

Can Chemicals Emitted by a Modern Incinerator Damage Health?

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Ralph Ryder is the Coordinator of Communities Against Toxics. **Communities Against Toxics (CATS)** is a coalition of long suffering communities throughout the UK and Ireland living with Toxic, Municipal and Clinical incinerators: landfill sites, waste treatment plants, chemical plants and other dangerous, polluting industrial facilities.

Before we can answer that question we need to look at the sensitivity of the developing foetus and growing children to chemical impact. Because of a variety of factors, children have a greater potential for adverse health effects from the impact of chemicals than adults. Children are still developing in many ways and less able to rid themselves of exposure due to immature mechanisms for detoxification. Because of differences in metabolism and behaviour, they may reach higher levels of exposure within the same environment as adults. Children are not simply 'small adults'.

While there has been increased research in the examination of children's health and chemical impact, little attention has been given to consequences of developmental exposures that occurred in either foetal development, during breast feeding, or in childhood, when the child reaches maturity.

To identify and understand the relationship among exposures and the developmental outcomes, we must first look towards identification of the key time periods during foetal development where chemical impact can result in specific outcomes.

Epidemiologists are now aware that it is not simply the dose of a toxin that causes damage to a developing foetus, but at what stage of development the foetus is at when exposed to the toxin.

Researchers have considered the importance of exposure timing and how this affects the outcomes, but no one has systematically compiled: preconception, prenatal, and postnatal developmental exposures and the subsequent outcomes from impact at these different stages.

Efforts have been undertaken to examine the information available and to evaluate the implications for risk assessment for several areas:

- a) respiratory and immune systems,
- b) reproductive system,
- c) nervous system,
- d) cardiovascular system, endocrine system, and general growth, and
- e) cancer.

A developing baby is called an embryo from the time the bilaminar germ layer appears during the second week after fertilisation to approximately the eighth week of gestation, by which time most major organ and tissue development has occurred. By the end of the embryonic period in the eighth week, tissues and organ systems have developed and the major features of the external body form have developed. The period of development between the fourth and the eighth week, when all of the major tissue and organ systems begin to develop in the human embryo, is referred to as organogenesis. The foetal period extends from the ninth week until birth. During the foetal period, the foetus grows in weight from approximately 8 g to approximately 3,400 g. Weight is gained mainly in the third trimester, but the foetus increases in length mainly during the second trimester. Many organ systems, including the brain, peripheral nervous system, sensory systems, and the reproductive system, are not mature at birth. [1]

As you can see this gives chemicals a large 'window of development' in which to reach though and impact a foetus, breast-fed or growing child. The result of that impact will be carried by that child all through its life, but might not become evident for many years.

This means that a developing foetus in the womb of a women living near any facility emitting chemicals today, is faced with a different type of risk as that faced by a foetus decades ago. The expansion of a chemicals industry that now has approximately 30,000 chemicals in daily use means each and every one of us carries something like 400 to 500 chemicals in our bodies that our grandparents didn't. Some of these chemicals can damage the immune system. Some can cause cancer. Some can damage reproductive systems. Some can damage the brain. Can we really believe these are not affecting something as sensitive as a developing foetus? Of course not! Yet these chemicals are being emitted every working hour of every day by even the most modern incinerator dealing with the complex waste steam of today's throw-away society.

Every incinerator ever built emits a whole cocktail of chemicals every hour of its operational life. Sometimes in large quantities, as during an upset or unauthorised releases. Sometimes in small quantities. Some chemicals, like dioxin and dioxin-like compounds are nearly always, (except in explosions as happened at Seveso) released in trace quantities, which the industry tells us are "insignificant" amounts.

However, because of their toxicity and persistence these traces are known to be the most dangerous. Advocates of burning waste who make claims that these amount are too small to have an impact on any section of society, including nursing children, are quite simply lying and cannot, when challenged, provide one genuinely conducted scientific study to prove what they say is true.

These "insignificant amounts" build up in the environment, human tissue and fat and consequently become a larger amount within the body and environment.

Some chemicals are considered harmless on their own, but take on a complete new look and toxicity when combined with others. This synergistic effect and its impact is a complete new ball game for scientist to consider when looking at human health effects. If we look at the epidemiological evidence available on the health of communities hosting incinerator facilities we can see the reality of the incineration process and what could well be (for example):

- The individual impact of a single toxin at a certain stage of foetal/childhood development
- The synergistic effect of a combination of chemicals
- The result of 'insignificant amounts" of persistent chemicals impact or build up.

In England a recent report has been published showing women living near incinerators have a higher risk of having a baby with spina bifida, brain damage or a heart defect. [2]

The study by a team of researchers lead by Professor Louis Parker of Newcastle University also found an increased risk of stillbirths among women who lived close to a crematorium.

The research analysed births in Cumbria between 1956 and 1993. There were almost 245,000 births, of which 3,234 were stillborn and 1,569 had congenital abnormalities.

