DOWNLOAD PDF PESTICIDES STUDIED IN MAN

Chapter 1 : Pesticides: Just How Bad Are They? â€“ Science-Based Medicine

Pesticides studied in man. [Inorganic and organometal pesticides -- Pesticides derived from plants and other organisms -- Synergists -- Propellants, solvents and oil insecticides -- Fumigants and nematocides -- Chlorinated hydrocarbon insecticides -- Organic phosphorus pesticides -- Carbamate pesticides -- Nitro compounds and related phenolic pesticides -- Synthetic organic rodenticides.

EPA, registration of given product. The list of pesticides for which registration standards have been issued is referred to as List A and can be found in Appendix I of the Federal Register notice of February 22, Under the FIFRA Amendments of , the data bases on the remaining registered pesticide products are being upgraded in five phases over a 9-year period. The conclusions and recommendation of the committee for further changes and additions to the toxicity testing battery to allow for more adequate consideration of the special testing needs for infants and children are presented. The more specific types of toxicity that are determined include carcinogenicity; developmental including teratogenicity in offspring and reproductive toxicity; mutagenicity; and neurotoxicity Table Detailed information on the metabolism or biotransformation of the pesticide is also obtained. Consideration is given to testing individual metabolites in animals, and in or on pesticide-treated plants to which humans could exposed through their diet. The extent of metabolite testing required depends on the level of potential toxicity and environmental persistence of the metabolite. Pesticides in the Diets of Infants and Children. The National Academies Press. The results enable toxicologists to estimate the safety of a material of humans Loomis, Weil published the following set of guidelines, which reflected a consensus among toxicologists. These should be considered before initiating a toxicity test: For this, metabolism, absorption, excretion, storage and other physiological effects might be considered. Where practical, use several dose levels on the principle that all types of toxicologic and pharmacologic actions in man and animals are dose-related. The only exception to this should be the use of a single, maximum dosage level if the material is relatively nontoxic; this level should be a sufficiently large multiple of that which is attainable by the applicable hazard exposure route, and should not be physiologically impractical. Effects produced at higher dose levels within the practical limits discussed in 2 are useful for delineating mechanism of action, but for any material effect, some dose level exists for man or animal below which this adverse effect will not appear. This biologically insignificant level can and should be set by use of a proper uncertainty factor and competent scientific judgment. Effects obtained by one route of administration to test animals are not a priori applicable to effects by another route of administration to man. Thus, for example, food additives for man should be tested by admixture of the material in the diet of animals. EPA does not recognize the existence of a dose level at which a carcinogen will not exert its effect. For carcinogens, EPA generally accepts a risk of , as extrapolated from bioassays using the nonthreshold modification of the linearized multistage model of Armitage and Doll , as adequate for the protection of humans. The selection of animal species for toxicity tests depends on life span, Page Share Cite Suggested Citation: EPA recommends using rats for subchronic, chronic, carcinogenicity, and reproduction studies; mice for carcinogenicity studies; and dogs for subchronic and chronic studies. Rats are routinely used for acute oral and inhalation studies and rabbits for eye and skin irritation studies and acute dermal studies. One exception to this is the use of guinea pigs for dermal sensitization testing. The rat and rabbit are recommended for developmental toxicity teratogenicity testing. Justification must be provided for the use of species other than those outlined above. The number of animals to be tested in each dose group depends on a number of factors, including the purpose of the experiment, the required sensitivity of the study, the reproductive capacity and the fertility of the species, economic aspects, and the availability of animals IPCS, Table lists the minimum number of animals required by EPA for some toxicity studies. The selection of dose levels for subchronic studies should be based on the results of acute toxicity testing, on range-finding studies, and on pharmacokinetic metabolism, including rate in various tissues data. For subchronic studies, four dose groups of animals should be included: This same guidance is relevant to chronic toxicity and reproduction studies. For teratology studies, the highest dose tested should elicit some signs of maternal toxicity, but the toxicity should not obscure the results. The one notable exception to this

guidance pertains to carcinogenicity studies. The highest dose levels for these studies should be at a maximum tolerated dose MTD , as determined in day toxicity studies in the appropriate test species and from pharmacokinetic information on the material being tested. The EPA has issued its own guidance for the selection of this dose level. Some of the factors to consider in selecting an MTD are: Page Share Cite Suggested Citation:

Chapter 2 : Phosphamidon | C10H19ClNO5P - PubChem

Pesticides Studied in Man is complementary to the first book, but is in no way duplicative. It is a comprehensive review and analysis of virtually all essential scientific information bearing on the toxic properties of several hundred pesticides.

