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Environment and Cancer: Myths Vs Facts

Our guest blogger is Devra Lee Davis, PhD, MPH, Director, Center for Environmental Oncology, University of Pittsburgh Cancer Institute and author of ***The Secret History of the War on Cancer****.*

At the Center for Environmental Oncology, our mission is helping to make prevention the cure for cancer. We translate scientific findings into educational materials and public policy recommendations to provide information on practical actions people can take to reduce the risk of cancer. Knowledge about cancer risks can empower people to make healthier choices for themselves their families and communities.

Myth: Chemical flame retardants in furniture and plastics are a "necessary evil" for preventing house fires.

Toxic flame retardants, long-lived chemicals that can accumulate in people and other animals, threaten the health of adults, children, the environment, and wildlife and are not proven to prevent fire deaths. Brominated Tris, a chemical used to make children's sleepwear fire resistant in the 70's, was banned in 1977 after it was found to damage DNA in laboratory tests and shown to leach into children's bodies. Its replacement, chlorinated Tris, was later banned after it was found to also damage DNA. (1)

Today, because of California law, much furniture and bedding foam is treated with a brominated chemical called poly brominated diphenyl ether (PBDE). PBDE's structurally resemble chlorinated Tris, which was a widely used fire retardant in furniture. Like chlorinated Tris, PBDE was recently deemed by the Consumer Product Safety Commission to be "a probable human carcinogen based on sufficient evidence in animals." (2) most chemicals in this family, when tested in animals, have been found to

cause health problems like cancer, sterility, thyroid disorders, endocrine disruption, and developmental impairment or birth defects, even at very low doses. (3, 4) The Centers for Disease Control and Prevention reported that residues of these and other persistent organic chemicals are found in children and women of reproductive age and in breast milk. (5) An analysis of fire data from 1980 to 2002 showed that, among the eight most populated states in the U.S., the rate of reduction of fire deaths in California (the only state with regulations leading to the use of fire retardant chemicals) is similar to seven other states that do not regulate the flammability of furniture. (6)

Myth: Asbestos, a known carcinogen, has been banned in the US.

Although restricted in use, asbestos is not banned and can sometimes be found in old brakes, roofing tiles, cement and insulation. Asbestos, the name given to a number of naturally occurring, fibrous silicate minerals mined for their useful properties such as thermal insulation and high tensile strength, is found in many products today, including roofing shingles, pipeline wrap, ceiling and floor tiles, paper and cement products, and in automobile parts such as the clutch, brake and transmission. Additionally, the EPA reports that 35 million American homes may be contaminated with asbestos in their attics in the form of Zonolite, the trade name for one specific type of insulation that was sold in the 1960s through 1980s and can contain an asbestos fiber called tremolite.

Asbestos is made up of microscopic bundles of fibers that may become airborne when asbestos-containing materials are damaged or disturbed. When inhaled, asbestos fibers can lead to serious lung diseases such as lung cancer, asbestosis and mesothelioma. If it must be disturbed or removed, asbestos should be handled only by a licensed inspector. Children should never play in attics or other areas where asbestos products have been used. (7) According to reports from several national cancer institutes (8), one in three cases of mesothelioma—a lethal and rare cancer uniquely tied with asbestos exposure—occurs today in a person who has never worked with asbestos, indicating that environmental exposures may play a role.

Myth: Personal care products are always safe to use.

The FDA does not have the authority to require safety testing on personal care products. Many of the products that women, men, and children use every day contain known and suspected cancer-causing agents. The Centers for Disease Control and Prevention (CDC), which has undertaken a human biomonitoring study, reports that some of the toxic chemicals found in personal care products - including those that can cause cancer,

interfere with hormone function and cause birth defects - are ending up in our bodies. (9, 10) These toxic chemicals include: lead in lipstick, phthalates and formaldehyde in nail polish, and parabens, used as preservatives in many products. the Campaign for Safe Cosmetics created Skin Deep Database, which can be searched to evaluate make up; skin-, hair-, eye-, nail-, baby-, and oral-, care products; and products containing fragrance.

Myth: Diagnostic radiation is safe for adults or children.

In 2007, the American College of Radiology (ACR) noted that in the past quarter century, the amount of radiation the U.S. population receives each year from medical imaging has increased fivefold. (11) Just this past month, the FDA issued an advisory to physicians regarding the inappropriate use of diagnostic radiation in children (12), while the Image Gently national campaign is encouraging pediatricians to use as low as reasonable achievable doses. (13)
A single CT scan of a child's stomach or head can be equivalent to between 200 to 6,000 chest X-rays. (14) One group of researchers, recently estimated that in one year, 700 people will die from cancers associated with head CT's and 1,800 will die from radiation-induced cancer from abdominal examinations carried out when they were infants. (15) If a CT scan is recommended for a healthy individual, especially a child, it is important to consider whether another diagnostic tool, such as Magnetic Resonance Imaging (MRI) or ultrasound (neither of which involve radiation) could be used, instead.

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Genetically Altered Food: Myths and Realities

by Rick Charnes, EarthSave Boston

1"Up to now, living organisms have evolved very slowly, and new forms have had plenty of time to settle in. Now whole proteins will be transposed overnight into wholly new associations, with consequences no one can foretell, either for the host organism, or their neighbors....going ahead in this direction may be not only unwise, but dangerous. Potentially, it could breed new animal and plant diseases, new sources of cancer, novel epidemics."

For those of us who follow a plant-based diet, this moment is truly a crossroads in history, a turning point from which we may never be able to turn back. The plant-based diet we have been following is under radical attack by a new class of foodstuffs never before seen on the planet. It is therefore incumbent upon us to truly understand the scope of this phenomenon in all its dimensions.

2We are poised at a moment in time where we, as individuals and as a society, face a choice between two paths. One path is that we find the personal and political will to move forward to an environmentally sustainable, healthy and organic agriculture. The other path is that we follow the pied piper of big business-controlled biotechnology and genetically altered food into potentially uncontrollable disasters of a magnitude never before seen on our planet.

The introduction of genetically altered (GA) food is part of a powerful series of interlocking political, economic and scientific mechanisms in our society wherein large corporations such as St. Louis-based Monsanto and Swiss-based Novartis have developed techniques to alter or disrupt the genetic blueprints of living organisms plants, animals, humans and microorganisms - in order to secure patent and intellectual property rights. These firms then formally 'own' these new creations, the resulting 'transgene' foods, seeds, or other products, and then sell them for profit.

