AN INTRODUCTION TO SYNTHETIC CHEMICAL CONTAMINATES IN FOOD pdf

1: Chemical Contaminants - www.enganchecubano.com

Chemical contaminants are chemicals toxic to plants and animals in waterways. The phrase 'chemical contamination' is used to indicate situations where chemicals are either present where they shouldn't be, or are at higher concentrations than they would naturally have occurred.

Give examples of bacteria, viruses, parasites, and molds that have the potential to cause foodborne illness. Discuss government efforts to protect the health of the population, and precautions consumers can take to protect themselves. Foodborne illness is another serious threat to health. Raw foods, such as seafood, produce, and meats, can all be contaminated during harvest or slaughter for meats , processing, packaging, or during distribution, though meat and poultry are the most common source of foodborne illness. For all kinds of food, contamination also can occur during preparation and cooking in a home kitchen or in a restaurant. In many developing nations, contaminated water is also a major source of foodborne illness. Many people are affected by foodborne illness each year, making food safety a very important issue. Annually, one out of six Americans becomes sick after consuming contaminated foods or beverages. Centers for Disease Control and Prevention. Foodborne illness can range from mild stomach upset to severe symptoms, or even fatalities. The problem of food contamination can not only be dangerous to your health, it can also be harmful to your wallet. At-Risk Groups No one is immune from consuming contaminated food. But, whether you become seriously ill depends on the microorganism, the amount you have consumed, and your overall health. In addition, some groups have a higher risk than others for developing severe complications to foodborne disease. Who is most at risk? Young children, elderly people, and pregnant women all have a higher chance of becoming very sick after consuming contaminated food. Exposure to contaminated food could also pose problems for diabetics, cancer patients, people who have liver disease, and people who have stomach problems as a result of low stomach acid or previous stomach surgery. People in all of these groups should handle food carefully, make sure that what they eat has been cooked thoroughly, and avoid taking any chances that could lead to exposure. The difference depends on the agent that causes the condition. Microbes, such as bacteria, cause food infections, while toxins, such as the kind produced by molds, cause intoxications. Different diseases manifest in different ways, so signs and symptoms can vary with the source of contamination. However the illness occurs, the microbe or toxin enters the body through the gastrointestinal tract, and as a result common symptoms include diarrhea, nausea, and abdominal pain. Additional symptoms may include vomiting, dehydration, lightheadedness, and rapid heartbeat. More severe complications can include a high fever, diarrhea that lasts more than three days, prolonged vomiting, bloody stools, and signs of shock. One of the biggest misconceptions about foodborne illness is that it is always triggered by the last meal that a person ate. However, it may take several days or more before the onset of symptoms. If you develop a foodborne illness, you should rest and drink plenty of fluids. Avoid antidiarrheal medications, because they could slow the elimination of the contaminant. Food Infection According to the CDC, more than different foodborne diseases have been identified. Most are food infections Foodborne illness caused by bacteria, viruses, or parasites. The infection then grows inside the body and becomes the source of symptoms. Food infections can be sporadic and often are not reported to physicians. However, ocassional outbreaks occur that put communities, states and provinces, or even entire nations at risk. For example, in , an outbreak of the infection salmonellosis occurred in the United States due to contaminated ice cream. An estimated , people became ill. In , contaminated clams resulted in an outbreak of hepatitis A in China, which affected about , people. Last reviewed March The Reproduction of Microorganisms Bacteria, one of the most common agents of food infection, are single-celled microorganisms that are too small to be seen with the human eye. Microbes live, die, and reproduce, and like all living creatures, they depend on certain conditions to survive and thrive. In order to reproduce within food, microorganisms require the following: More than two hours in the danger zone. High moisture content is helpful. Fresh fruits and vegetables have the highest moisture content. Most microorganisms need oxygen to

