Alliance re-echoes call for a Cancer Action Plan.
We must face the stark realisation that our cancer plans and strategies are grossly outdated. Despite gains in treatment and detection still almost 900 people will be diagnosed with cancer in the UK and about half that number will die from the disease each and every day.

Current cancer strategies and plans target lifestyle factors but not 'life circumstance' factors.[1] Not only do strategies and plans ignore the social, economic and gender inequalities but also the interwoven and intrinsically linked environmental and occupational risk factors for cancer. There is little or no consideration given to the fact that lifestyle factors are influenced by economic and social aspects. By not addressing these *confounding* risk factors, strategies to tackle cancer seek to place the onus at the feet of the individual by focusing on individual instead of institutional action.

There are many barriers to action on the primary prevention of cancer; cancer is also caused by lack of political will [2]. Despite high levels calls for inclusion of environmental and occupational risk factors in all cancer plans, the cancer establishment (those involved in determining the dominant thinking from government, industry and the cancer charities and organisations on cancer) continue to maintain the status quo. The onus needs to be shifted away from the feet of individuals to the feet of the cancer establishment to stem the rising incidence of a largely preventable disease. A more balanced approach is needed from the cancer establishment.

Cancer Action Plan
What is needed is a **new Cancer Action Plan** which specifically addresses environmental and occupational risk factors [3] for breast and other cancers with targeted actions for those risk factors and specifically allocated funding. The plan needs to encompass social, economic and gender inequalities and would need to be rolled out across England, Scotland, Wales and Northern Ireland taking into account all countries specific cancer plans and strategies.

The Alliance calls for a **Cancer Action Plan** which includes:

- Environmental and occupational **risk factors** (determinants) addressed as risk factors for cancer in a specific Cancer Action Plan and included in all cancer plans and strategies with definitive targets for action and appropriate allocated funding.
- **Phase out** of all IARC classified Group 1 carcinogens and Group 2A potential carcinogens.
- **Targeted** toxics reduction across all environments, the lived, worked and the first environment, the womb.
- Government **support** for green chemistry and engineering. Hazardous substances should be replaced with safe alternatives utilising the substitution principle.
- **Elimination of** all toxic and man-made chemicals which are found in breast milk and cord blood.
- **Inclusion of** *Just Transition* principles in all toxics use reduction initiatives and product lifecycle management analysis.
- **Elimination** of the future use of all types of asbestos and ensure proper management of the asbestos currently in place to protect workers from asbestos exposure and to prevent future asbestos-related deaths.[4]
- **Readdress** the unsustainable costs of cancer in terms of prevention.
- **Education** on environmental and occupational insults for all cancer specialists.
- B**ringing** cancer policy into the 21st century, by embracing new and emerging science.
- **Use** of relevant language and ensuring that references to the environment and primary prevention are universal and defined in terms of stopping cancer before it starts.
- **Equal consideration** given to precautionary and preventive approaches to cancer alongside better treatment and care.

- **Factoring in** environmental justice principles and the right to a clean and safe environment into all cancer plans. [5]

Moving from the 'scientific Jurassic"

The World Health Organisation (WHO) gives a very conservative estimate of up to 24% of all human diseases are at least in part due to environmental factors which includes chemical exposures.[6] Both the United Nations Environment Programme (UNEP) and the WHO report that the incidence of chronic disease such as cancer is now greater than that of communicable disease. Twenty six different cancers alone have been linked to occupational and environmental exposures. [7]

Our current outdated thinking on tackling cancer is in the '*scientific jurassic'*. [8] Cancer is no longer *a disease that is solely linked to genes meaning it is a disease under hereditary control.* The reality is that cancer *is a disease linked to genes which means it is vulnerable to environmental (and occupational) causes.* [9]

In 2011 the WHO acknowledged the environmental and occupational risk factors for cancer in the Asturias Declaration originating from its conference on Environmental and Occupational Determinants of Cancer: *"Primary prevention - prevention of the exposures that cause cancer - is the single most effective means of prevention".* It goes to state that: *"Prevention of the environmental and occupational exposures that cause cancer must be an integral component of cancer control worldwide."* [10]