This is of great concern to EarthSave members, not only because of the health and environmental consequences of these technologies, but also because of their social and political ramifications. We understand that in order to have a healthy and sustainable plant-based diet, we need to radically democratize the food and agricultural policy of our society. We need to change these policies so that they are not based not on the needs of business with its constant need for profit, market share and growth, but rather on the health and environmental needs of all the planet's citizens.
The worldwide alarm about the safety of genetically altered food, both for human health and the environment, has reached a monumental pitch for those who care to listen. In the European Union and particularly Great Britain, citizens have stated clearly and forcefully that they simply do not want these foods grown in their countries or on their dinner table. On June 24, EU environmental ministers moved to implement the legal equivalent of a three-year moratorium on any new approvals of GE foods or crops. In response to huge consumer demand, many grocery chain stores in Britain have removed these foods from their shelves. In May, the prestigious 115,000-member British Medical Association (the equivalent of the AMA in the US) issued a report, which called for a moratorium on GE foods and crops. The BMA warned that the commercialization of untested and unlabeled gene-foods could lead to the development of new allergies and antibiotic resistance in humans. In third world countries such as India, farmers have been protesting against the loss of their independence and traditional farming practices entailed in this radical new

form of agriculture. In the United States, the movement is only beginning, and I believe we in EarthSave have a vital and unique role to play in this.

What is genetically altered food?

Approximately 50% of all the soy and 38% of the corn acreage planted in the US this year is genetically altered. In addition, much of the canola oil in the US market is from genetically altered plants. Given the prevalence of these products in processed foods, unless you are eating all organically grown food chances are you're already consuming some of this food without knowing it. It remains unlabeled and typically not segregated from non-altered food, so if you are consuming vegetarian products containing any of these ingredients not labeled as organically grown, it is more than likely that some of what you are eating is genetically altered.

TMThere are two common forms of genetic alteration of foodcrops. In the first, used frequently with soy, the plant is modified in order to be resistant to the Monsanto herbicide Roundup so that farmers can apply it to kill weeds without killing the young soy seedling. In the second, often used with corn, the plant is modified to contain within its genetic structure a pesticide called Bt (Bacillus thuringiensis).

3We are told that these genetic modifications are made in order to reduce the amount of chemicals applied externally. Yet, in part because of the increasing resistance to these chemicals by pests, all indications so far are that these genetic modifications may in fact be leading to their increased use.

Contrary to its proponents' sweet-sounding words, genetic engineering is a form of plant breeding radically different from anything that humans have ever practiced in our history.4 All prior forms of plant breeding have relied on the plant's natural mechanisms of reproduction. Only related species can be bred together in this fashion. With genetic engineering, however, genes from one species are synthetically inserted into a different species with which it could never breed in nature. Furthermore, traditional breeding always takes place on the species level, whereas genetic alteration is done at the level of the gene.

In order for this to happen, the natural species barriers of the recipient plant are deliberately overcome and broken down. This process is typically affected by a virus that acts as a 'vector' to overcome the plant's normal protective mechanisms and insert the new genes into the recipient, and then as a 'promoter' in order to turn on the functionality of these new genes in the recipient plant. This process is called 'gene expression.'

Health Risks

5By altering the genetic composition of the plant genome (the entirety of the genetic structure of an organism), this process introduces new proteins into the human and animal food chains. This means that human beings are now consuming products that have never before been considered foodstuffs. There is concern that these new proteins could potentially cause toxic or allergic reactions, or other health effects. Unfortunately, there is no easy way to predict the allergenic potential of GA foods since allergic reactions typically occur only after the individual consuming the food is sensitized by initial exposure to the allergen.

6There has already been at least one known health disaster regarding genetically altered products. In 1989 the Japanese company Showa Denko marketed a GA version of the supplement L-tryptophan. After the release an estimated 5000 people suffered from an

outbreak of Eosinophilia Myalgia Syndrome (EMS). It was initially reported that 37 people died, and 1500 were left with permanent disabilities.

[7]When gene engineers splice a foreign gene into a plant or microbe, they often link it to another gene, called an antibiotic resistance marker gene (ARM), that helps determine if the first gene was successfully spliced into the host organism. Some researchers warn that these ARM genes might unexpectedly recombine with disease-causing bacteria or microbes in the environment or in the guts of animals or people who eat GE food, contributing to the growing public health danger of antibiotic resistance. Research from the Netherlands show that these antibiotic resistant marker genes from genetically altered bacteria can be transferred horizontally to indigenous bacteria in an artificial gut.

[8]One of the rationales offered by the federal government for its approval of GA food is the claim that it is "substantially equivalent" to non-GA food. This conclusion, however, was reached with inadequate study, and recent research has called it into question. A 1999 study by Dr. Marc Lappe found that concentrations of beneficial phytoestrogen compounds -- thought to protect against heart disease and cancer-were 12-14% lower in genetically modified soybeans than in traditional strains. It is important for EarthSave members to consider the number of vegetarian soy products on the market and to understand therefore how severe the threat is to the health of our plant-based diet.

[9]Earlier in 1999, prominent front-page headline stories in the British press trumpeted scientist Dr. Arpad Pusztai's explosive research findings that GA potatoes, spliced with DNA from the snowdrop plant and the Cauliflower Mosaic Virus (CaMv), a commonly used viral promoter, are poisonous to mammals. When fed to rats, these GA potatoes, found to be significantly different in chemical composition from regular potatoes, caused highly significant reduction in the weight of many organs, impairment of immunological responsiveness and signs suggestive of viral infection.

The biotech companies proclaim the benefits of the elements inserted via the genetic engineering process, such as herbicide resistance and insecticidal properties. Unfortunately, nature doesn't work as simply as these scientists might wish, as we must consider not only what is added via the GA process, but to the process by which it is added. One of the most alarming parts of Dr. Pusztai's research was that damage to the rats' stomach linings - apparently a severe viral infection - most likely was caused by the CaMv viral promoter, used by nearly all GA foods and crops.
Dr. Mae-Won Ho, Reader in Biology at the Open University in Great Britain and a Fellow of the US National Genetics Foundation, is of the opinion that the viruses used as vector and promoter for the new GA foods are the most dangerous aspect of the alteration process. Most typically used is the Cauliflower Mosaic Virus, which despite the name is actually present in many of the vegetables that make up our standard diet. However, there is a great difference between the CaMV we may eat everyday in vegetables and the promoter used in GA food. Ordinary CaMV cannot enter mammalian cells because its protein coat is specific to plant cells. In nature, a virus is typically ensheathed in a protein coat that enables the defenses of any species being invaded - whether plant or human to recognize it as a foreign body. In order to overcome this natural protective process, [10]however, the genetic engineers remove the protein coat, creating 'naked DNA' which is then unrecognizable as foreign by the recipient plant, which will then receive it and take it into its own genetic structure. The CaMV promoter used in GMOs comes in the form of this naked viral DNA and naked DNA of any sort is highly infectious.

[11]Viral DNA fed to mice has been found to resist digestion in the gut. Large fragments passed into the bloodstream and into white blood cells, spleen and liver cells. In some

instances, the viral DNA may integrate into the mouse cell genome. Viral DNA is now known to be more infectious than the intact virus, which has a protein coat wrapped around the DNA.

[12]Evidence is accumulating that DNA is not broken down rapidly in the human intestine as has been previously supposed, thus providing for the possibility that transgenes and antibiotic resistance marker genes may spread to bacteria in the gut.

Because these viruses are capable of recombining and jumping species, we must be aware that we cannot rule out the possibly of their triggering a vast range of public health disasters.