Harriet Hall on December 9, Shares 3D model of dichlorodiphenyltrichloroethane DDT , an insecticide I think everyone would agree that it would not be a good idea to put pesticides in a saltshaker and add them to our food at the table. But there is little agreement when it comes to their use in agriculture. How much gets into our food? What are the effects on our health? Is there a safer alternative? Where should we look to find science-based answers to those questions? One place we should not look is books written by biased non-scientists to advance their personal agendas. A friend recently sent me a prime example of such a book: The foreword and introduction: A bad first impression The Foreword is by Dr. And his evidence for pesticide-free alternatives is far from convincing. He set out to find evidence to validate his belief that pesticides were responsible. Predictably, confirmation bias kicked right in and had a field day. His bias even interferes with his reading comprehension. Pesticides are low on the list. All agricultural poisons are scientifically tested to ensure safe use. The residues are too low to cause any problems. Modern pesticides rapidly degrade. Regulatory authorities are reliable and trustworthy. Pesticides are essential to farming. Note the inflammatory choice of words: It is true that many chemicals in use in the US have not been adequately tested for safety, but even he himself admits that pesticides have been studied more than most. He cites several of those studies. For instance, one study found chemicals in the cord blood of newborns; some of those chemicals can harm brain development and the nervous system, but they have never been found to do so in the amounts detected. He criticizes current scientific testing methods as unsound, and he points out that the developing fetus may have special needs. Pesticide exposure has been linked to a number of health problems in children, including lower IQs, autism, ADHD, lack of physical coordination, loss of temper, bipolar illness, schizophrenia, and depression. These are reported correlations, not proven causations. He cites birth defects and gene alterations in mice exposed to pesticides, but there is no comparable evidence for humans. I agree that these studies are cause for concern and further research, but I think it is premature to draw firm conclusions or use that evidence to guide public policy. He says the lowest doses of some chemicals can be more toxic because they begin to act as hormones at those low levels. Several of us have written about endocrine disruptors on SBM here , here , here , and here. Leu reproduces graphs showing increasing rates of diabetes, obesity, and thyroid cancer, and implies that endocrine disruptors are a major cause. Dioxins are very persistent in the environment, and they can contaminate food. Pesticides can degrade into other chemical compounds that are harmful. Testing is not done on every possible pesticide and metabolite. He says the bulk of pesticides are inside the food, but that is only true for systemic pesticides; other pesticides only affect the surface and can be washed off. For that matter, Any synthetic pesticide residue is a drop in the bucket compared to the much larger concentrations of natural plant pesticides. He could have cited some of the many, many successes of government regulation in protecting public health and the environment; some of those successes involve the very contaminants he lists. He faults the government for continuing to allow mercury in fillings and vaccines, not acknowledging that mercury is no longer used in any vaccine but the multidose injectable flu vaccine, and that there has never been any evidence of danger from the use of mercury in vaccines or fillings. He particularly targets glyphosate Roundup. He shows nine graphs with correlations between glyphosate, GMOs, and everything from diabetes to intestinal infection. He omits that now-famous graph showing an almost perfect correlation between autism and organic food. Pesticides are essential to farming He cites a number of studies where organic farming practices produced greater yields than conventional methods. He shows evidence that organic crops are more resilient in adverse conditions like droughts, and that good-practice organic systems produce higher yields in traditional smallholder farm settings. Recent advances in organic farming techniques are very encouraging, and anything that reduces the need for pesticides sounds like a good idea. It may be possible for farmers to eschew pesticides; but is it feasible on a large scale, and is it really preferable to judicious use of pesticides following best practices and

evidence-based guidelines? Those are questions that science will be able to answer, but the necessary studies have not been done yet. Some facts and balances How much pesticide residue is actually present on our foods? You can read the details here. The obvious next question is how are safe levels determined. The details are here. Levels change as new evidence warrants. One activist organization reports that 86 pesticides were found on cucumbers. That might sound scary, but what does it really mean? There is a legitimate concern that ingesting multiple chemicals at safe levels might add up to unsafe cumulative effects, and that infants and pregnant women might be at higher risk. As Bruce Ames has pointed out: Carrots, celery, parsley, parsnips, mushrooms, cabbage, Brussels sprouts, mustard, basil, fennel, orange and grapefruit juices, pepper, cauliflower, broccoli, raspberry, and pineapple contain natural pesticides that cause cancer in rats or mice and that are present at levels ranging from 70ppb parts per billion to 4 million ppbâ€"levels that are enormously higher than the amounts of man-made pesticide residues in plant foods. Any discussion of harms from pesticides should weigh the harms against the benefits. There certainly are benefits: Pesticides are the only effective means of controlling disease organisms, weeds, or insect pests in many circumstances. Consumers receive direct benefits from pesticides through wider selections and lower prices for food and clothing. Pesticides protect private, public, and commercial dwellings from structural damage associated with termite infestations. Pesticides contribute to enhanced human health by preventing disease outbreaks through the control of rodent and insect populations. Pesticides are used to sanitize our drinking and recreational water. Pesticides are used to disinfect indoor areas e. The pesticide industry also provides benefits to society. For instance, local communities and state governments may be partially dependent upon the jobs and tax bases that pesticide manufacturers, distributors, dealers, commercial applicators, and farmers provide. Incidentally, when plants are not exposed to artificial pesticides, they tend to increase their production of natural pesticides. This phenomenon has not been well studied. It is a fallacy to assume they are safer because they are natural. The news about health effects of pesticides is not all bad. When compared to the general population total mortality has been found to be consistently lower among pesticide manufacturers as well as among other groups of workers. With the exception of deaths by accidental causes, non- cancer causes of death mainly represented by cardiovascular diseases , were generally found to be less frequent than expected among manufacturers or users of pesticides, in particular among farmers. No consistent evidence of global cancer mortality different from that of the general population has been reported among pesticide manufacturers or applicators. On the other hand, the papers examined have been strikingly consistent in reporting a low overall cancer risk among agricultural workers; life-style, clean air, low prevalence of smoking have been hypothesized so as to explain this observation. Conclusion Pesticides are meant to harm weeds and insects, but are they also harming us? I certainly agree with him that there is a need for more research. There is a danger to invoking the precautionary principle before ensuring that the alternatives are not worse. This is what typically happens when a layman with an ax to grind ventures into the scientific arena looking for evidence to support his prior beliefs. A good scientist would look just as carefully for any evidence that might prove his hypothesis wrong. Unusually for a layman, Fitzgerald approached his subject without bias and got it right. I reviewed that book here. Things that scientists are already addressing. During a long career as an Air Force physician, she held various positions from flight surgeon to DBMS Director of Base Medical Services and did everything from delivering babies to taking the controls of a B She retired with the rank of Colonel. In she published her memoirs,.