A recent paper on environmental and occupational interventions for cancer which has as one of its authors the WHO Director of Public Health and the Environment Maria Neira, echoed the WHO call for a precautionary and preventive approach to cancer: *"Estimations show that at least one–third of all cancer cases could be prevented based on current knowledge. Although preventable risk factors such as tobacco use, alcohol consumption, unhealthy diet, and physical inactivity play a major role in the development of cancer, a range of environmental factors and occupational exposures also contribute significantly to the global cancer burden. Exposures to environmental and occupational carcinogens are often preventable.* [11]

The same paper goes on to state: *"Primary prevention of cancer of environmental and occupational origin reduces cancer incidence and mortality, and is highly cost effective; in fact, it is not just socially beneficial because it reduces medical and other costs, but because it avoids many human beings suffering from cancer."*

The EU partnership on cancer supports the need to address other risk factors rather than just lifestyle: *"Cancer is caused by many factors and therefore its prevention shall address on equal footing the lifestyle, occupational and environmental causes."* [12]

The World Medical Associate statement on Environmental Degradation and the sound management of chemicals advocates for legislation that reduces chemical pollution, reduces human exposure to chemicals, detects and monitors harmful chemicals in both humans and the environment, and mitigates the health effects of toxic exposures with special attention to vulnerability during pregnancy and early childhood.[13]

While the American Medical Association has accepted the statement from the Endocrine Society which supports the evidence on external chemicals factors part in cancer causation: "*The evidence for adverse reproductive outcomes (infertility, cancers, malformations) from exposure to endocrine disrupting chemicals is strong, and there is mounting evidence for effects on other endocrine*

systems, including thyroid, neuroendocrine, obesity and metabolism, and insulin and glucose homeostasis". [14]

In May 2010 a landmark report from the US President's Cancer Panel declared that the *"true burden of environmentally-induced cancer has been grossly underestimated.*

It went on to note that: *"Environmental health, including cancer risk, has been largely excluded from overall national policy on protecting and improving the health of Americans. It is more effective to prevent disease than to treat it, but cancer prevention efforts have focused narrowly on smoking, other lifestyle behaviors, and chemopreventive interventions…….Weak laws and regulations, inefficient enforcement, regulatory complexity, and fragmented authority allow avoidable exposures to known or suspected cancer-causing and cancer-promoting agents to continue and proliferate in the workplace and the community."* [15]

As in the US, in the UK we have a similar fragmented approach when it comes to cancer. Responsibility is spread across the Department for Environment, Food and Rural Affairs (DEFRA), Department for Business, Innovation and Skills, Department of Health and the Health and Safety Executive. It is hard to see where these departments coalesce and where and how policy on cancer is decided. This facilitates exploitation also like in the US where:

"Industry has exploited regulatory weaknesses, such as government's reactionary (rather than precautionary) approach to regulation. Likewise, industry has exploited government's use of an outdated methodology for assessing "attributable fractions" of the cancer burden due to specific environmental exposures. This methodology has been used effectively by industry to justify introducing untested chemicals into the environment. [15]

In the EU, chemicals legislation called REACH will seek to address this and reverse the burden of proof back onto industry to prove a chemical does not harm health or environment before it is released for use.[16] REACH will save €54 billion in health care over the next 30 years. But environmental law group Client Earth found information submitted on certain chemicals had gaps in the data and this was specifically in relation to chemicals which had endocrine disrupting properties having the potential to cause cancer. [17]

In view of all this high level demand for action to address the environmental and occupational risk factors the Alliance has consistently questioned why we are still only addressing the so called lifestyle factors in our cancer programs, which only account for some 40% of cancer cases. What about the other 60%? The alliance believes that environmental and occupational exposures are the *confounding risk factors* which research fails to factor in, so any resulting data would be skewed in favour of addressing the 'acceptable lifestyle' risk factors only. What would the landscape for cancer look like if we factored in the confounding factors?