Environmental Concerns

[13]One of the most frightening aspects of the increasing acreage given over to GA crops is that the pollen from these plants can travel miles from their host via wind and insects and fertilize other non-GA crops or related weed species growing nearby.[14] This has already happened with canola (known as oilseed rape in England)[15] and sugar beet, creating the potential for superweeds.[TM] After touring the American Midwest, one farm analyst noted, "there are Roundup resistant weeds everywhere now."[1617] Furthermore, the genes inserted by the alteration process are more biologically vigorous and may be up to 30 times more likely to escape than the plant's own genes. We have already seen this process take place with disastrous results with other 'exotic' and invasive species such as kudzu in the south, zebra mussels in our waterways, etc.

Even organic food is threatened. Some 87,000 bags of organic corn chips manufactured by Wisconsin-based Terra Prima had to be destroyed when a Dutch importer discovered genetic contamination that had apparently blown over via pollen from a nearby GA plot in Texas where the corn was grown.

[18]In some of the most publicized American research to date, Cornell University scientists reported recently that 44% of monarch butterfly larvae died within four days when fed milkweed (their exclusive food) that had been dusted with pollen from GA corn, while all the caterpillars fed normal corn pollen survived.[19,20] British research has shown that beneficial insects such as ladybugs and lacewings are negatively affected by feeding on GA crops, which are supposed to only affect 'target' insect predators.[21] Study has begun on the effects on the rest of the food chain, as birds and other wildlife then feed on these insects that have consumed the GA crops. Fear of his has led English Nature (the British Government's wildlife advisor) to warn that the introduction of GA herbicide tolerant crops "could be the final blow for species like the skylark, the linnet and the corn bunting."
[22]As these novel organisms enter and gradually saturate the biosphere, there is grave concern for the effect on soil microorganisms upon which many other organisms depend. When applied externally, Bt remains active only a few days in the environment.
[23]However, when engineered into the genetic structure of the plant, a recent study found it to be active in the nearby soil at least eight months later.[24] Bt toxins are engineered into a wide range of transgenic plants already released into the environment and this build-up in the soil may have a devastating influence on pollinators and other beneficial insects.

EarthSave's Unique Role

The biotech companies insist that this radical food technology is needed to feed the world's growing population, and in their many advertisements tout biogenetic food as the

solution to world hunger. Of course we have all heard this propaganda before, years ago during the Green Revolution. Delegates from 24 African nations responded to recent probiotech advertisements with the following statement:

[25]"We...strongly object that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology that is neither safe, environmentally friendly, nor economically beneficial to us. We do not believe that such companies or gene technologies will help our farmers to produce the food that is needed in the 21st century. On the contrary, we think it will destroy the diversity, the local knowledge and the sustainable agricultural systems that our farmers have developed for millennia and that it will thus undermine our capacity to feed ourselves."

World hunger is not a problem of technology or insufficient production, but primarily one of unequal distribution and economic inequality. As farmers lose their land and move to the cities, they also lose their food-independence and begin to rely on money, often in drastically short supply for many in the third world, in order to buy food that they formerly grew themselves. The accelerating corporatization and concentration of agriculture, in which big business is playing such a large part, is hastening this process, thereby actually increasing the problem of hunger.

The new seeds offered by the biotech companies are not legally the property of the farmer who only leases them from the company. The farmer may not legally re-plant his own seeds, a measure insisted upon by the industry in order to protect its intellectual investment. As happened during the Green Revolution of the 1960s, however, this further commodification of the entire food system will increasingly tend to favor wealthy and larger landowners, further marginalizing poorer farmers and throwing even more off the land, therefore only contributing more to the hunger problem.

[26]Though considering the drumbeat of propaganda one would expect otherwise, there is very little evidence that GA crops produce larger yields. Research has shown mixed results, with some studies revealing approximately 5%-10% lower yields for GA soybeans.[27, 28] The biotech companies are also fond of insisting that organic agriculture produces yields too low in order to feed the world in adequate amounts. This is highly questionable, as test plots in several countries have shown organic agriculture producing equal or greater yields than chemical or genetic agriculture. Furthermore, we can only speculate what organic agriculture could produce if more than a paltry 1% of USDA research funds were allocated to this superior form of agriculture.
I believe, however, that we in EarthSave have a particularly vital role to play as the public debate about genetically altered food sharpens in this country. Those who follow a plantbased diet understand that one of the most healthful and environmentally sustainable ways for more food to be made available is for our global civilization to begin to make the slow, inexorable shift, along with the tremendous dislocations and resistance it will entail, towards a plant-based diet and agriculture. As the percentage of animal foods in the human diet gradually decreases over time, we as a society will be able to utilize the substantial grain and legume acreage throughout the world for human rather than animal consumption. When accompanied by necessary changes in the political and economic institutions that hold these structures of animal agriculture in place, tremendous amount of foods can be freed up, thus rendering irrelevant the genetic engineers' primary argument.

I am convinced that this is a very powerful response to the misleading information put out by the biotech companies regarding GA food. Because of this, I hope that local chapters and the international organization will take our knowledge of the importance of a

plantbased diet and use it in a comprehensive way to help the growing movement against GA food and agriculture.

Political Perspectives

Given the immediate threat to the quality of our diet, many of us now see the importance of taking up this issue not only as a matter of personal dietary choice but as something requiring political education. After educating ourselves in a serious way about this, a number of us who once shied away from politics are finding that we simply have no choice but to engage this issue in both the personal and political realms.

Our opposition to the genetic engineering of food is not based on any generalized antagonism to science but rather on a skepticism of an outdated but commercially profitable reductionist science that can only understand the whole in terms of its pieces, reduced to readily quantifiable entities such as genes. There has been developing for quite some time in the scientific community a more rigorous and advanced understanding of the complex webs of life of which our human food and agricultural systems are but a part. This more modern science is coming to a recognition of the marvelously subtle interactions between genes and the entire organism, and between genes and the environment. The science of genetic engineering of food, on the other hand, relies on antiquated notions of genetic determinism, in which it is falsely believed that there is an easily discernable one-to-one correspondence between a gene and a trait. It is a science generated to serve the needs of business, and it is primarily to serve these needs that these extreme new foods were developed.

We find it repugnant to see private companies create new life forms only to reduce them to nothing but commodities on the global marketplace. We must stand up and say loud and clear wherever we can: the needs of business for profit, market share, return on investment and protection of intellectual property rights must always be subservient to the health needs of human beings and the natural environment. When there is a clash of these two realms - and this seems inevitable - we will always stand up for the latter.

Ethical and Spiritual Views

We in the Boston chapter have spent a great deal of time studying these issues and the reductionist science, ideology and economic structures that lead to these technologies. We see in the genetic alteration of food crops not only an extremely serious hazard to health and to the natural environment, but also an affront to the wholeness and integrity of life upon which we base our understanding of the world. We understand and honor the intricate connections between the evolution of the plant kingdom and our own human evolution. We are concerned about the effects that this radical modification of the genetic structure of plants will have on current and future human, as well as other earthly, life.

Considering the redesigned genetic code of life which we are now taking into our bodies, we understand now that what is involved here is in effect a fundamental remaking of the human being and its future evolutionary path. There is no recalling these organisms once they are released into the biosphere; they become a permanent part of our world as long as the earth is capable of supporting life. The process is biologically irreversible.