Chapter 3 : Health effects of pesticides - Wikipedia

General use pesticides may be purchased and used by persons who are not certified pesticide applicators. Check with specific state regulations for local restrictions which may apply. Pesticide products containing Propoxur must bear the signal word, "Caution" or "Danger. Propoxur is not used on food crops. It is used against mosquitoes in outdoor areas, for flies in agricultural settings, for fleas and ticks on pets, as an acaricide, on lawns and turf for ants, on flowering plants, and in private dwellings and public buildings. It is also used as a molluscicide, a chemical that kills snails. It is effective against cockroaches, aphids and leafhoppers 27 , Propoxur is one of the chemicals that have, to a large extent, replaced DDT in the control of black flies and mosquitoes It is a nonsystemic insecticide with contact and stomach action that has longstanding residual poisonous, or toxic activity when it is in direct contact with the target pest 27 , 7. Many formulations are available including ready-to-use liquids and aerosols, emulsifiable concentrates, wettable powders, granular baits, dusts and impregnated pet collars and strips Propoxur is one of a family of insecticides called carbamates. These chemicals block the production and action of cholinesterase, an essential nervous system enzyme. These materials quickly paralyze the nervous systems of insects, gaining them a reputation of having a rapid "knockdown" effect 8 , 2. Please refer to the Toxicology Information Brief on cholinesterase-inhibition for a more detailed discussion of cholinesterase inhibition. Carbamates can be absorbed in a variety of ways: During wide-scale spraying of propoxur in malarial control activities conducted by the World Health Organization WHO , only mild cases of poisoning were noted. Applicators who used propoxur regularly showed a pronounced daily fall in whole blood cholinesterase activity and a distinct recovery after exposure stopped. No adverse cumulative effects on cholinesterase activity were demonstrated 27 , Human adults have ingested single doses of 90 mg of propoxur without apparent symptoms 4. A 42 year old male volunteer who ingested 1. Complete recovery from an acute poisoning by propoxur, with no long-term health effects, is possible if exposure ceases and the victim has time to reform their normal level of cholinesterase and to recover from symptoms 25 , 7. Carbamates generally are excreted rapidly and do not accumulate in mammalian tissue. If exposure does not continue, cholinesterase inhibition reverses rapidly. In non-fatal cases, the illness generally lasts less than 24 hours The oral LD50 in mice is Propoxur is reportedly less toxic when absorbed through the skin, than when it is ingested Tests show that propoxur is not an eye irritant While permanent behavioral changes were reported in rats that received propoxur repeatedly, no effect was seen in experimental rats exposed to 7. Propoxur is very efficiently detoxified, or made into nonpoisonous forms, thus making it possible for rats to tolerate daily doses approximately equal to the LD50 of the insecticide for long periods, provided that the dose is spread out over the entire day, rather than ingested all at once In the same study, dietary doses of However, the size and growth of litters was reduced, and food intake, growth, and lactation were depressed in parents Mutagenic Effects Propoxur did not cause mutations in six different types of bacteria 8. A derivative of propoxur N-nitroso is mutagenic, however 5. Carcinogenic Effects No carcinogenic effects have been reported for propoxur. Organ Toxicity The autopsy of a human adult who died six hours after eating an unknown quantity of UNDEN, a pesticide containing propoxur, showed swelling of the brain with excess fluid, distended lungs, and increased blood in the capillaries of internal organs 4. Fate in Humans and Animals Propoxur is broken down and excreted rapidly in urine 1 , In humans given a single oral dose of The toxicity of propoxur varies by type of bird. The following list indicates the oral LD50s, for several bird species, of two different formulations:

Chapter 4 : Triazophos | C12H16N3O3PS - PubChem

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

Synthetic Pyrethroid Pesticides 1 Frederick M. Fishel 2 This document provides a general overview of human toxicity, a listing of laboratory animal and wildlife toxicities, and a cross reference of chemical and common names with their trade names of many synthetic pyrethroid pesticides registered for use in Florida. General Pyrethrins were originally derived from East African chrysanthemum flowers and were shown to have insecticidal activity. In a natural environment, they were chemically unstable and broke down rapidly upon exposure to air and sunlight. Beginning in the s, synthetic pyrethroids came into the market for agricultural purposes as they were synthesized from petroleum derivatives. They are also widely used as home and garden insecticides along with uses on pets and livestock, mosquito control, treatment of transport vehicles, and for treatment of ectoparasitic disease. Their desirable features provide a quick knockdown of insects at low rates, relatively low mammalian toxicity, and improved stability in outdoor environments, which has increased their marketability in agriculture. They are effective against a wide range of insect and mite pests and may be mixed with other pesticides for a broad spectrum of pest control. Formulations that are commercially available include aerosols, dips, emulsifiable concentrates, wettable powders, granules, and concentrates for ultra low volume applications targeting mosquitoes. Pyrethroids may be mixed with piperonyl butoxide, a synergist, which enhances the effect of the active ingredient. Their mode of action is interference with transmission of nerve impulses. Toxicity Pyrethroids are one of the least acutely toxic insecticides to mammals because they are quickly deactivated by metabolic processes. Toxicity by inhalation and dermal absorption is low. Sensitization sometimes occurs in some individuals after a single exposure, which causes either an asthmatic condition or a skin rash or inflammation. After the initial exposure to the sensitizing agent, the sensitized individual responds to a dose smaller than the initial dose. Symptoms are more common with exposure to the pyrethroids whose structures include cyano-groups. Sensations are described as stinging, burning, itching, and tingling, progressing to numbness, with the face most commonly affected. Persons treated with permethrin for lice or flea infestations sometimes experience itching and burning at the site of application, but this is more of a reaction to the effects of the parasites themselves. Due to the inclusion of certain solvents, some formulations of fluvalinate are corrosive to the eyes. Scientists have no data from work-related, accidental poisonings, or epidemiological studies that indicate whether or not pyrethrins are likely to cause cancer in humans. There were no birth defects in pups of rabbits exposed to pyrethrins Vettorazzi ; however, rat pups born to rats fed very high doses of pyrethrins for three weeks prior to mating were of low body weights Hayes Pyrethrins are highly toxic to fish and tadpoles. They affect their skin touch receptors and balance organs Tomlin Mammalian toxicities for pyrethroid pesticides registered in Florida are shown in Table 1. Table 2 lists the toxicities to wildlife by the common name of the pyrethroid pesticide. Table 3 provides a cross listing of many of the trade names that these products are registered and sold by in Florida. Additional Information Hayes, W. Pesticides studied in man. Cornell University and Michigan State University. Incorporating the Agrochemicals Handbook.

Chapter 5 : Effects of Pesticides

Pesticides studied in man by Wayland J. Hayes, , Williams & Wilkins edition, in English.

Pesticides are designed to kill insects, weeds, fungi, bacteria, and other things that feed on crops, spread disease, are a nuisance, or destroy property. Farming is big business, and most food producing companies are driven to make money and pay the most attention to the bottom-line. Pesticides and genetically modified organisms are a way to ensure they get the crop yield they demand, no matter how it hurts the environment or the consumers. Pest control methods may be either biological or chemical in nature. Biological pest control can include fungi, bacteria, natural pest predators, and other organically present substances. Some biological measures include organisms that, without any manipulation, are naturally effective against pests; cats to mice, for example. Who Is to Blame? Seven of the most toxic chemical compounds known to man are approved for use as pesticides in the production of food! The intent of the original nations involved in this effort was to develop a set of food guidelines, standards, and codes of practice. It was to be an international endeavor to promote safety in food. The greatest risk to our environment and our health comes from the chemical pesticides. In spite of the dangers, the government maintains its approval of the use of toxic chemicals to make pesticides. And science is constantly developing new variations of poisons. Broad-spectrum and Narrow-spectrum Pesticides Broad-spectrum pesticides kill many pests, while narrow-spectrum pesticides do just the opposite. Narrow-spectrum pesticides are developed to kill specific types of organisms. Most pesticides kill pests directly on contact. Systemic pesticides work differently. They penetrate to the inside of a plant traveling along its absorption path. Pesticides and Bees Pesticides are a major threat to bees. The bees and butterflies are pollinators, and they represent a natural tour de force in perpetuating plant cycles and the natural evolution of plants that rely on pollinators. You see, bees cross-pollinate to collect their food. Almost a quarter of maintained bee hives did not survive the winter of Farmers and their families and other persons who use chemical pesticides regularly are at greatest risk for pesticide toxicity in their bodies. The danger spreads across larger areas, as the pesticides: Are carried on the wind Leave residues on produce Remain inside produce and animals Run off into open water, contaminating public water supply as well as fish and other seafood Anyone who uses pesticides, or is present when pesticides are sprayed, is at risk for dangerous exposure. The pesticides can enter the body through skin, eyes, mouth and nose. Pesticides can be toxic to humans and animals. In some cases, it only takes a small amount of some toxins to kill. And other toxins that are slower acting may take a long time to cause harm. One disaster at a pesticide manufacturing plant was in Bhopal, India. The plant accidentally released over 40 tons of an intermediate chemical gas, methyl isocyanate, used to produce some pesticides. As a direct result of the spill, nearly 4, people were killed immediately, overall approximately 15,, people died in the ensuing years because of toxic chemical exposure. Today more than half a million people suffer from mild to severe permanent damage as a result of the disaster. The Natural Resource Defense Council has collected data which recorded higher incidence of childhood leukemia, brain cancer, and congenital disabilities. These results correlated with early exposure to pesticides. Researchers report the dangers of pesticides can start as early as fetal stages of life. What you also need to understand is that toxins from pesticides can remain in the body and build up in the liver and fatty tissue. High levels of exposure can be fatal. You just have to hope for the best. How will you be affected? Several factors determine how your body will react including your level of exposure, the type of chemical you ingest, and your individual resistance to the chemicals. Some people are unaffected or are mildly affected, while others become severely ill from similar levels of exposure. Some possible reactions are:

Chapter 6 : Pesticides Studied in Man - Wayland J. Hayes - Google Books

The second portion of each discussion is concerned with those aspects of the biochemistry and animal toxicity data that may be relevant to man. The third portion of the discussion of each compound is concerned with one or more kinds of experience with the effects of the compound in man.

Restricted Use materials may be purchased and used only by certified applicators. All product labels must include the following statement on the front panel, "This pesticide may be fatal to dogs or other pets if eaten. Keep pets out of treated areas" Products containing metaldehyde must bear the signal word "Caution" or "Warning" Check with specific state regulations for local restrictions which may apply. It is used in a variety of vegetable and ornamental crops in the field or greenhouse, on fruit trees, small-fruit plants, or in avocado or citrus orchards, berry plants and banana plants. It is applied to the soil around plants 7. Care should be taken not to contaminate edible parts of the plant 1. It is used in the form of granules, sprays and dusts, or mixed with bran as a bait 8. It works primarily in the stomach by producing toxic effects after it is ingested by the pest 7. Metaldehyde is available in pelleted baits Tablets containing metaldehyde, or meta-fuel, are used in Europe as fuel for lamps and small stoves. Meta-fuel is not available in the United States Skin and eye irritation may result from exposure to this material Inhalation of vapors of metaldehyde may cause severe irritation of the mucous membranes lining the mouth, throat, sinuses and lungs Ingestion of this molluscicide causes irritation of the stomach and intestines 7. Metaldehyde can also cause kidney and liver damage One to three hours after ingestion, the following symptoms may appear: Other symptoms of acute exposure include increased heart rate, panting, asthma attack, depression, drowsiness, high blood pressure, inability to control the release of urine and feces, incoordination, muscle tremors, sweating, excessive salivation, tearing, cyanosis, acidosis, stupor, and unconsciousness 6 , Mental deficiencies and memory loss from ingestion poisoning may persist for one year or more 10 , Death may occur due to kidney or lung failure 6. A child died after ingesting 3, mg of metaldehyde 4. The lethal concentration fifty, or LC50, is that concentration of a chemical in air or water that kills half of the experimental animals exposed to it for a set time period. Long-term, repeated skin exposure to metaldehyde can result in dermatitis, the inflammation of skin in humans Prolonged eye exposure can cause conjunctivitis. Fifty percent of female rats given this dose showed paralysis Reproductive Effects During a 3-generation study of rats exposed to chronic ingestion of metaldehyde, adverse effects were seen on reproduction and on the survival rate of offspring Dietary levels of 1, and 5, ppm interfered with the reproduction of female rats in a 3-generation test 8. Mutagenic Effects Metaldehyde is suspected of causing mutagenic effects 6. There was no evidence of mutagenicity when metaldehyde was tested on five strains of bacteria It may also cause lesions, inflammation of the gastrointestinal tract, liver damage, and brain damage Fate in Humans and Animals The central nervous system is either depressed or excited by metaldehyde or its metabolites. Metaldehyde is slowly decomposed in the body to a substance called acetaldehyde, a chemical that acts like a narcotic. Death from metaldehyde poisoning generally results from over depression of control centers in the brain that are responsible for the normal function of respiratory and vasomotor systems. Metaldehyde is readily absorbed into the bloodstream from the gastrointestinal tract. Its metabolites can cross the blood-brain barrier, as evidenced by their effect on the level of consciousness of animals Autopsies of dogs poisoned with metaldehyde revealed congestion and hemorrhages in the liver, kidneys and heart Excitability, tremors, muscle spasms, diarrhea, and difficult or rapid breathing was observed in poultry that was exposed to metaldehyde Effects on Aquatic Organisms Available data suggest that metaldehyde is practically non-toxic to aquatic organisms Bait pellets containing metaldehyde are attractive to dogs. Pets should be confined during application, and kept away from application and storage sites While it does not adsorb strongly to soil particles, metaldehyde is insoluble in water and it has a short soil half-life Breakdown of Chemical in Water This material should not be applied directly to water. Inappropriate storage or disposal, or cleaning of equipment can contaminate water 2. Breakdown of Chemical in Vegetation Metaldehyde must not be applied to edible parts of plants. Specific product labels should be referred to for particular crop guidelines e. Many types of flowers lose their color

when they come in contact with metaldehyde dust or spray 7. It may be formulated with or without calcium arsenate and is also available in a mixed formulation with thiram 1 , 7. It is flammable and burns with a nonsmoking flame 8. It is dangerous when exposed to heat or flame and can react with oxidizing materials Thermal decomposition of metaldehyde may release toxic oxides of carbon. Mixtures of metaldehyde dust and air may explode It is compatible with other substances that are in neutral media. Metaldehyde is noncorrosive 7. Metaldehyde should be used and stored under conditions that are not hazardous. All precautions should be taken to ensure that bait does not get mistaken for food or feed. As it is harmful if swallowed, it should be kept out of the reach of children and pets. Contamination of the edible parts of plants should be avoided when applying metaldehyde 1. Breathing of its dust, as well as skin, eye, or clothing contact should be avoided 2 , 7. A respirator should be worn when using metaldehyde dust 7. After handling, a thorough washing is recommended 1. All unprotected persons should be kept out of the range of drift. Treated areas must not be entered without protective clothing until dusts settle. Metaldehyde is combustible and should be stored in its original container in a cool place, to minimize sublimation. Prolonged storage should be avoided 2.

