environmental cancer causation.

---

<sup>18</sup> [Men under threat: A referenced briefing on the decline in male reproductive health and the potential role of exposure to chemicals during in-utero development](#) Written by CHEM Trust, <http://www.chemicalshealthmonitor.org/spip.php?rubrique11>

<sup>19</sup> US President's Cancer Panel: Environmentally caused cancers are 'grossly underestimated' and 'needlessly devastate American lives.' <http://www.environmentalhealthnews.org/ehs/news/presidents-cancer-panel>

<sup>20</sup> See "What will new EU chemicals legislation deliver for public health?" Briefing from HEAL's Chemicals Health Monitor project, available in seven languages at <http://www.chemicalshealthmonitor.org/spip.php?article148>

<sup>21</sup> A review of the role pesticides play in some cancers, Gwynne Lyons and Andrew Watterson, CHEMTrust, 2010. <http://www.chemtrust.org.uk/documents/CHEM%20Trust%20Report%20-%20Pesticides%20&%20Cancer%20July%202010.pdf>

<sup>22</sup> Letter to the European Parliament's Environment committee, on Commission Communication on Action against Cancer: European Partnership, 7 April 2010, see <http://www.env-health.org/a/3554>

## Create a governmental code

The existing European Code Against Cancer<sup>23</sup> provides guidance on life-style changes to individuals. However, it also includes the following: "Apply strictly regulations aimed at preventing any exposure to known cancer causing substances."

A second European Code Against Cancer aimed at governments and businesses should be created into which the statement about reducing exposure to cancer causing chemicals could be included. Other items in this second Code would relate to the value of involving the non-governmental sector in the promotion of primary environmental prevention, addressing the need for advice to individuals on environmental exposures and cancer and the need to improve cancer registers. Registers can help increase accuracy in identifying trends, discrepancies in rates between genders and age groups, and geographical "clusters" of cancer by location, living or working conditions of those affected.

## Share good examples and case studies

If governments are to be convinced that change needs to be made and bring the necessary resources to bear to eliminate use of cancer-causing chemicals, key interest groups and the public must be aware of the need for action and advocate for change.

Examples of "what works" in terms of building community support should be shared widely. They include the creation of "pesticide-free" public spaces taking place in European and North American cities<sup>24</sup>; publishing the chemical analysis of a typical diet, such as demonstrated in the 'Toxic Menu' initiative<sup>25</sup> recently published in France; the launch of a network for farmers and bystanders affected by pesticide use, also in France<sup>26</sup>; the "Occupational Cancer/Zero Cancer" initiative by European trade unions<sup>27</sup>; training programmes for medical professionals<sup>28</sup>, and many educational initiatives such as the film and community development programme "Living Downstream" developed by scientist and cancer survivor Sandra Steingraber.<sup>29</sup>

## Conclusion

With our emerging understanding of the complexity of cancer, the approaches to prevention must also become more sophisticated. As noted in the Cancer Consensus Statement by the Collaborative on Health and the Environment, "Successful cancer prevention will depend on addressing other co-occurring and interactive risk factors along with the broader set of social conditions that influence these exposures".<sup>30</sup>

With cancer affecting ever greater numbers of people and killing one in every four Europeans, we can no longer afford to downplay, as we have in the past, environmental risk factors, particularly chemical contaminants, and the important role their reduction and elimination can play in primary environmental and occupational prevention of cancer.

## Useful documents:

### WMA Statement on Environmental Degradation and Sound Management of Chemicals

<http://www.wma.net>

### Standing Committee of European Doctors (CPME) Statement on Environment and Health, 2005

[http://cpme.dyndns.org:591/adopted/CPME\\_AD\\_Brd\\_030905\\_100\\_EN.pdf](http://cpme.dyndns.org:591/adopted/CPME_AD_Brd_030905_100_EN.pdf)

### Collaborative on Health and the Environment consensus statement

<http://www.healthandenvironment.org/about/consensus>

### Living with chemicals, Danish Ministry of the Environment

[http://www.mst.dk/English/Focus\\_areas/LivingWithChemicals/default.htm](http://www.mst.dk/English/Focus_areas/LivingWithChemicals/default.htm)

---

<sup>23</sup> European Cancer Prevention Code <http://www.cancercode.org/code.htm>

<sup>24</sup> Six steps to pesticide reduction: a community guide, HEAL 2011. <http://www.pesticidescancer.eu/spip.php?article80>

<sup>25</sup> "Toxic Menu" launches cancer and environment programme in France, article on HEAL website 2010. [http://www.env-health.org/a/3607?var\\_mode=calcul](http://www.env-health.org/a/3607?var_mode=calcul)

<sup>26</sup> Pesticide victims fight for justice, Sick of Pesticides Bulletin, HEAL, [http://www.env-health.org/IMG/pdf/Pesticides\\_and\\_health\\_enews\\_-\\_February\\_2010.pdf](http://www.env-health.org/IMG/pdf/Pesticides_and_health_enews_-_February_2010.pdf)

<sup>27</sup> Occupational cancer/zero cancer brochure at <http://www.imfmetal.org/files/07031915130979/ZeroCancer-Update.pdf>

<sup>28</sup> Example of training programme: Intensive Course in Environmental Medicine, 14-16 April 2011, Paris, France, [www.artac.info](http://www.artac.info), and fact sheet, "Cancer and the Environment, What health care providers should know" <http://www.psr.org/assets/pdfs/cancer-and-the-environment.pdf>

<sup>29</sup> Living downstream (film and book) and Walking upstream (community guide) see [http://www.livingdownstream.com/use\\_guides](http://www.livingdownstream.com/use_guides)

<sup>30</sup> Collaborative on Health and the Environment. Consensus Statement on Cancer and the Environment. <http://www.healthandenvironment.org/cancersignon>