We reject a worldview that sees nature as something to be picked on, picked apart, analyzed, spliced, recombined, deconstructed and reconstructed according to our human desires of the moment. This is not a psychologically healthy ideology by which we choose to live our lives, nor is it conducive to maintaining a nourishing emotional and spiritual

climate for children and adults. We believe it leads to a constant tendency to see the world as being at one's beck and call, as ours to use in whatever way we see fit.

We are particularly concerned about what kind of religion or spirituality can survive this assault on the integrity of life, this forceful penetration of human analytical knowledge into the most minute and sacred arenas of life. Most religions have based themselves on some human sense that we are part of a whole, which is greater than ourselves. This sensibility naturally inspires awe, humility, gratitude and appreciation. If our food, our climate, and all of life begins to carry an easily recognizable human imprint, what effect will that have on our spiritual lives?

The memory, the 'feeling' of the entire universe lies within us. When we sit down to eat, we take in not only physical nourishment but also a sense of the connection to all of evolution, to all of natural and human history, through the DNA inherent in every species that we eat and therefore transform into our bodies, minds, hearts and souls. Every act of eating is an affirmation of that evolution, of that connection. It plays a part in how we physiologically and psychologically understand and sense ourselves as natural beings, as expressions and creatures of the earth. One might speculate that the artificial food we've been eating up till now has been a major factor in the breakdown of that sensibility. It's not entirely unreasonable, then, to suggest that the new genetic alteration of our foodstuffs would be a quantum leap in the breakdown of that connection.

When we said in the 60s that "we are stardust, we are golden," one way we might understand this is to acknowledge that our DNA contains the "memory" of our entire natural history, from the creation of the universe to the beginnings of organic life on earth to the evolution of humanity.

When we eat healthy food and take the DNA of other creatures into our bodies, we ritually and physically enact the story of that evolutionary and environmental journey. Will the artificial restructuring of the DNA in our food rupture that connection in ways that we can't now even begin to imagine?
The earth with its myriad species is a thing of beauty, elegance, grace and balance. It offers itself to us for our pleasure, joy and nourishment when we learn to listen and watch carefully. The genetic engineering of food represents a radical step backwards, a devolution of the human species and the planet, a step leading to unknown health disasters and environmental havoc.With our understanding of the value of a plant-based diet we in EarthSave have in our hands a profound tool we can use to help the world think and act our way out of this challenge. Using this tool might require an expanding of our focus on our traditional concern with encouraging dietary choice. It may require us to help people see the importance of making a political analysis of the situation as well as to ask the spiritual questions now posed to us by the biotech revolution and the genetic alteration of our food supply. Let us as individuals and an organization find the personal and collective courage to do so.

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Genetic Altered Foods: What are the Dangers?

Fundamental Weaknesses of the Concept

- **Imprecise Technology**—A genetic engineer moves genes from one organism to another. A gene can be cut precisely from the DNA of an organism, but the insertion into the DNA of the target organism is basically random. As a consequence, there is a risk that it may disrupt the functioning of other genes essential to the life of that organism. (Bergelson 1998)

- **Side Effects**—Genetic engineering is like performing heart surgery with a shovel. Scientists do not yet understand living systems completely enough to perform DNA surgery without creating mutations which could be harmful to the environment and our health. They are experimenting with very delicate, yet powerful forces of nature, without full knowledge of the repercussions. (Washington Times 1997, The Village Voice 1998)

- **Widespread Crop Failure**—Genetic engineers intend to profit by patenting genetically engineered seeds. This means that, when a farmer plants genetically engineered seeds, all the seeds have identical genetic structure. As a result, if a fungus, a virus, or a pest develops which can attack this particular crop, there could be widespread crop failure. (Robinson 1996)

- **Threatens Our Entire Food Supply**—Insects, birds, and wind can carry genetically altered seeds into neighboring fields and beyond. Pollen from transgenic plants can cross-pollinate with genetically natural crops and wild relatives. All crops, organic and non-organic, are vulnerable to contamination from cross-pollinatation. (Emberlin et al 1999)

Health Hazards

- **No Long-Term Safety Testing**—Genetic engineering uses material from organisms that have never been part of the human food supply to change the fundamental nature of the food we eat. Without long-term testing no one knows if these foods are safe.

- **Toxins**—Genetic engineering can cause unexpected mutations in an organism, which can create new and higher levels of toxins in foods. (Inose 1995, Mayeno 1994)

- **Allergic Reactions**—Genetic engineering can also produce unforeseen and unknown allergens in foods. (Nordlee 1996)

Decreased Nutritional Value—Transgenic foods may mislead consumers with counterfeit freshness. A luscious-looking, bright red genetically engineered tomato could be several weeks old and of little nutritional

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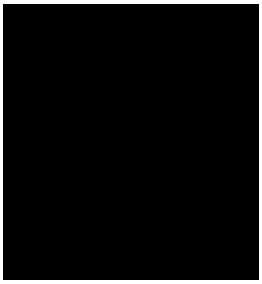
MEDICAL NEWS: BISPHENOL A (BPA) AND ADVERSE HEALTH EFFECTS

If you live in the U.S., Europe or any industrialized nation, your body is probably home to a chemical called *Bisphenol A*, a chemical that has been shown to disrupt the hormonal system, leading to reproductive defects as well as brain damage, cardiovascular disease, cancer, obesity and diabetes. It is a chemical that mimics estrogen that factories use in everything from plastics to epoxies accumulating at a rate of 6 pounds per American per year. More than 92% of Americans have BPA in their urine. Scientists have linked it to erectile dysfunction, hyperactivity, early puberty, prostate cancer, from attention deficit disorder to genital abnormalities in boys and girls alike. Additionally it is in our food. It is in the lining of cans as well as in plastics. Just drinking out of a plastic bottle raises your BPA levels 70 percent. According to the *Breast Cancer Fund* which is trying to ban the chemical from food and beverage containers, there have been more than 200 studies recently of this chemical toxin (first introduced in 1930) showing its link to adverse health effects. Even the official journal for the *American Medical Association* (*JAMA*) has published articles linking BPA to "an increased prevalence of cardiovascular disease, diabetes and liver-enzyme abnormalities." While Canada as well as other countries has condemned it, politics in the U.S. via special interest lobbying have kept the FDA dormant as it continues protectionism of Big Business in America at the expense of our health. This is only the tip of the iceberg. This is not the only harmful toxin that is affecting our health. There are over 85,000 chemicals in commercial use which often find their way to our bodies and the environment. There is also *Phthalates* which affects or contributes to gender problems. In California alone, 58 million pounds of chemicals are released annually but unfortunately scientists do not have the methods necessary to detect but 10% of them. In an effort to save money, California will be the first state to introduce legislation that shifts the cost of developing methods for detecting chemicals from the taxpayers to the manufacturers. While this dismisses the responsibility of the State to the manufacturer, how objective can the testing be? Is this not the same as leaving the fox in charge of the chicken coop? We need independent scientific testing not industry sponsored testing. Leaks to the media reveal that the chemical industry may soon have a commercial featuring a pregnant woman stating there is nothing wrong with BPA.! The emerging toxic problems are serious as was the case with the discovery of PBDEs (toxic flame retardants) and rocket fuel in drinking water. For more information, articles relevant to BPA research will be posted shortly under News and Tips\Natural Health\Health Issues. Arnoldo Carlos Vento, Ph.D

Phthalate: Dangerous Toxin



General chemical structure of phthalates. R and R' = C_nH_{2n+1}; n = 4-15

Phthalates, or **phthalate esters**, are esters of phthalic acid and are mainly used as plasticizers (substances added to plastics to increase their flexibility, transparency, durability, and longevity). They are primarily used to soften polyvinyl chloride. Phthalates are being phased out of many products in the United States and European Union over health concerns.