Cancer at work

Occupational factors are thought to cause in excess of 40,000 cancers each year [18] and cost up to £59bn. Certain occupations carry with them greater cancer risk yet: "*the actual scale of cancer caused by work goes unacknowledged, the numbers of workers exposed is underestimated and there is no sense of urgency to tackle this massive but preventable workplace epidemic.* [19]

Occupational cancer Researcher Simon Pickvance warned that the UK HSE was in denial about the scale of occupational cancer for over three decades. Research relied too heavily on epidemiology which is only capable of seeing widespread, long-established problems amongst large numbers of workers, employed for long periods of time, in large workplaces such as mines, mills and

manufacturing. This is totally unsuitable for today's, smaller and fast evolving workplaces with more complex, and diverse exposures. It is incapable of picking up high risk exposures affecting smaller groups of workers. On diesel fumes exposure alone, it is simply incomprehensible that the well over a million workers who have a raised risk of a cancer because they work in diesel-exposed jobs.

Pickvance joined occupational cancer campaigners in demanding a workers inquiry to identify all workplace exposure to carcinogens and urgent action to enforce their elimination. A fully participatory approach towards identifying exposure scenarios and methods for toxic use reduction must be the way forward. What is needed is a picture of the risks we face in the jobs we do today via a *Trade Union backed workers inquiry to identify all workplace cancer exposures. Plus a massive preventive proactive enforcement of elimination and an abandonment of the use of cost-benefit analysis in setting exposure limit for carcinogens in EU, as there are no safe levels of exposure to carcinogens.*[20]

In 2007 a group of international unions put together a union campaign guide on occupational cancer prevention and called for a global campaign on occupational cancer. [21] The conservative estimate then for deaths from occupational cancer was 1 death each 52 seconds, cancer accounted for 32% of work related deaths worldwide, the figure now will be far higher. Research based on outdated theories about exposures at work and gender blindness continue to contribute to the rising number of work related cancers.

This is also exemplified in the HSE approach to women's cancers where there can be a triple jeopardy effect for women with exposures happening daily not only in the workplace, but also in the home and then again in the wider environment. Some examples are those working with cleaning or cosmetics products or in agriculture.

The HSE scope for carcinogens should be widened to include all carcinogenic, mutagenic and reprotoxic chemicals and substances (CMR's), and encompass those not only addressed in REACH but also listed on the Sin List.[22]

Canadian researchers found excesses of breast cancer among women in working in agriculture, automotive plastics, and the food canning industries. There was an elevated breast cancer risk, up to 5 times higher than the controls among those working in certain sectors such as automotive plastics.[23]

Danish studies of occupational work patterns such as shift work have also shown that working night shifts more than twice a week is associated with a 40% increased risk of breast cancer. [24] The Danes gave compensation to those women whose illness was brought on by working night shifts and sought to reducing the risk from night shift work.

Yet the institution responsible for acting on this, the Health and Safety Executive, does nothing. Action could be taken immediately to eliminate or reduce exposures in these identified industries and workplaces and make simple interventions to reduce shift work risks. But the HSE has chosen instead to fund yet more research. [25] These studies won't be completed until Dec 2015 by which time another 1,500 women will have died of breast cancer related to night work.

A cancer free economy

The Lowell Centre for Sustainable Production talks about creating a cancer-free economy, how we must move away from building our economy on cancer causing chemicals. [26] The centre has had considerable measurable success with its Toxic Use Reduction Act in Massachusetts[27] the releases of carcinogens into air and water have declined by 93% since the program began.

According to the Centre: *"The more we learn about cancer causation, the more it becomes evident that a cancer prevention program based simply on exposure reduction just isn't protective enough. Future exposure reduction programs likely need to be replaced by chemicals policies that promote green chemistry, alternatives assessment and "sun-setting" of current carcinogenic chemicals."*[28]

Consideration must be given in any cancer action plan acting on these occupational and environmental risk factors to take a *just transition*[29] approach to all phase-out and toxic reduction initiatives to minimise impacts on workers. Exposure scenarios also have to be considered across all environments, the lived, worked and the first environment, the womb.

