

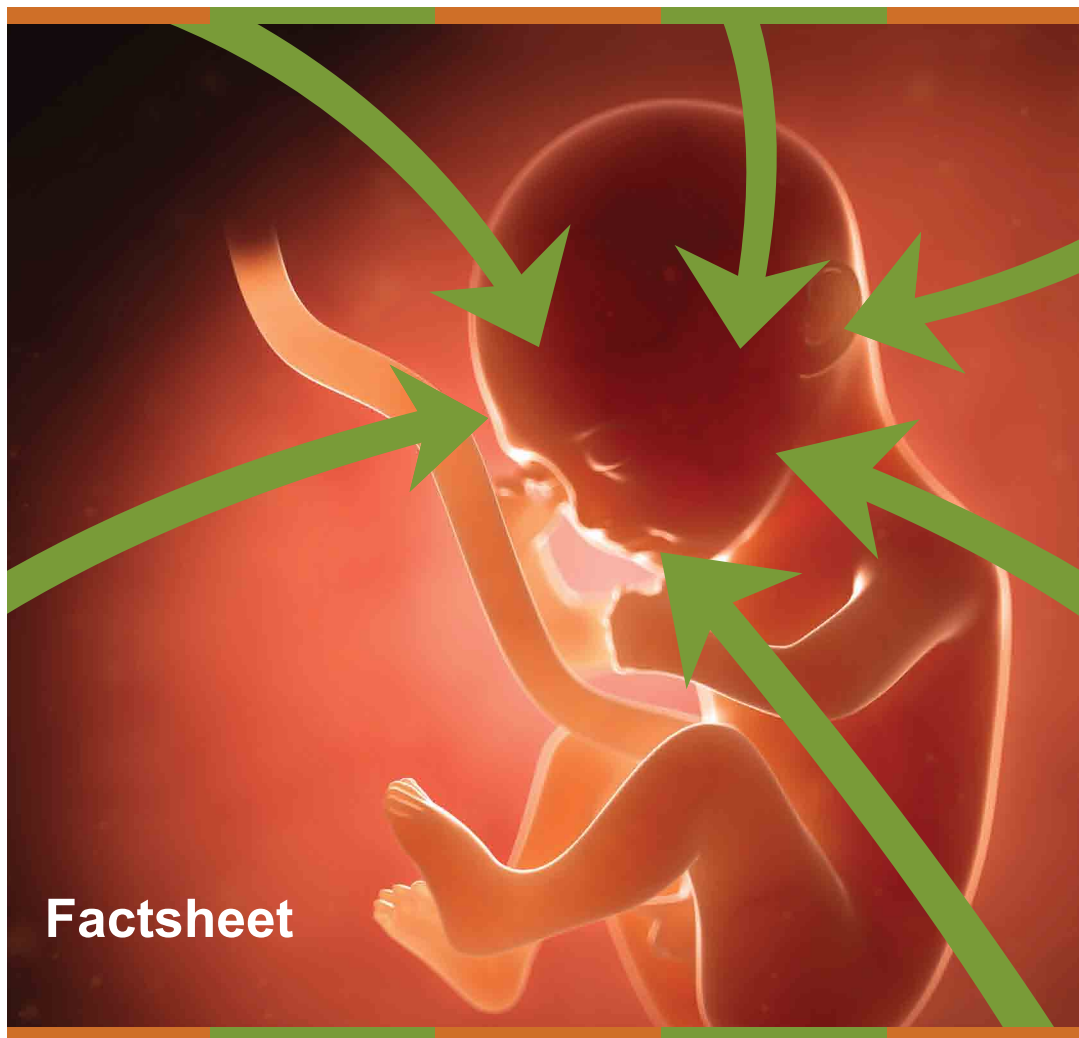


CHEMTrust

Protecting humans and wildlife
from harmful chemicals

No Brainer

The impact of chemicals on children's brain development:
a cause for concern and a need for action



Factsheet

We are all exposed to hundreds of man-made chemicals in our daily life. These come from everyday products such as furniture, food and food packaging, toiletries, electronic goods, and clothes. This means we are exposed to a cocktail of chemicals throughout our day and throughout our lives. It is now well established that some chemicals are able to disrupt the normal development of the brain. **Unfortunately, chemical exposure is now so ubiquitous that babies are born pre-polluted by this chemical cocktail, which means that children may not be able to reach their full potential.**

The developing brain

Brains are astoundingly complex. They are made up of over 85 billion neurons which have grown, developed and interconnected during our lives.