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[edit] Uses

Phthalates are used in a large variety of products, from enteric coatings of pharmaceutical pills and nutritional supplements to viscosity control agents, gelling agents, film formers, stabilizers, dispersants, lubricants, binders, emulsifying agents, and suspending agents. End applications include adhesives and glues, agricultural adjuvants, building materials, personal care products, medical devices, detergents and surfactants, packaging, children's toys, modelling clay, waxes, paints, printing inks and coatings, pharmaceuticals, food products, and textiles. Phthalates are also frequently used in soft plastic fishing lures, caulk, paint pigments, and sex toys made of so-called "jelly rubber." Phthalates are used in a variety of household applications such as shower curtains, vinyl upholstery, adhesives, floor tiles, food containers and wrappers, and cleaning materials. Personal care items containing phthalates include perfume, eye shadow, moisturizer, nail polish, liquid soap, and hair spray.[1] They are also found in modern electronics and medical applications such as catheters and blood transfusion devices. The most widely-used phthalates are the di-2-ethyl hexyl phthalate (DEHP), the diisodecyl phthalate (DIDP) and the diisononyl phthalate (DINP). DEHP is the dominant plasticizer used in PVC due to its low cost. Benzylbutylphthalate (BBP) is used in the manufacture of foamed PVC, which is mostly used as a flooring material. Phthalates with small R and R' groups are used as solvents in perfumes and pesticides.

As of 2004 manufacturers produced about 363 thousand metric tonnes (800 million pounds or 400 000 short tons) of phthalates each year. They contribute 10-60% of plastic products by weight.[1]

[edit] History

The development of cellulose nitrate in 1846 led to castor oil being patented in 1856 for use as the first plasticizer. In 1870 camphor became the more favored plasticizer for cellulose nitrate. Phthalates were first introduced in the 1920's and quickly replaced the volatile and odorous camphor. In 1931 the commercial availability of polyvinyl chloride and the development of di-2-ethylhexyl phthalate began the boom of the plasticizer PVC industry.

[edit] Properties

Phthalate esters are the dialkyl or alkyl aryl esters of phthalic acid (also called 1,2-benzenedicarboxylic acid, not be confused with the isomeric terephthalic or isophthalic acids); the name *phthalate* derives from phthalic acid, which itself is derived from word "naphthalene". When added to plastics, phthalates allow the long polyvinyl molecules to slide against one another. The phthalates show low

water solubility, high oil solubility, and low volatility. The polar carboxyl group contributes little to the physical properties of the phthalates, except when R and R' are very small (such as ethyl or methyl groups).[*citation needed*] They are colorless, odorless liquids produced by reacting phthalic anhydride with an appropriate alcohol (usually 6 to 13 carbon).

[edit] Table of the most common phthalates

Name	Acronym	Structural formula	CAS No.
Dimethyl phthalate	DMP	$C_6H_4(COOCH_3)_2$	131-11-3
Diethyl phthalate	DEP	$C_6H_4(COOC_2H_5)_2$	84-66-2
Diallyl phthalate	DAP	$C_6H_4(COOCH_2CH{=}CH_2)_2$	131-17-9
Di-n-propyl phthalate	DPP	$C_6H_4[COO(CH_2)_2CH_3]_2$	131-16-8
Di-n-butyl phthalate	DBP	$C_6H_4[COO(CH_2)_3CH_3]_2$	84-74-2
Diisobutyl phthalate	DIBP	$C_6H_4[COOCH_2CH(CH_3)_2]_2$	84-69-5
Butyl cyclohexyl phthalate	BCP	$CH_3(CH_2)_3OOCC_6H_4COOC_6H_{11}$	84-64-0
Di-n-pentyl phthalate	DNPP	$C_6H_4[COO(CH_2)_4CH_3]_2$	131-18-0
Dicyclohexyl	DCP	$C_6H_4[COOC_6H_{11}]_2$	84-61-7

phthalate			
Butyl benzyl phthalate	BBP	$CH_3(CH_2)_3OOCC_6H_4COOCH_2C_6H_5$	85-68-7
Di-n-hexyl phthalate	DNHP	$C_6H_4[COO(CH_2)_5CH_3]_2$	84-75-3
Diisohexyl phthalate	DIHxP	$C_6H_4[COO(CH_2)_3CH(CH_3)_2]_2$	146-50-9
Diisoheptyl phthalate	DIHpP	$C_6H_4[COO(CH_2)_4CH(CH_3)_2]_2$	41451-28-9
Butyl decyl phthalate	BDP	$CH_3(CH_2)_3OOCC_6H_4COO(CH_2)_9CH_3$	89-19-0
Di(2-ethylhexyl) phthalate	DEHP, DOP	$C_6H_4[COOCH_2CH(C_2H_5)(CH_2)_3CH_3]_2$	117-81-7
Di(n-octyl) phthalate	DNOP	$C_6H_4[COO(CH_2)_7CH_3]_2$	117-84-0
Diisooctyl phthalate	DIOP	$C_6H_4[COO(CH_2)_5CH(CH_3)_2]_2$	27554-26-3
n-Octyl n-decyl phthalate	ODP	$CH_3(CH_2)_7OOCC_6H_4COO(CH_2)_9CH_3$	119-07-3
Diisononyl phthalate	DINP	$C_6H_4[COO(CH_2)_6CH(CH_3)_2]_2$	28553-12-0

Diisodecyl phthalate	DIDP	$C_6H_4[COO(CH_2)_7CH(CH_3)_2]_2$	26761-40-0
Diundecyl phthalate	DUP	$C_6H_4[COO(CH_2)_{10}CH_3]_2$	3648-20-2
Diisoundecyl phthalate	DIUP	$C_6H_4[COO(CH_2)_8CH(CH_3)_2]_2$	85507-79-5
Ditridecyl phthalate	DTDP	$C_6H_4[COO(CH_2)_{12}CH_3]_2$	119-06-2
Diisotridecyl phthalate	DIUP	$C_6H_4[COO(CH_2)_{10}CH(CH_3)_2]_2$	68515-47-9