Chapter 7 : Pesticides Linked to Autism in Study

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The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit. Also used as substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport. These include the pyrethroids , rotenoids , nicotinoids , and a fourth group that includes strychnine and scilliroside. Prominent insecticide families include organochlorines , organophosphates , and carbamates. Their toxicities vary greatly, but they have been phased out because of their persistence and potential to bioaccumulate. Both operate through inhibiting the enzyme acetylcholinesterase , allowing acetylcholine to transfer nerve impulses indefinitely and causing a variety of symptoms such as weakness or paralysis. Organophosphates are quite toxic to vertebrates and have in some cases been replaced by less toxic carbamates. Prominent families of herbicides include phenoxy and benzoic acid herbicides e. Phenoxy compounds tend to selectively kill broad-leaf weeds rather than grasses. The application of pest control agents is usually carried out by dispersing the chemical in a often hydrocarbon-based solvent - surfactant system to give a homogeneous preparation. A virus lethality study performed in demonstrated that a particular pesticide did not increase the lethality of the virus, however combinations which included some surfactants and the solvent clearly showed that pretreatment with them markedly increased the viral lethality in the test mice. Most pesticides work by poisoning pests. With insecticides and most fungicides, this movement is usually upward through the xylem and outward. Increased efficiency may be a result. Systemic insecticides, which poison pollen and nectar in the flowers ,[citation needed] may kill bees and other needed pollinators. These work by taking advantage of natural defense chemicals released by plants called phytoalexins , which fungi then detoxify using enzymes. They are believed to be safer and greener. The first known pesticide was elemental sulfur dusting used in ancient Sumer about 4, years ago in ancient Mesopotamia. The Rig Veda , which is about 4, years old, mentions the use of poisonous plants for pest control. In the 17th century, nicotine sulfate was extracted from tobacco leaves for use as an insecticide. The 19th century saw the introduction of two more natural pesticides, pyrethrum , which is derived from chrysanthemums , and rotenone , which is derived from the roots of tropical vegetables. Organochlorines such as DDT were dominant, but they were replaced in the U. Since then, pyrethrin compounds have become the dominant insecticide. Environmental Protection Agency was established in and amendments to the pesticide law in , [15] pesticide use has increased fold since and 2. Rachel Carson wrote the best-selling book Silent Spring about biological magnification. The agricultural use of DDT is now banned under the Stockholm Convention on Persistent Organic Pollutants, but it is still used in some developing nations to prevent malaria and other tropical diseases by spraying on interior walls to kill or repel mosquitoes. They can also kill bees , wasps or ants that can cause allergic reactions. Insecticides can protect animals from illnesses that can be caused by parasites such as fleas. Herbicides can be used to clear roadside weeds, trees, and brush. They can also kill invasive weeds that may cause environmental damage. Herbicides are commonly applied in ponds and lakes to control algae and plants such as water grasses that can interfere with activities like swimming and fishing and cause the water to look or smell unpleasant. Each use of a pesticide carries some associated risk. DDT , sprayed on the walls of houses, is an organochlorine that has been used to fight malaria since the s. Recent policy statements by the World Health Organization have given stronger support to this approach. DDT use is not always effective, as resistance to DDT was identified in Africa as early as , and by nineteen species of mosquito worldwide were resistant to DDT. In and the U. The state of California alone used million pounds. Pesticides are also found in majority of U. Insecticide use in the US has declined by more than half since In corn fields, the decline was even steeper, due to the switchover to transgenic Bt corn. Primary benefits are direct gains from the use of pesticides and secondary benefits are effects that are more long-term. Diseases controlled include malaria, [35] with millions of lives having been saved or enhanced with the use of DDT alone.