The risk of neural tube defects, particularly spina bifida, for babies of women who lived near incinerators was 17% higher, and heart defects 12% higher. For women who lived near a crematorium, the risk of stillbirth was 4% higher and the chance of the baby having a brain abnormality known as anencephalus was 5% higher.

Their findings stressed that they did not find conclusive evidence that living near an incinerator or crematorium caused birth defects or stillbirths, but they said the issue should be investigated further, especially as incineration was becoming a widely used method of waste disposal.

In France another epidemiological study [3] compared the number of births of deformed babies before and after the installation of incinerators: they conclude that within a 10-year-period, in the Rhone-Alpes region, an excess of 220 children were born with malformations after the construction of the incinerators. Therefore, according to the authors, "for the total of congenital malformations and the large categories of minor and non-genetic malformations, a significant difference in incidence is observed with a greater risk for the population exposed after the start of the incinerators than before".

This temporal correlation is matched by a geographical correlation. Still according to the authors, "the general objective ...consists of assessing the risk of congenital malformations among the neighbours living in the surroundings of the municipal solid waste incinerators.

"Globally, significant risks for the exposed population are observed regarding two types of malformation: chromosomal anomalies and other major malformations." With that spatial approach, they actually find an excess of over 300 deformed children.

Even taking into account the data from the French Ministry of the Environment, clearly underestimated, one realises that the problem is not limited to 'small, dirty or old incinerators' as supporter of process claim. Among the worst French incinerators in terms of dioxin emissions are the biggest and most beautiful ones: St-Ouen (just outside Paris) emits 4.99 g/year, Strasbourg emits 8.75 g/year, and Lyon emits 4.49 g/year (just to give two examples).

Yet another recent study [4] whose authors had previously detected a cluster of patients with non-Hodgkin lymphoma around a French municipal solid waste incinerator with high dioxin emissions. They undertook a study to explore the environmental route suggested by these findings and carried out a population-based case-control study in the same area. They compared 222 incident cases of non-Hodgkin lymphoma diagnosed between 1980 and 1995 and controls randomly selected from the 1990 population census, using a 10-to-1 match. They discovered the risk of developing non-Hodgkin lymphoma was 2.3 times higher (95% confidence interval $_ 1.4 -3.8$) among individuals living in the area with the highest dioxin concentration (as estimated by an airborne dispersion model) than among those living in the area with the lowest dioxin concentration. No increased risk was found for the intermediate dioxin exposure categories. Adjustment for a wide range of socio-economic characteristics at the block group level did not alter the results.

Their conclusion was "although emissions from incinerators are usually not regarded as an important source of exposure to dioxins compared with other background sources, their findings support the hypothesis that environmental dioxins increase the risk of non-Hodgkin lymphoma among the population living in the vicinity of a municipal solid waste incinerator."

This finding, together with the non-Hodgkin lymphoma mortality excess reported by Bertazzi et al around Seveso, lends support to the hypothesis that airborne dioxin exposure may be a public health concern.

Staying with studies revealing increased levels of Non-Hodgkin's Lymphoma we look again to France and a study conducted by Jean François Viel et al [5] where the authors examined the spatial distribution of soft-tissue sarcomas and non-Hodgkin's lymphomas around a French municipal solid waste incinerator with high dioxin emissions (16.3ng international toxic equivalency factor /m³(ITQ)

The authors write "Soft tissue sarcoma is a rare event but during the 16 year study 110 cases were accrued, corresponding to a crude incidence rate of 1.4 per 100,000. The focused test found a significant cluster around the incinerator. An excess of 14 cases was observed and the

standardised ration was 1.44.

Clusters were found at a number of census areas around the incinerator as follows:

45 observed, 31.22 expected.
12 observed, 3.49 expected.
45 observed, 31.22 expected.
286 observed, 225.25 expected.
109 observed, 59.09 expected.

The authors wrote, "On the whole the consistency of our findings for soft tissue sarcoma and non-Hodgkin's lymphoma is remarkable. Moreover, the fact we found no specific cluster for the control cancer category of Hodgkin's disease reinforces previous, positive results. These finding together with the consistency of the results across genders for non-Hodgkin's lymphoma (cluster involving only males would have favoured an occupational exposure) makes us suspect, at least for this type of cancer, an environmental pathway involving dioxin.

Of course advocates of incineration will claim these illnesses are likely a result of these people being members of the lower classes, the socio-economic section of society renowned for excessive smoking and drinking etc., which is already taking its toll on their health. But surely that is yet another reason not to build incinerator among these sections. Why burden society with even more health care costs by exposing these already damaged people to an overload of chemical mixtures? Surely if governments are keen to build incinerators they should build them in affluent areas where the people, because of their healthy diets and lifestyles are better able to resist chemical impact because of their excellent immune systems? Of course not, no government would ever consider this, it's a ludicrous, silly idea. But then the British government started the silliness with their refusal to take notice of the ever-increasing mountain of epidemiological evidence of ill health around incinerators and the publication of a Waste Strategy calling for the building of over 100 energy-from-waste burners over the next 15 years.

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