[edit] Health effects

[edit] Exposure

Phthalates are easily released into the environment because there is no covalent bond between the phthalates and plastics in which they are mixed. As plastics age and break down the release of phthalates accelerates. Phthalates in the environment are subject to biodegredation, photodegredation, and anaerobic degredation and, therefore, they do not generally persist in the outdoor environment. Outdoor air concentrations are higher in urban and suburban areas than in rural and remote areas.[1]

Indoor air concentrations are generally higher than outdoor air concentrations due to the nature of the sources. Because of their volatility, DEP and DMP are present in higher concentrations in air in comparison with the heavier and less volatile DEHP. Higher air temperatures result in higher concentrations of phthalates in the air. PVC flooring leads to higher concentrations of BBP and DEHP which are more prevalent in dust.[1]

People are commonly exposed to phthalates, and most Americans tested by the Centers for Disease Control and Prevention have metabolites of multiple phthalates in their urine. Because phthalate plasticizers are not chemically bound to PVC they can easily leach and evaporate into food or the atmosphere. Phthalate

exposure can be through direct use or indirectly through leaching and general environmental contamination. Diet is believed to be the main source of DEHP and other phthalates in the general population. Fatty foods such as milk, butter, and meats are a major source. Low molecular weight phthalates such as DEP, DBP, BBzP may be dermally absorbed. Inhalational exposure is also significant with the more volatile phthalates.[2]

In a 2008 Bulgarian study higher dust concentrations of DEHP were found in homes of children with asthma and allergies, compared with healthy children's homes.[3] The author of the study stated, "The concentration of DEHP was found to be significantly associated with wheezing in the last 12 months as reported by the parents."[3] Phthalates were found in almost every sampled home in Bulgaria. The same study found that DEHP, BBzP, and DnOP were in significantly higher concentrations in dust samples collected in homes where polishing agents were used. Data on flooring materials was collected but there was not a significant difference in concentrations between homes where no polish was used that have balatum (PVC or linoleum) flooring verses homes with wood. High frequency of dusting did decrease the concentration.[3]

Children's exposure to phthalates generally is greater than adults. In a 1990's Canadian study that modelled ambient exposures it was estimated that daily exposure to DEHP was "9mcg/kg bodyweight/day in infants, 19 mcg/kg bodyweight/day in toddlers, 14 mcg/kg bodyweight/day in children, and 6 mcg/kg bodyweight/day in adults.[2] Infants and toddlers are at the greatest risk of exposure due to their mouthing behavior. Body care products containing phthalates are a source of exposure for infants. The authors of a 2008 study "observed that reported use of infant lotion, infant powder, and infant shampoo were associated with increased infant urine concentrations of [phthalate metabolites], and this association is strongest in younger infants. These findings suggest that dermal exposures may contribute significantly to phthalate body burden in this population." Though they did not examine health outcomes, they noted that "Young infants are more vulnerable to the potential adverse effects of phthalates given their increased dosage per unit body surface area, metabolic capabilities, and developing endocrine and reproductive systems."[4]

In 2008 the Danish Environmental Protection Agency (EPA) found a variety of phthalates in erasers and warned of health risks when children regularly suck and chew on them. The European Commission Scientific Committee on Health and Environmental Risks (SCHER), however, considers that, even in the case when children bite off pieces from erasers and swallow them, it is unlikely that this exposure leads to health consequences.[5]

Phthalates are also found in medications, where they are used as inactive ingredients in producing enteric coatings. It's not known how many medications are made using phthalates, but some include omeprazole, didanosine, mesalamine,

and theophylline. A recent study found that urinary concentrations of monobutyl phthalate, the DBP metabolite, of mesalamine users was 50 times higher than the mean of nonusers (some formulations of mesalamine do not contain phthalates).[6] The study showed that exposures from phthalate containing medications can far exceed population levels from other sources.[6] DBP in medications raises concern about health risks due to the high level of exposures associated with taking these medications especially in vulnerable segments of the population, including pregnant women and children.[6]

In 2008 the United States National Research Council recommended that the cumulative effects of phthalates and other antiandrogens be investigated. It criticized US EPA guidances, which stipulate that when examining cumulative effects the chemicals examined should have similar mechanisms of action or similar structures, as too restrictive. It recommended instead that the effects of chemicals which cause similar adverse outcomes should be examined cumulatively.[7]:9 Thus the effect of phthalates should be examined together with other antiandrogens, which otherwise may have been excluded because their mechanisms or structure were different.

[edit] Endocrine disruption

Main article: Endocrine Disruptors

In studies of rodents exposed to certain phthalates high doses have been shown to change hormone levels and cause birth defects.[8] A recent British study showed that the phthalate di(n-butyl) phthalate (DBP) or its metabolite monobutyl phthalate (MBP) suppresses steroidogenesis by fetal-type Leydig cells in primates as in rodents.[9]

A study published in 2005 reported that human phthalate exposure during pregnancy resulted in decreased anogenital distance among baby boys. In this study phthalate metabolites were measured in urine samples collected from the pregnant women who gave birth to the infants. After birth the genital features and anogenital distance of these women's babies were measured and correlated with the residue levels in the mother's urine. Boys born to mothers with the highest levels of phthalates were 7 times more likely to have a shortened anogenital distance.[10] An editorial concerning this paper in the same volume stated that the study population was small, and "needs to be investigated more thoroughly in a larger, more diverse population".[11] While anogenital distance is routinely used as a measure of fetal exposure to endocrine disruptors in animals,[12] this parameter is rarely assessed in humans and its significance is unknown.[13] One paper states that "Whether anogenital distance measurements in humans relate to clinically important outcomes … remains to be determined,"[14] and a National Toxicology Program expert panel concluded that anogenital distance is a "'novel index' whose relevance in humans 'has not been established,'" and that there is "insufficient

evidence in humans" that DEHP causes harm.[15] The Swan study is thought by some to "suggest that male reproductive development in humans could be affected by prenatal exposure to environmentally relevant levels of phthalates."[16] Authors of a more recent study of boys with undescended testis hypothesized that exposure to a combination of phthalates and anti-androgenic pesticides may have contributed to that condition.[17]

In contrast to the Swan study an earlier study found that "adolescents exposed to significant quantities of DEHP as neonates showed no significant adverse effects on their physical growth and pubertal maturity."[18] This study, however, examined children exposed intravenously to phthalate diesters, and intravenous exposure results in little metabolic conversion of the relatively nontoxic phthalate diester to its more toxic monoester metabolite.[19]

In November 2009, Swan et al., in the *International Journal of Andrology*, in a paper titled "*Prenatal phthalate exposure and reduced masculine play in boys*",

"... suggest that prenatal exposure to antiandrogenic phthalates may be associated with less male-typical play behaviour in boys. ... [and] ... suggest that these ubiquitous environmental chemicals have the potential to alter androgen-responsive brain development in humans." [20]

[edit] Other effects

There may be link between the obesity epidemic and endocrine disruption and metabolic interference. Studies conducted on mice exposed to phthalates in utero did not result in metabolic disorder in adults.[21] Although, "in a national cross-section of U.S. men, concentrations of several prevalent phthalate metabolites showed statistically significant correlations with abnormal obesity and insulin resistance."[21] Mono-ethyl-hexyl-phthalate, a metabolite of DEHP, has been found to interact with all three peroxisome proliferator-activated receptors (PPARs).[21] PPARs are members of the nuclear receptor superfamily. The author of the study stated "The roles of PPARs in lipid and carbohydrate metabolism raise the question of their activation by a sub-class of pollutants, tentatively named metabolic disrupters."[21] Phthalates belong to this class of metabolic disruptors. It is a possibility that over many years of exposure to these metabolic disruptors, they are able to deregulate complex metabolic pathways in a subtle manner.[21]

Large amounts of specific phthalates fed to rodents have been shown to damage their liver and testes,[8] and initial rodent studies also indicated hepatocarcinogenicity. Following this result diethyl hexyl phthalate was listed as a possible carcinogen by IARC, EC, and WHO. Later studies on primates showed that the mechanism was specific to rodents - humans are resistant to the effect.[22] The carcinogen classification was subsequently withdrawn.