Brains take a long time to develop and it does not stop at birth – it isn't until our 20's that the neurons in the brain are fully developed.

A range of hormones play an important role in normal brain development and function. But this interaction can be disrupted by chemicals that for example mimic or block the function of the hormone. Exposure to some chemicals may mimic the action of the thyroid hormone which is essential for growth and brain development, whereas for example lack of iodine, a nutritional deficiency, prevents production of the hormone.

Early impact on brain development can cause permanent problems for the rest of an individual's life. There is only one chance to develop a child's brain!

Scientists are increasingly linking chemical exposure during development to an upsurge in behavioural challenges in children. These behavioural traits include Attention Deficit Hyperactivity Disorder (ADHD), impaired social interactions; and intellectual challenges include learning disabilities, impaired reasoning skills (reduced IQ) and autism. The effects may be subtle at the individual level, but across a whole population they can represent a significant decrease in intellectual ability within a generation, which may have big societal costs.

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The current generation has the responsibility to safeguard the brains of the future.”

Professor Philippe Grandjean



Brain Damaging Chemicals

There are a number of well-known chemicals that damage the developing brain and which have had tragic consequences. These include substances such as lead, (methyl) mercury and PCBs (a group of very persistent and toxic chemicals). Their use is now restricted by global actions – for example, lead has been taken out of paints and petrol. However, their impact on the developing brain was only discovered by scientists after the damage to large numbers of children and adults had taken place.

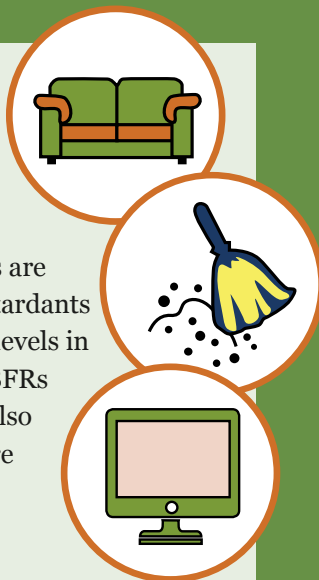
Recently other chemicals, that can damage the brain during development and which are commonly used in many consumer products, have been identified. We need to learn from our previous mistakes and bring in the strongest possible public health protection against these chemicals. The protection of future generations of children depends entirely on us.

The chemicals which are particularly concerning for brain development are:

Brominated flame retardants (BFRs)

A group of chemicals added to furniture, electrical equipment and building materials to reduce flammability. Some of these chemicals are banned yet they are still found in older products in the home, e.g. sofas, soft furnishings and electrical goods, while others are still being added to new products. Because the flame retardants leach out of products, they are found in worryingly high levels in household dust which we can inhale and ingest. Some BFRs induce neurodevelopmental effects in rats. BFRs have also been found in human blood serum and some of them are associated with neurodevelopmental effects in children.

Organosphorous flame retardants have been introduced to the market as an alternative to the problematic brominated flame retardants. However, some of these substitutes have already been regulated due to reproductive toxicity and some studies also report effects on the brain.



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Chemical exposure is now at unprecedented levels, is multiple, ubiquitous and present from conception onwards.

Professor Barbara Demeneix

Bisphenols

A group of chemicals that are used in the production of a wide range of products from hard clear plastic and tin can linings to till receipts and the housing of electronic products like mobile phones. In a 2015-study, bisphenol A (BPA) was detected in over 90% of people from six EU Member States, including in 100% of Swedish mothers and children. Today, bisphenol A is one of the most closely scrutinised chemicals in the world, yet it is still produced in the millions of tonnes per year in the EU alone. Concerns about bisphenol A and the impact on brain development are well documented, hence some product manufacturers have removed it from their manufacturing. However, often they have simply replaced it with very similar chemical bisphenol S (BPS), or another bisphenol, about which similar toxic concerns are now being raised. An expert committee of the the European Chemicals Agency (ECHA) has concluded that BPS has a “toxicological profile” similar to BPA and should not be used to replace it in products.



