

Chemicals, Kids and Cancer: Why kids are particularly vulnerable to toxic home chemicals



By Associate Professor Peter Dingle

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There is little doubt that our kids have a greater susceptibility to toxic chemicals. Everyday, we expose our children to hundreds of different chemicals in an array of household products and yet remain puzzled as to why they get sick and why the rates of childhood asthma, allergies and cancer are higher than ever.

There are many contributing factors that increase rates of childhood disease: these include very important considerations such as diet, lifestyle and attitude, but I wish to draw your attention to your child's immediate environment, as it is the environment you provide in your home that will contribute greatly to either your child's enjoyment of good health or their development of disease. Over the last 40 to 50 years we have increased the number of synthetic chemicals we use with virtually no extra thought as to how vulnerable children are to these chemicals or how little we know about their subtle and accumulative toxic effects. We assume that because these chemicals are so easily purchased off the supermarket shelf, they must be safe to use. Wrong! Many of these chemicals are known to be toxic and few of them are extensively studied before they are put on the shelf, freely available to the general public. Furthermore, certain assumptions are made in the process of allowing these products to be generally available - one of these assumptions is that kids are just smaller versions of adults. Scientific and medical studies show that this is not the case and that children are much more vulnerable to chemical toxins and environmental pollutants.

The World Health Organisation has emphasised that infants and young children have different structural and functional characteristics from those of older children and adults. These characteristics are simply stages of normal growth and development but affect a child's vulnerability when exposed to chemicals. In March of this year (2005), the US Environmental Protection Agency (US EPA) reiterated again that children are more vulnerable to gene-damaging chemicals than are adults. Kids are not simply smaller versions of adults, but this is how they're seen when it comes to developing regulations and safety standards.

For the first time the US EPA have tried to put a figure on how much more susceptible children are. They reported children two years old and younger might be 10 times more vulnerable than adults to certain chemicals and that children between the ages of two and 16 might be three times more vulnerable to certain chemicals. This means we need to make a huge shift in the way we regulate chemicals and may mean in some cases that the chemicals kids are exposed to in the home may be up to 10 times too high in concentration. Oops! Our regulators have made yet another

mistake and while they will say there are no problems with the existing system and will defend it, along with the manufacturing industry, it will eventually be changed - it will just take 10 or 20 years for it to happen. I have seen this many times.

It was argued for many decades that low levels of lead were not a problem but in just two or three years all the regulations were changed in the reluctant recognition that even low levels were a major health concern for kids. The scientific proof of this was available 20-30 years earlier with the US removing lead from petrol in 1972. Australian authorities sat on their hands until 1986.

Kids are more vulnerable to toxic chemicals because of certain behavioural and physiological characteristics that multiply not only their exposures to environmental toxins but also increase the effects of these chemicals on them. Physiological characteristics include rapid rates of growth, immature body systems and physiology, such as enzyme systems, as well as underdeveloped barriers which prevent toxins from being absorbed. Kids are particularly vulnerable to toxins during rapid periods of growth such as those which occur in-utero, in the first 12 months of life and at puberty.

A typical human infant increases in weight by about 200% and in length by 50% in his or her first 12 months. On average, the infant's brain is just over 30% of the weight of an adult brain at birth, their maximum number of neurons will be reached by age two but the brain will not structurally mature until four - six years of age. Their nervous system will not be fully developed until adolescence. The spinal cord and the peripheral nerves are protected by a fatty sheath called myelin, and the process of neural myelination is not complete until adolescence. As a result a child's nervous system is at higher risk of damage from common household insecticides, heavy metals and solvents typically found in household products.

A child's brain is also more vulnerable because of the immaturity of the blood-brain-barrier, which is designed to protect it from toxins. Even in adults this barrier cannot protect the brain from many heavy metals and synthetic chemicals such as solvents and pesticides. In infants it is almost totally ineffective against most modern day chemicals. This dramatically increases the risk of both temporary and permanent damage to the brain. It's possible that early exposure to some chemicals may permanently reduce the effectiveness of the blood brain barrier, allowing increased passage of toxins to the brain, and increasing the person's vulnerability to certain chemicals throughout their life.

Children are also susceptible in other areas of their physiology. The many enzyme pathways that metabolise foreign compounds in the body take several years to develop and a child is at increased risk until they are fully matured. For example, infants have lower levels of the neurotransmitter cholinesterase which helps to maintain the balance in the nervous system's communication channels. Many of pesticides and the nicotine in tobacco smoke inactivate cholinesterases, allowing the stimulating neurotransmitter acetylcholine to remain and increase in concentration, causing over stimulation of the nervous system. Depressed levels of cholinesterase can cause irreversible damage. Chronic effects include weakness and malaise, headache and light-headedness and symptoms can mimic those of ADHD.

While the pesticides may not accumulate to any significant degree, repeated exposures with the resultant cholinesterase-inhibiting effect, can be a significant problem. Don't expose your children (or yourselves) to pesticides - any of them. Even if claims are made as to their safety, they are not safe! The aerosol spraying method for household insect killing chemicals enables the toxins to penetrate deep into the lungs. You wouldn't expose your kids to tobacco smoke would you, so why pesticides? They are much more toxic.