In 2004 a joint Swedish-Danish epidemiologic team found a link between allergies in children and the phthalates DEHP and BBzP. Their review article and meta-analysis of published data relating to phthalates and asthma found an association between phthalates in the home and asthma, especially in children, but this evidence was limited by imprecise data on levels of exposure.[23]

In 2007 a cross-sectional study of U.S. males concluded that urine concentrations of four phthalate metabolites correlate with waist size and three phthalate metabolites correlate with the cellular resistance to insulin, a precursor to Type II diabetes. The authors note the need for follow-up longitudinal studies, as waist size is known to correlate with insulin resistance.[24]

On November 15, 2009, South Korean scientists reported findings of a statistically-significant correlation between urine phthalate concentrations in children and symptoms of ADHD. Although more research is needed in order to conclusively determine the relationship between phthalate and ADHD, the article suggests that consumers should be aware of its potential effects on behavior and neurological disorders. [25]

[edit] Legal status

[edit] European Union

The use of some phthalates has been restricted in the European Union for use in children's toys since 1999.[26] DEHP, BBP, and DBP are restricted for all toys; DINP, DIDP, and DNOP are restricted only in toys that can be taken into the mouth. The restriction states that the amount of phthalates may not be greater than 0.1% mass percent of the plasticized part of the toy. These phthalates are allowed at any concentration in other products and other phthalates are not restricted.

There are no other specific restrictions in the European Union although draft proposals have been tabled for the inclusion of BBP, DEHP and DBP on the Candidate list of Substances for Authorisation under REACH.[27] The Dutch office of Greenpeace UK sought to encourage the European Union to ban sex toys that contained phthalates.[28]

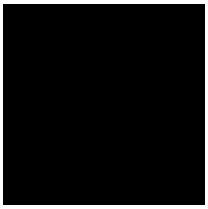
[edit] United States

In August 2008, the United States Congress passed and President George W. Bush signed the Consumer Product Safety Improvement Act (CPSIA) which became public law 110-314[29]. Section 108 of that law specified that as of 10 February 2009, "it shall be unlawful for any person to manufacture for sale, offer for sale, distribute in commerce, or import into the United States any children's toy or child care article that contains concentrations of more than 0.1 percent of"

DEHP, DBP, or BBP and "it shall be unlawful for any person to manufacture for sale, offer for sale, distribute in commerce, or import into the United States any children's toy that can be placed in a child's mouth or child care article that contains concentrations of more than 0.1 percent of" DINP, DIDP, DnOP. Furthermore, the law requires the establishment of a permanent review board to determine the safety of other phthalates. Prior to this legislation, the Consumer Product Safety Commission had determined that voluntary withdrawals of DEHP and DINP from teethers, pacifiers, and rattles had eliminated the risk to children, and advised against enacting a phthalate ban.[30]

Some phthalates were restricted in children's toys sold in California starting in 2009.[31]

[edit] Identification in plastics



Some type 3 plastics may leach phthalates.[*citation needed*]

Phthalates are used in some but not all PVC formulations, and there are no labeling requirements for phthalates specifically. PVC plastics are typically used for various containers and hard packaging, medical tubing and bags, and are labelled "Type 3" for recycling reasons. However, the presence of phthalates rather than other plasticizers is not marked on PVC items, and thus it is not possible to identify phthalate-containing items by markings alone.

Chemical analysis, for example by gas chromatography, can establish the presence of phthalates.

Polyethylene terephthalate ethylene (PETE) is the main substance used to package bottled water and many sodas. Products containing PETE are labeled "Type 1" (with a "1" in the recycle triangle) for recycling purposes. Although the word "phthalate" appears in the name, however, PETE is not a phthalate. They are chemically different substances. [1]

[edit] Detection in food products

Please help improve this section by expanding it. Further information might be found on the talk page.

In February 2009, the Joint Research Centre (JRC) of the European Commission published a review of methods to measure phthalates in food.[32]

[edit] See also

- Xenoestrogen

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20. ^ AU: S. H. Swan AU: F. Liu AU: M. Hines AU: R. L. Kruse AU: C. Wang AU: J. B. Redmon AU: A. Sparks AU: B. Weiss TI: Prenatal phthalate exposure and reduced masculine play in boys SO: International Journal of Andrology VL: 9999 NO: 9999 YR: 2009 CP: © 2009 The Authors. Journal compilation © 2009 European Academy of Andrology ON: 1365-2605 PN: 0105-6263 AD: Department of Obstetrics and Gynecology, University of Rochester, Rochester, NY, USA; Department of Social and Developmental Psychology, University of Cambridge, Cambridge, UK; Department of Family and Community Medicine, University of Missouri, Columbia, MO, USA; Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, Los Angeles, CA, USA; Department of Medicine, University of Minnesota Medical School, Minneapolis, MN, USA; Department of Pediatrics, University of Iowa, Iowa City, IA, USA; Department of Environmental Medicine, University of Rochester, Rochester, NY, USA DOI: 10.1111/j.1365-2605.2009.01019.x US: http://dx.doi.org/10.1111/j.1365-2605.2009.01019.x
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[edit] External links

[edit] Media

- Get Phthalates out of Children's Toys
- NOW on PBS: Phthalates and Toxic Toys? Why does the United States allow children to play with toys some scientists say may cause infertility in boys?
- Interview with Mark Schapiro from Fresh Air (NPR) ; November 26, 2007

- Phthalates Now Linked to Fat, Related Health Risks, University of Rochester Medical Center, March 14, 2007.
- New Scientist and Scientific American articles on Environmental Health Perspectives report; see Research.
- Unsafe Sex Toys with Violet Blue
- Naughty by Nature: Ever thought about the toxins in your sex toys? by Emily Gertz, "Grist magazine", 6 December 2005
- Panel Ranks Risks of Common Phthalate: Additional research underscores concerns about DEHP that were first expressed in 2000 report, Bette Hileman, *Chemical and Engineering News*, NOVEMBER 14, 2005, 83(46):32–36.
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[edit] Sources suggesting low/no health risks