Way back in 2002, the National Cancer Research Institute published their report into prevention and risk research in the UK. [30] Then, less than 2% (£6.3m) was spent on prevention of all cancers in 2011 this had risen to a heady 3.4% (£17.1m).[31]

Yet the economics don't add up, the cost of cancer which includes healthcare costs comprising of NHS and hospice costs, costs to family and patient, losses in productivity covering cancer survivors and cancer deaths (both paid & unpaid work) is a conservative £18.33 billion/yr. (2008 figure). [32]
In the EU, Cancer costs countries 126bn euro (£107bn) a year. [33]

Given our current economic climate taking precautionary and preventive action by addressing environmental and occupational risk factors is obviously the most economical way forward, if we are to have sustainable public health.

Including the confounding risk factors
Some countries have already addressed these risk factors, the cancer establishments in Canada [34]and France [35,36] have identified and targeted for action the environmental and occupational risk factors in their cancer plans. While others are recognising the need for inclusion. Iin its critical review of the policies regarding cancer-related chemicals in our living environment, the Flemish Cancer League concluded that: *A cancer plan should contain initiatives in the area of primary environmental prevention of cancer.* [37]

The Danish Chemicals Action Plan 2010-2013 [38] which takes as its starting point the goal agreed at the 2002 World Summit on Sustainable Development in Johannesburg. That is to ensure that by the year 2020 there are no goods or products on the market which have significant adverse effects on human health and the environment. The Danes plan to focus on EDCs and the 'cocktail effect' in relation to cancer.

For specific cancers, such as breast cancer, there have been repeated demands to prioritise prevention, most recently in 2013 from the Interagency Breast Cancer and Environmental Research Coordinating Committee (IBCERCC). [39] The report gives 7 recommendations which could apply to cancer action plans here and urge engagement across all disciplines.

Work began on this initially in 1997 in the UK [40] with a petition to the UK government to devise a national action for breast cancer which including action on the primary prevention of the disease. At the World Conference on Breast Cancer delegates called for a Global Action Plan for Breast Cancer which was developed in 1997.[41]

In 2000, a seminar in the House of Commons, Stopping Breast Cancer Before it Starts, re-echoed that call for a National Strategy and separate funding for the primary prevention of breast cancer.[42]

A seminal document was published in 2005 by the UK Working Group on the Primary Prevention of Breast Cancer; Breast Cancer: An Environmental Disease – the Case for Primary Prevention. The report criticised the government and the cancer establishment for their complicity for not exposing the real facts on breast cancer – that man-made environmental pollutants are major causes and that breast cancer is preventable. The group urged the cancer establishment to break the silence that kills and urgently prioritise primary prevention and to reduce production, release and use of toxic substances.[43]

In 2007 Women in Europe for a Common Future issued a campaign call for an EU strategy on the primary prevention of breast cancer on the back of a briefing on breast cancer: the politics and prevention. [44] In April 2011 the Health and Environment Alliance (HEAL) [45] reiterated the Asturias call for recognition and action on the primary prevention of cancer to deal with the environmental and occupational risk factors.

Considerable work has been done over the last few decades to try and get recognition for environmental and occupational risk factors but with little movement from the cancer establishment. We can only speculate why this 21st century disease is still being addressed with an 18th century solution, and question who is financially benefiting from breast and other cancers, while continuing to investigate the long-standing inaction on this issue by the cancer establishment.

EDCs

Closely linked with the rising cancer epidemic is our universal exposure to Endocrine Disrupting Chemicals (EDCs) which have the ability to adversely interfere with the functions of our hormones and our endocrine system which regulates every aspect of life. They can have effects at extremely low levels and in combination and they are closely connected to cancer causation, promotion and predisposition. [46]

Theo Colborn, author of our stolen future said that the "*damaging effects of hormone-disrupting chemicals on fertility, the brain and behaviour quite possibly make them a more imminent threat to humankind than climate change".* EDC's effect all the systems that participated in how we are constructed in the womb and how we are functioning today.[47] The very same chemicals that threaten our future health and are many of the same ones which threat our climate, polluting from cradle to grave.