A child's immature enzyme systems can also affect their ability to eliminate the environmental toxins to which they are exposed. The metabolic pathways and enzyme detoxification systems of infants and young children have reduced capacity for dealing with toxins as compared to adults. The major excretory organs in the human body (the liver and kidney) take some years to develop and become fully and efficiently functional. For example, the Phase I and II enzyme detoxification systems (stimulated in all the liver detox diets) are immature at birth and only develop gradually as an infant. The immaturity of an infant's capacity for detoxification and elimination usually produces higher blood levels of toxins for longer periods in comparison to an adult, meaning the toxic chemical hangs around a lot longer in your kids' bodies, doing more damage.

In general tissue and membrane barriers are more permeable in the early years of life to help with the demands of rapid development and growth. However, this also increases their capacity to absorb toxins. For example, absorption rates of heavy metals from the gastrointestinal tract in humans and other mammals are significantly higher in infancy compared to other ages. Lead is a well-known poison, causing irreversible neurological damage to the young, including a reduced IQ. Studies have shown that infants and young children absorb lead more efficiently than adults via the gastrointestinal tract. 40 - 90% of an oral dose is absorbed by a child less than 8 years of age, compared with 10% by an adult. Studies have also shown that retention of the absorbed dose is higher. While adults retain 10% of an ingested dose, 18% is retained by children and 32% retained by children less than 5 years of age. Absorption through the skin is also higher in children. Their skin is more permeable and they have a greater surface area relative to body weight.

Kid's are also at increased risk from environmental carcinogens. In infants and children cells are dividing more rapidly. There is a greater probability of DNA mutation and cancerous growth being initiated. Studies show that one day old rats exposed to vinyl chloride developed a much higher incidence of cancers than rats which were exposed at eleven weeks of age. Early exposure to carcinogens also means there's more time for cancer to develop over the person's lifetime. Many cancers which develop in adults are a result of exposure to carcinogens in childhood. Reducing childhood exposure to these toxic chemicals will reduce the potential for cancers later in life.

Kids' Behaviour

Aside from the physiological and biochemical reasons behind children's increased susceptibility to toxins, there are behavioural, cultural and sociological reasons as to why they are more at risk.

Increased exposure of infants and kids occurs through both their food consumption and respiration. Kilogram for kilogram of body weight, children drink more fluids, eat more food and breathe more air than adults. Children aged one to five years for example, eat three to four times more food per kilogram than the average adult. The types of food they eat also increase their exposure. In the first five to seven years of life, a child's diet is very limited. One study in the US estimated that children between one and five years of age consumed six times the amount of fruit consumed by women aged 22 - 30, and 18 times more apple and apple products, including juices and purees. More recent estimates from studies in the US suggest that the intake of apples by infants expressed as a ratio of body weight may be up to 20 times higher than that for adults. These consumption rates mean that young children face a greater risk from residues such as pesticides and fungicides in fresh produce than do adults. This highlights the need to feed our kids as much organic and biodynamic produce as possible.

Young children's play behaviour can be a potential source of exposure to toxic substances. Mouthing, whereby hands and objects are put into the mouth (an exploratory behaviour of the young called PICA), has been shown to lead to significant ingestion of soil and dust. One study found average daily estimates of soil consumed by kids ranged from 25.3 to 81.3 mg/day, and reported that this was consistent with results from other studies. This dramatically increases their risk of exposure to heavy metals and pesticides in the soil. This doesn't mean that you stop your children from playing outside. It does mean you shouldn't use any pesticides or toxic chemicals in the garden.

Other behaviour such as crawling and playing close to the ground can also contribute to higher exposure to many chemicals as this is where many of the chemicals actually accumulate. Children's tendency to play around cars while the engine is running really highlights this. More than 4000 chemicals spew from the exhaust pipes of cars. I often see kids playing around the car while parents are saying their farewells. For kids, who are closer to exhaust pipe height, it's a toxic game.

Kids also don't have the experience or know how to reduce their exposure. Unlike adults who can relate a chemical smell to making them sick or causing an allergic reaction, young children have too little experienced to make the connection and often lack the necessary verbal skills. So they will continue to expose themselves to more of the toxin. We, as adults and parents, must provide the protection of a safe environment. And children are easily influenced by the conditioning of media advertising to use toxic chemicals such as deodorant spray cans or perfumes. Or to consume more junk foods with toxic food additives in them.

Research is proving the toxicity of these chemicals. Many studies, including some of our own research and other Australian studies, show that the higher the use of chemicals in the home, including cleaning chemicals, the use of spray cans and pesticides, the higher the incidence of childhood disease, such as asthma and allergies. In a few years when the research is complete, it will also show an increase in children's and adult's cancer rates.

It is also worth noting that thousands of kids are poisoned by domestic chemicals every year. Some of them are permanently damaged. Some children die. The fewer toxic chemicals you bring into the home the safer it is for your children and you.

What can YOU do?

** Set a goal to reduce the amount of synthetic chemicals you have and use in the home by 50% over the next month. When you achieved this, review your chemical use again, and see if you can reduce it further.*

** Use safer more environmentally friendly chemicals*

** Use high quality, genuine fibre technology for cleaning.*

** Don't use spray cans - they are major air pollutants. Just read the warning on the back of the can to see how toxic they are.*

** Use non toxic baits and traps for pests instead of toxic pesticides.*

** Do not believe the pest control company when they tell you their product is safe. They are not and they are actually not allowed to say they are safe.*

** Don't paint the new baby's room.*

** Don't put child care centres on busy roads.*

** Ban spray cans from your child's school.*

** Don't allow people to smoke around children.*