- Phthalates Information Centre; an initiative of the European Council for Plasticisers and Intermediates (ECPI)
- Phthalates Information Center; from the American Chemistry Council, Inc.
- Phthalates and Human Health, by Kenneth Green, D.Env.; Director of the Environmental Program at Reason Public Policy Institute, Reason Foundation, 2000

[hide] v · d · e **Health issues of plastics and Polyhalogenated compounds (PHC)'s**	
Plasticizers: Phthalates	DIBP · DBP · BBP (BBzP) · DIHP · DEHP (DOP) · DIDP · DINP
Other plasticizers	Organophosphates · Adipates (DEHA · DOA)

Monomers	Bisphenol A (BPA, in Polycarbonates) · Vinyl chloride (in PVC)
Other additives incl. PHC's	PBDEs · PCBs · Organotins · PFCs
Health issues	Teratogen · Carcinogen · Endocrine disruptor · Diabetes · Obesity
Miscellaneous	PVC · Plastic recycling · Plastic bottle · Vinyl chloride · Dioxins · Polystyrene · Styrofoam · PTFE (Teflon) · California Proposition 65 · List of environmental health hazards · Persistent organic pollutant · European REACH regulation · Japan Toxic Substances Law · Toxic Substances Control Act

Retrieved from "http://en.wikipedia.org/wiki/Phthalate"
Categories: Aromatic compounds | Carboxylate esters | Plasticizers | Phthalates
Hidden categories: All articles with unsourced statements | Articles with unsourced statements from August 2008 | Articles with unsourced statements from September 2008 | Articles to be expanded | All articles to be expanded

MOST DANGEROUSLY POLLUTED CITIES

PARTICULATE MATTER AIR POLUTION 2004
(Micrograms per cubic meter)
Source: The World Bank

RANK	CITY	COUNTRY	Particulate Matter
1	Cairo	Egypt	169
2	Delhi	India	150
3	Kolkata	India	128
4	Tianjin	China	125
5	Chongqing	China	123
7	Kampur	India	109
8	Lucknow	India	109
9	Jakarta	Indonesia	104
10	Shenyang	China	101
11	Zhengzhou	China	97
12	Jinan	China	94
13	Lanzhou	China	91

14	Taiyuan	China	88
16	Beijing	China	89
17	Chengdu	China	86
18	Ahmadabad	India	83
19	Anshan	China	82
20	Wuhan	China	79

About the Data: Indoor and outdoor air pollution place a major burden on world health.

where coal is the primary fuel for power plants, steel mills, industrial boilers, and domestic heating, the result is usually high levels of urban air pollution -- especially particulates and sometimes sulfur dioxide -- and, if sulfur content of the coal is high, widespread acid deposition. Where coal is not an important primary fuel or is used in plants with effective dust control, the worst emissions of air pollutants stem from the combustionn of petroleum products.

The data on concentrations of particulate matter are estimates, for selected cities, of averge annual concentrations in residential areas away from air pollution "hotspots", such as industrial districts and transport corridors. The data are extracted from a complete set of estimates by the World Banks's Development Research Group and Environment Department in a study of annual ambient concentrations of particulate matter in world cities with populations exceeding 100,000.

Pollutant concentrations are sensitive to local conditions, and even in the same city different monitoring sites may register different concentrations. Thus these data should be considered only a general indication of air quality in each city, and cross-country comparisons should be made with caution. The current World Health Organization air quality guidelines are annual mean concentrations of 20 micrograms per cubic meter for particulate matter less than 10 microns n diameter (PM10).

Particulate matter refers to fine suspended particulates less than 10 microns in diameter (PM10) that are cabable of penetrating deep into the respiratory tract and causing significant health damage. Data are extracted from a larger study of urban population-weighted PM10 levels in residential areas of cities with more than 100,000 residents. The estimates represent the average annual exposure level of the average urgan resident to outdoor particulate matter. The state of a country's technology and pollution controls is an important detrminant of particulate matter concentrations

Soft drinks linked to pancreatic cancer risk

Study followed 60,000 Singapore residents

By Sharon Kirkey, Canwest News ServiceFebruary 8, 2010

Drinking two or more soft drinks a week may nearly double a person's risk of developing pancreatic cancer, researchers are warning.

Cancer of the pancreas, the disease that killed actor Patrick Swayze last year, is one of the most rapidly fatal tumours in adults; only six per cent of people are alive five years after a diagnosis.

The pancreas makes insulin, and scientists believe high concentrations of insulin can drive the growth of pancreatic cancer cells.

Eating too much sugar increases insulin levels in the body, and one of the leading sources of added sugar in our diets are soft drinks.

The new study, by researchers from the University of Minnesota, was based on more than 60,000 men and women in the Singapore Chinese Health Study who were followed for 14 years. During that time, 140 people developed invasive pancreatic cancer.

At the start of the study, as part of a food frequency questionnaire, people were asked to report how often they drank one glass of pop. A glass was considered 237 millilitres or about the equivalent of one cup.

Those who reported drinking two or more soft drinks per week had an 87-per-cent increased risk of pancreatic cancer compared to those who didn't drink soft drinks. The pop drinkers were averaging five drinks per week.

The finding held after researchers took smoking, obesity, diabetes, red meat intake, coffee consumption and a "whole myriad" of other nutritional factors into account, said lead author Noel Mueller, now a research associate at the Georgetown University Medical Center in Washington.

There was no significant association between juice consumption and risk of pancreatic cancer.

Mueller also said caution needs to be taken when extrapolating the findings from the Singapore Chinese study to a western population. But other studies in American and European populations have found similar associations.

A study of 88,794 U.S. nurses and 49,364 male health professionals found that women who consumed three or more sugar-sweetened drinks a week had a 57-per-cent greater risk of pancreatic cancer than did women who drank no more than one soft drink per month. In that study, there was no association between sweetened soft drinks and pancreatic cancer among men. But a Swedish study involving nearly 78,000 women and men reported in 2006 that high consumption of sugar and high-sugar foods -- including soft drinks -- was associated with a greater risk of pancreatic cancer in both sexes.

An estimated 3,900 Canadians were diagnosed with pancreatic cancer last year.

The new study is published this week in the journal Cancer Epidemiology, Biomarkers & Prevention.

Previous research in U.S. and European populations has suggested an association between sweetened sodas and juices and pancreatic cancer. This is the first study to examine the association in an Asian population, although the authors feel the findings can be extrapolated to Western nations.

"We believe that because Singaporean adults have a lot of the same mannerisms as Western countries, which is a tendency to eat fast food and also go shopping, one could say that these findings may be generalizable to other Western countries," said Mueller. "Genetically they are very different from Caucasians, however their lifestyle is similar to Western countries."

The findings are biologically plausible.

Type 2 diabetes, a disorder of blood sugar levels and insulin under-activity, has also tentatively been linked to pancreatic cancer.

The researchers speculate that elevated blood sugar levels associated with soda-drinking and the associated increase in insulin levels prompt pancreatic cells to divide abnormally.

"Drinking sugar-sweetened soft drinks has been linked to weight gain, obesity and diabetes. Both obesity and diabetes are associated with higher risk of pancreatic cancer, one of the leading causes of cancer death in the United States," Jacobs said.