Our exposure to EDCs is ubiquitous and has been called a global threat to health given their intrinsic ability to interfere with our hormones[10] hence efforts to regulate and control our exposure to them would have unwelcome global ramifications for industry. EDCs have been linked to cancer, reproductive and developmental disorders, cardiovascular disease, neurodevelopmental disorders in children, asthma and allergies, diabetes and obesity.

In connection with EDCs, the old adage the dose makes the poison is no longer relevant. [48] We now know that timing is more critical than dose. Hence legislation based on this dose related premise is outdated. EDCs can alter gene behavior at extremely low doses and exposures pre-birth can program adult disease in later life. Experiments on high doses don't predict low dose response.

Doubt is their product

Much doubt has been cast on the science in relation to low level cumulative and combined exposures and the capacity for certain chemicals to act differently than expected particularly in relation to EDCs. Part of the uphill struggle we have all unwittingly experienced over the years has been trying to address this doubt with yet more reports and briefings. But maybe there the doubt is a smoke screen which we need to blow clean away.

The European commission is currently updating its strategy on EDCs. These chemicals are utilised in a vast array of consumer products from plastics, to cosmetics, toys, cleaning products etc and workers are daily exposed to levels which can cause harm.

Work to remove these chemicals from all our environments has been supported by statements from the Collegium Ramazzini, an international academy of 180 scientists from 35 countries experts in environmental and occupational health, who urge a stringent hazard based evaluation for EDCs and a precautionary approach that will protect the general population and workers from the effects of EDCs.

Their concern is for Europeans who are exposed to EDCs both natural and synthetic to an extent that is causing adverse health effects such as breast, testicular and prostate cancer and reproductive and neurological problems. They suggest that EDC effects can be transmitted to future generations. [49] Current health and safety regulations may aim to protect pregnant women, but pre-birth exposures to EDCs can happen from the moment of conception and even preconception. 6

This concern is echoed by the Berlaymont Declaration which originated from a 2012 conference convened by the EU Commission comprising of international scientists and representatives from stakeholder groups to discuss the upcoming policy initiatives on EDCs. The declaration called on the EU Commission to implement a regulatory regime for endocrine disrupters that is based on sound scientific principles. Although they acknowledged uncertainties remain, these scientific uncertainties should not delay regulatory action. Commercial interests must not take precedent over concerns about risks associated with endocrine disruptors. [50]

But other scientists have been critical of work to reduce the impact of EDCs especially around the issue of the definition of an EDC and the levels at which they can cause harm. In an award winning article in Environmental Health News, investigative journalists examined this debate raging between scientists. [51]

Seventeen scientists who subsequently were discovered to have current or past ties with industry, to signed an editorial which was published in 14 scientific journals. The editorial strongly criticised the precautionary approach of the EU to EDCs and suggested that it defied science. In a rebuttal, by 41 other scientists with no industry ties, [52] they questioned the conflict of interest and reasons behind such an 'emotional' attack.

Others question the industries 'war on carcinogens'. An editorial questions why, when evidence from animal studies is essential to identifying chemicals likely to contribute to cancer causation in humans, the chemical industry put forward spurious arguments to discount human relevance of animal studies. The editorial suggests that this tactic have delayed and prevented timely action on *'many economically important yet carcinogenic chemicals"* such as asbestos, phthalates, tobacco, trichloroethylene, and arsenic, to name few. [53]

We know that *"every proven cause of cancer in humans has also been shown to cause cancer in animals when adequately studied. Policymakers have agreed that in order to prevent cancer in humans, we should rely on experimental findings."* [54]

The worrying questions that continue to be raised about conflict of interest and bias not only in research papers but also by publishers and in scientific journals who control the flow of scientific information is of great concern. This is outside the remit of the average citizen who depends on truthful reporting of science to help us prevent cancer. This delaying tactics ultimately leads to unnecessary illness, suffering and deaths and is therefore unacceptable.

We must be mindful about how a debate about policy (on toxic exposures and public health) can successfully been turned into a debate about the science [55] and how this will impact on cancer prevent policies.