Chemical threat to brain development

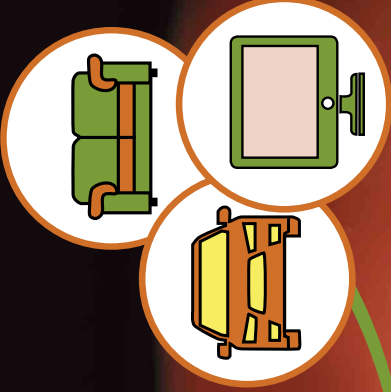
Bisphenols
Till receipts



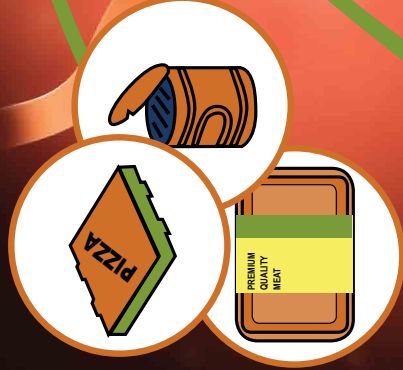
**Phthalates/
BFRs**
Household dust



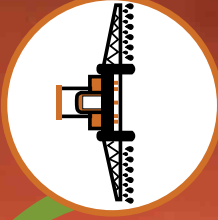
BFRs
Car upholstery, sofas, screens



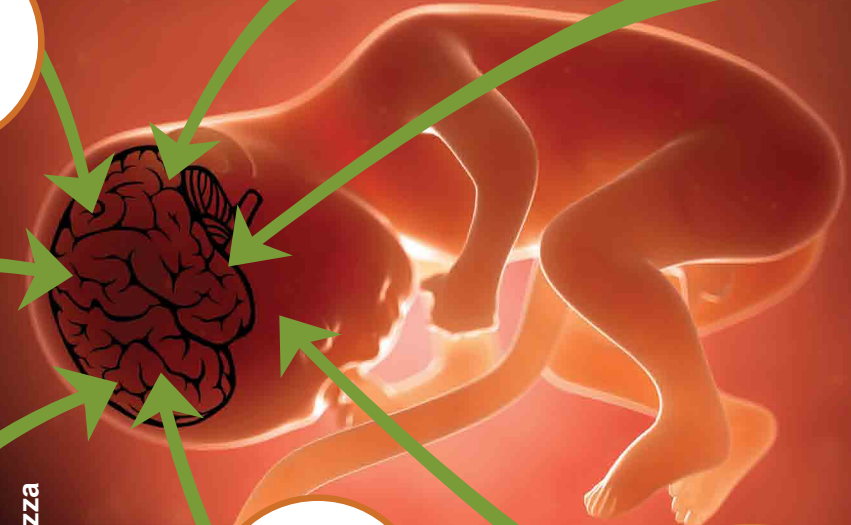
Bisphenols, PFAS, Phthalates
Food containers like pizza boxes, tin cans, plastic food packaging



Pesticides
Agricultural pesticide sprays



PFAS
Waterproof clothing, cosmetics, non-stick cookware

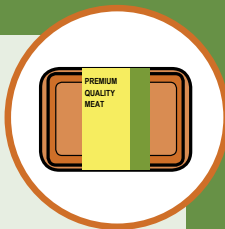


Phthalates

A group of chemicals that are found in paints, toys, plastic food packaging and personal care products.

They are known to be anti-androgenic and may cause altered reproductive organ development in boys, however, new scientific findings also suggest that prenatal exposure to phthalates may affect cognitive development in children.

Some phthalates have been restricted for some uses in the EU such as in baby products and some toys, but they are still found in food contact materials, and in imported goods that have not been adequately checked.