Chapter 8 : Pesticide - Wikipedia

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Although nitrate and bacterial contamination were known to occur in some locations, groundwater was thought to be immune from more serious forms of pollution such as industrial discharges, hazardous waste dumps, or leaching of pesticides from agricultural operations. Synthetic organic compounds are chemicals synthesized from carbon and other elements such as hydrogen, nitrogen, or chlorine. They do not occur naturally, but are manufactured to meet hundreds of needs in our daily lives, ranging from moth balls to hair sprays, from solvents to pesticides. Why have they only recently been discovered in groundwater? One reason is that use of synthetic organic compounds has greatly increased within the past 40 years, and some of these gradually have made their way into groundwater. Another reason for the recent discoveries of organic contaminants in groundwater is that the laboratory capability to detect these chemicals has greatly improved within the past decade. A classic example of this occurred in Bedford, Massachusetts, where severe organic chemical contamination of the town groundwater supply was discovered in only because a resident engineer took a sample of his home tap water with him to work where he was developing and testing a new laboratory instrument for analyzing organic chemicals. The Bedford contamination eventually was traced to several local industries that were improperly disposing of their chemical wastes. Now that people are aware of organic contaminants in drinking water, sampling for such chemicals has increased, and more than synthetic organic compounds have been identified in various U. This contamination originates from a variety of sources, including household products and leakage or improper disposal of chemical wastes from commercial and industrial establishments. By-products of industrial manufacturing or cleaning operations have been disposed of in unrecorded dump sites across the nation, and some of these chemicals have leached to groundwater. Pesticides constitute another, smaller category of synthetic organic compounds, some of which have been found in groundwater. Between and production of synthetic organic pesticides more than tripled in the United States, from about million pounds in to over 1. Although most of these compounds have not been detected in groundwater, a few have become significant contaminants. Twenty- two pesticides have been detected in U. One area with conditions highly conducive to leaching is Long Island, New York, where soils are sandy, the water table is shallow, and agriculture is intensive. A total of 13 pesticides have been detected at least once in Long Island groundwater, and 8 of these have been found multiple times through continued monitoring. In upstate New York, sampling for pesticides has been limited to measurement of aldicarb in wells near treated fields. Low concentrations of aldicarb have been detected in 30 percent of the 76 wells sampled. Twenty-two other states, including Maine, Maryland, and New Jersey, also have reported some pesticide contamination of groundwater. This bulletin focuses on the health effects of pesticides in drinking water, although the same concepts also apply to the much wider range of synthetic organic compounds contaminating groundwater supplies. Types of Pesticides in Groundwater The health effects of pesticides depend upon their chemical characteristics. Before the s most pesticides were compounds of arsenic, mercury, copper, or lead. Although these compounds may have made their way into drinking water, they were not highly soluble, and the residues ingested in foods were of far greater concern. Synthetic organic pesticides were introduced during World War II and were thought to be far safer and more effective. These included chlorinated hydrocarbons such as DDT, aldrin, dieldrin, chlordane, heptachlor, lindane, endrin, and toxaphene. Because of their low solubility in water and their strong tendency to chemically attach to soil particles, these compounds have rarely contaminated groundwater. They originally were thought to be safe to humans and the environment, but later were discovered to accumulate in the environment and build up to toxic concentrations in food chains. Use of most of the chlorinated hydrocarbon pesticides, consequently, has been restricted, suspended, or canceled. One group replacing them has been the organophosphorous compounds such as malathion and diazinon. Although some organophosphorous compounds are highly toxic to humans, they generally break down rapidly in the environment and rarely have been found in groundwater. Another group replacing the chlorinated

hydrocarbons are carbamate pesticides including aldicarb, carbofuran, and oxamyl. These compounds tend to be soluble in water and weakly adsorbed to soil. Consequently, if not degraded in the upper soil layers, they have a tendency to migrate to groundwater. The most significant occurrences of groundwater contamination have been with the carbamate pesticides. Aldicarb has been detected in over 2, wells on Long Island as well as in 12 other states including Maine and New Jersey. As awareness has grown of the potential for pesticides to leach to groundwater, attention has focused on ways of changing registration and monitoring requirements to prevent such contamination from occurring in the future. Intensive studies have also been carried out in an attempt to determine what levels of pesticides are acceptable in water supplies. Health Effects of Pesticides Studies of the health effects of pesticides on humans focus on two aspects, the acute toxicity, or immediate effects resulting from short-term exposure, and the chronic toxicity, or effects resulting from more-prolonged exposures. Acute toxicity typically is expressed as the concentration required to kill 50 percent of a population of test animals such as laboratory rats, either through ingestion or through contact with the skin. These lethal concentrations can vary greatly from one pesticide to another. When pesticides are found in water supplies, they normally are not present in high enough concentrations to cause acute health effects such as chemical burns, nausea, or convulsions. Instead, they typically occur in trace levels, and the concern is primarily for their potential for causing chronic health problems. To estimate chronic toxicity, laboratory animals are exposed to lower than lethal concentrations for extended periods of time. Measurements are made of the incidence of cancer, birth defects, genetic mutations, or other problems such as damage to the liver or central nervous system. Although we may encounter many toxic substances in our daily lives, in low enough concentrations they do not impair our health. Caffeine, for example, is regularly consumed in coffee, tea, chocolate, and soft drinks. Although the amount of caffeine consumed in a normal diet does not cause illness, just 50 times this amount is sufficient to kill a human. Similarly, the oxalic acid found in rhubarb and spinach is harmless at low concentrations found in these foods, but will lead to kidney damage or death at higher doses. Pesticides by definition are toxic to at least some forms of life, but whether or not a particular pesticide in groundwater is hazardous to human health depends on its concentration, how much is absorbed from water or other sources. The duration of exposure to the chemical, and how quickly the compound is metabolized and excreted from the body. Drinking water guidelines are aimed at keeping pesticides at levels below those that are considered to cause any health effects in humans. They are derived from laboratory data using one of two methods, depending on whether or not the compound causes cancer. It is expressed as milligrams of pesticide per kilogram of body weight. Ranges are defined as follows: The lowest level from all these tests is defined to be the NOEL no observed effect level and is used as the starting point from which drinking water standards are derived. Although aldicarb is the most acutely toxic pesticide registered by the Environmental Protection Agency, its hazard at levels typically found in groundwater is relatively low because it is rapidly metabolized and excreted. It does not accumulate in body tissues and has not been found to cause cancer, birth defects, genetic changes, or other chronic health problems in laboratory animals. In setting drinking water guidelines, the acceptable daily intake ADI for a pesticide is calculated by dividing the NOEL by a "safety factor" determined by the level of uncertainty in the experimental data. If valid experimental results are available from studies on prolonged ingestion by humans, for example, a minimum safety factor of 10 might be chosen. This could increase to as much as several thousand if human data were lacking and laboratory data inconclusive. Most commonly, long-term animal feeding data are available, and a safety factor of is used. This is based on the assumption that humans are roughly 10 times more sensitive to toxic substances than laboratory animals and that the susceptibility between different individuals can vary by another lO-fold. The resulting ADI represents an estimate of the amount of a pesticide that a typical person can consume daily for a lifetime with no adverse health effects. For aldicarb, the currently accepted NOEL is 0. The method for conversion from an ADI to a drinking water guideline varies form one agency to another. In New York State the 7 ppb guideline for aldicarb was derived in the following manner: Estimates must be made, for example, of the average weight of a person and the amount of water consumed per day. The percentage of the daily intake of pesticide that would be consumed in drinking water must also be estimated, based on factors such as how much is contained in foods and whether the compound can also be absorbed through the skin while bathing. Although aldicarb