Not just a disease of old age

Although we have to acknowledge that *'cancer has always been with us',* it was extremely rare in ancient times. [56] But it has risen exponentially over the last 50 years to the point where 1 in 3 of us are expected to live or die from the disease at some point in our lives. We might be living longer but we spend fewer years of our lives without disease. [57]

But cancer is not just a disease of old age. Childhood cancers (who have none of the 'lifestyle risk factors associated with adult cancers such as smoking) in industrialised countries increasing by 3% every 3 yrs [58]and 1 in 500 children develop a cancer before the age of 15 and before the age of 6 years for almost half of them, and evidence suggests pre-birth exposures can dictate future cancers.[59]

In the UK childhood cancer rates have increased by 40% since the late 1960's. Prenatal exposure to certain chemicals has been documented to increase the risk of cancer in childhood. And the American College of Obstetricians and Gynecologists and the American Society for Reproductive Medicine recently joined *"leading scientists and other clinical practitioners in calling for timely action to identify and reduce exposure to toxic environmental agents while addressing the consequences of such exposure". [60]*

Redefine cancer in terms of a violation of our human rights

If we start from the premise that "*health is a fundamental human right indispensable for the exercise of other human rights*. [61] The right to prevention in relation to epidemic, occupational and other diseases has been addressed in the International Covenant on Economic, Social and Cultural rights amongst others. [62]

Allowing chemicals and substances which are known or suspected of instigating or promoting cancer into our bodies shows a 'reckless disregard for human life". [63] People make a presumption that 'we' are controlling cancer causing chemicals and substances. What's on sale is safe and my boss wouldn't let me work with anything if it was toxic.

But cancer is not a stand-alone disease, it is intrinsically linked with the environment we are born into, live and work in. When we introduced toxic chemicals into our environment, our bodily environment, even our first environment, in the womb, we consigned a number of people to death.

A redefinition of environmental and occupational exposures as an expression of 'violence' against the human body might serve to place these exposures where they should be seen as a violation of human rights.

At the World Summit in 2002 Mary Robinson then UN High Commissioner for human rights stated: *"The contribution of environmental protection to the realization of basic human rights, and the role of human rights in protection of the environment are undeniable. Substantive rights such as the right to food, health and the right to life itself will not materialize for all of the world's inhabitants unless we maintain a clean and healthy environment with a sustainable base of environmental and natural resources. Certainly, the full potential of human rights cannot be realized when an increasing portion of the world's inhabitants find their human potential constrained by a polluted and degraded environment and are relegated to hopelessness in extreme poverty." [64]*

The need to bring cancer policy into the 21st century

New technologies bring with them new cancer risks, our strive for energy and the use of fracking and other 'unconventional' extraction methods for gas bring associated exposures and environmental degradation. 25% of the 632 chemicals used in all natural gas extraction have been associated with cancer causation. [65]

This is also true in terms of technologies such as microelectronics and its associated e-waste. Thousands of toxic chemicals are used as raw materials and can affect those exposed right through the supply chain but especially during manufacture and disposal. [66] Now we are also exporting cancer risk to other countries whose health and safety laws give even less protection than they do here. We need to consider cradle to grave exposures when it comes to cancer.

But our neglectful cancer establishment would rather retain the status quo than really tackle primary prevention and fail miserably to understand the true meaning of the word prevention. Primary prevention means stopping cancer before it starts, it means acting on what we know and working to eliminate all exposures to chemicals and substances linked to cancer in our homes, workplaces, and in the wider environment, and also now in the womb, our first environment.

A first step maybe to change our language around cancer. this is not a war to be fought, detection is not a weapon, drugs are not bullets and cancer patients are not casualties but collateral damage.

We are at a crossroads in terms of old ideas about chemicals that don't apply any more, new approaches are needed. Current gaps in our knowledge means assumptions are being made. Time and time again scientists discover damage to human health or the environment caused by factors that were never considered in any risk assessment. What would the landscape for cancer look like if we factored in the confounding factors? Will we ever take the chance to find out?

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