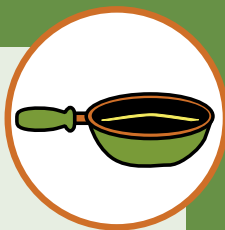


PFAS

These chemicals are used as water repellents on outdoor clothing and as stain repellents on clothing, including school uniforms, and in greaseproof food packaging, such as fast food and takeaway packaging, in cosmetics and in non-stick pans.

PFAS are very persistent in the environment and are routinely found in human blood. There is evidence that some of these chemicals can disrupt the action of the thyroid hormone.

Only a few of these chemicals have been banned. But five European countries are currently working on proposing an EU wide restriction of all PFAS.



Perchlorate

A chemical that contaminates food that has been treated by perchlorite bleach to clean it, such as “chlorinated-chicken” and salad leaves when used as a fertiliser.

It is known to be a thyroid hormone disruptor.



Pesticides

Many pesticides are designed to affect the endocrine or the nervous system of pests. Several are thyroid hormone disruptors or are toxic to the developing nervous system.

Prenatal exposure to organophosphate pesticides may contribute to neurodevelopmental and behavioral deficits in children, for example chlorpyrifos is associated with poor working memory, IQ-deficits and ADHD.



The chemicals above are the ones we know about, there are probably many more. Therefore we are calling for the EU to prioritise the regulation of chemicals that disrupt brain development.



Multiple exposure to chemicals

A recent EU funded research project used data from more than 2300 pregnant women to develop reference chemical mixtures to mimic real life exposures.

These mixtures were tested in various experimental models (cell and animal). Worryingly, the researchers found that even at real life concentrations, these hormone disrupting chemicals interfere with brain development and growth through impacts on the thyroid hormones, which are essential for brain development.

Are we protected?

The EU has the most sophisticated chemical regulation in the world but there are a number of flaws in the system:

- There is often a lack of safety information about individual chemicals and the effect that they have on the developing brain;
- Chemicals are banned one at a time – we need to be banning groups of related chemicals which have similar properties such as the bisphenols, flame retardants and the PFAS chemicals;
- Regulations often assume we are exposed to one chemical at a time – when in fact we are exposed to multiple chemicals.

What can you do?

Full protection from chemicals will only come from proper regulation. CHEM Trust is working hard on this, but it will take time. As a concerned individual, please check out CHEM Trust's Take action page <https://chemtrust.org/take-action/> to see how you can contact retailers and your elected representatives about these issues.

You can reduce the exposure of you and your family to harmful chemicals by:

Food

- Buy more fresh food to reduce your exposure to chemicals through food packaging.
- Do not cook and microwave food in its packaging.
- Eat lower down the food chain – i.e. eat less meat and dairy products as they concentrate toxic chemicals – and eat more vegetables.
- Wash fruit and vegetables and eat organic food, if you can.

Around the house

- Dust and vacuum your house frequently to prevent chemicals building up in household dust.
- Ventilate your house and any other indoor environments.
- Replace carpets with natural flooring when the opportunity arises.
- Avoid offered additional stain repellents on new sofas and other furniture.

Other

- Avoid stain repellent school uniform and clothes.
- Reduce your handling of till receipts and don't let children play with them.
- Cut down on the number of beauty products and toiletries you use.

Check out the CHEM Trust webpages on How to reduce your exposure for more tips. <https://chemtrust.org/reduce-your-risk/>

You can read more about this issue in our full report “No Brainer” <https://www.chemtrust.org/wp-content/uploads/chemtrust-nobrainier-mar17.pdf>

CHEM Trust is a charity working at UK, EU and International level to protect humans and wildlife from harmful chemicals.

CHEM Trust’s particular concerns are the endocrine disrupting chemicals, the cocktail effect of chemicals and the role of chemical exposures in the early life of wildlife and humans.

CHEM Trust engages with scientific, environmental, medical and policy communities to improve the dialogue concerning the role of adverse effects of chemicals in wildlife and humans and to harness a wide coalition to drive improved chemicals policy and regulation.

For more about our work, see <https://chemtrust.org>

You can download more copies of this factsheet at <https://chemtrust.org/neurological-impairment/>

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