has a high dermal toxicity, probably only negligible amounts would be absorbed through skin unless the pesticide is dissolved in oil or an organic solvent rather than water. Environmental Protection Agency calculated drinking water guidelines differently, basing the calculation on the amount that would be consumed by a kilogram pound child who drinks 1 liter approximately 1 quart of water per day: Instead, it is a health advisory that simply indicates a conservative estimate of the concentration that can be consumed in drinking water with no adverse health effects. Other sources of exposure, such as pesticides consumed in food, inhaled, or absorbed through the skin, are not included. The Environmental Protection Agency currently is attempting to revise this system to provide a more realistic assessment of total exposure from all sources. Carcinogenic Compounds Drinking water standards are set in a different manner for carcinogenic pesticides. Current regulatory policy is that there is no specific threshold below which these chemicals do not cause an effect, although this is a matter of considerable scientific controversy. Instead of setting a threshold value, analysis focuses on the relationship between concentration and the risk of causing a specified number of cancer cases in a population of a specified size. Experiments with laboratory animals are used to correlate dose with expected frequency of cancer occurrence. These data are then extrapolated to humans, and regulatory decisions are made about the level of risk considered acceptable to human populations. Whether this level of risk is acceptable to an individual is a highly subjective and complex issue. Studies have shown, for example, that the public is willing to accept a risk as high as 1 in 10, from eating peanut butter, which may be contaminated with aflatoxin, a natural mold and one of the most potent carcinogens known to man, but would reject using a synthetic chemical with a cancer risk factor times lower. Federal regulatory agencies commonly define acceptable risk in drinking water to be one that causes no more than one additional case of cancer in a population of a million people who drink the water over the course of a lifetime. This risk is roughly the same as that of dying from diptheria, polio, or German measles, or of being in a fatal plane accident. For pesticides that are carcinogenic, the concentrations causing no more than one cancer per million people typically are in the range of a few parts per trillion. In some cases these concentrations are so low that they exceed our capability for accurate laboratory measurement. For most pesticides, drinking water standards have yet to be set. The Environmental Protection Agency has authority to develop nationwide standards, and some of the states are setting local standards as well. Other organic pesticides are covered by a guideline limiting the concentration of any single organic chemical to no more than 50 parts per million and the combined concentration of all organics found to no higher than parts per million. One of the complicating factors in setting standards for the individual chemicals is that it generally is not known how a given compound might interact with other chemicals to affect human health. Often when one organic compound is found in groundwater, others are there also, and their effects together may be either greater or less than that observed when any one is ingested individually. The number of possible interactions makes thorough analysis of them all an impossible task. Health studies have been conducted of people drinking contaminated water supplies, but these studies are limited by the fact that many health problems are difficult to trace to a specific cause, especially since some cancers can remain latent for up to 40 years. Conclusions Approximately 50, different pesticide products are used in this country, composed of over active ingredients. Although the acute health effects of ingesting large amounts of a pesticide can readily be measured, the chronic effects of long-term exposure to low levels are much harder to define. Extensive laboratory experiments are required, and in many cases these experiments are incomplete or inconclusive. The Environmental Protection Agency is currently working on reevaluation of all pesticides registered before to bring them up to modern health standards and is requiring extensive testing of new products before they come on the market. Many questions remain, however, about the chronic health effects of pesticides and other synthetic organic contaminants in drinking water. Establishment of drinking water standards is an inexact science, with many assumptions and value judgments needed in the conversion from laboratory animal data to an estimate of health effects in humans. The resulting standards represent the best judgment of regulatory authorities about the acceptable level of risk to people exposed to chemicals in drinking water.

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