grow and multiply, but a few are anaerobic and do not. Acidity and pH Level. Foods that have a low level of acidity or a high pH level provide an ideal environment, since most microorganisms grow best around 7. Examples of higher pH foods include meat, seafood, milk, and corn. Examples of low pH foods include citrus fruits, sauerkraut, tomatoes, and pineapples. Microorganisms need protein, starch, sugars, fats, and other compounds to grow. Typically high-protein foods are better for bacterial growth. Food Intoxication Other kinds of foodborne illness are food intoxications Foodborne illness caused by natural toxins or harmful chemicals. These and other unspecified agents are major contributors to episodes of acute gastroenteritis and other kinds of foodborne illness. Like pathogens, toxins and chemicals can be introduced to food during cultivation, harvesting, processing, or distribution. Some toxins can lead to symptoms that are also common to food infection, such as abdominal cramping, while others can cause different kinds of symptoms and complications, some very severe. For example, mercury, which is sometimes found in fish, can cause neurological damage in infants and children. Exposure to cadmium can cause kidney damage, typically in elderly people. The Causes of Food Contamination Both food infections and food intoxications can create a burden on health systems, when patients require treatment and support, and on food systems, when companies must recall contaminated food or address public concerns. It all begins with the agent that causes the contamination. When a person ingests a food contaminant, it travels to the stomach and intestines. In the next part, we will focus on different types of food contaminants and examine common microbes, toxins, chemicals, and other substances that can cause food infections and intoxications. About one hundred years ago, typhoid fever, tuberculosis, and cholera were common diseases caused by food and water contaminated by pathogens. Over time, improvements in food processing and water treatment eliminated most of those problems in North America. Today, other bacteria and viruses have become common causes of food infection. Bacteria All foods naturally contain small amounts of bacteria. However, poor handling and preparation of food, along with improper cooking or storage can multiply bacteria and cause illness. In addition, bacteria can multiply quickly when cooked food is left out at room temperature for more than a few hours. Most bacteria grow undetected because they do not change the color or texture of food or produce a bad odor. Freezing and refrigeration slow or stop the growth of bacteria, but does not destroy the bacteria completely. The microbes can reactivate when the food is taken out and thawed. Salmonella was first identified in and many types of this kind of bacteria exist. The incidence of Salmonella infections has risen dramatically in the past few decades. One of the most common is Salmonella, which is found in the intestines of birds, reptiles, and mammals. Salmonella can spread to humans via a variety of different animal-origin foods, including meats, poultry, eggs, dairy products, and seafood. The disease it causes, salmonellosis, typically brings about fever, diarrhea, and abdominal cramps within twelve to seventy-two hours after eating. Usually, the illness lasts four to seven days, and most people recover without treatment. However, in individuals with weakened immune systems, Salmonella can invade the bloodstream and lead to life-threatening complications, such as a high fever and severe diarrhea. The bacterium Listeria monocytogenes is found in soft cheeses, unpasteurized milk, and seafood. It causes a disease called listeriosis that can bring about fever, headache, nausea, and vomiting. Listeria monocytogenes mostly affects pregnant women, newborns, older adults, and people with cancer and compromised immune systems. The food infection E. Sources include raw or undercooked meat, raw vegetables, unpasteurized milk, minimally processed ciders and juices, and contaminated drinking water. Symptoms can occur a few days after eating, and include watery and bloody diarrhea, severe stomach cramps, and dehydration. More severe complications may include colitis, neurological symptoms, stroke, and hemolytic uremic syndrome. In young children, an E. The bacterium Clostridium botulinum causes botulism. Sources include improperly canned foods, lunch meats, and garlic. An infected person may experience symptoms within four to thirty-six hours after eating. Symptoms could include nerve dysfunction, such as double vision, inability to swallow, speech difficulty, and progressive paralysis of the respiratory system. Botulism can also be fatal. Campylobacter jejuni causes the disease campylobacteriosis. It is the most commonly identified bacterial cause of diarrhea worldwide. Consuming undercooked chicken, or food contaminated with the juices of raw chicken, is the most

frequent source of this infection. Other sources include raw meat and unpasteurized milk. Within two to five days after consumption, symptoms can begin and include diarrhea, stomach cramps, fever, and bloody stools. The duration of this disease is about seven to ten days. The food infection shigellosis is caused by Shigella, of which there are several types. Sources include undercooked liquid or moist food that has been handled by an infected person. The onset of symptoms occurs one to seven days after eating, and can include stomach cramps, diarrhea, fever, and vomiting. Another common symptom is blood, pus, or mucus in stool.

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2: Natural Living > Eat Organic Food and Avoid Synthetic Food > Introduction

Chemical contaminants are unwanted harmful chemical substances that are intentionally or unintentionally added to foods and can come from natural sources, environmental pollution or can be formed during food processing, distribution, and storage.

Pesticides and carcinogens[edit] There are many cases of banned pesticides or carcinogens found in foods. Tangerine , strawberry , and Kyofung grape samples were also found contaminated by banned pesticides, including the highly toxic methamidophos. In India, soft drinks were found contaminated with high levels of pesticides and insecticides, including lindane, DDT , malathion and chlorpyrifos. Vietnamese vegetables and fruits were also found to have banned pesticides. The Indonesia food scare , where carcinogenic formaldehyde was found to be added as a preservative to noodles, tofu , salted fish, and meatballs. In Chinese milk scandal , melamine was discovered to have been added to milk and infant formula which caused 54, babies to be sent to the hospital. Six babies died because of kidney stones related to the contaminant. There is a risk that it may induce choking and vomiting , and also that it may be contaminated by toxic substances. It may also be interpreted as a sign of more widespread problems with hygiene. The introduction of complete-capture hairnets is believed to have resulted in a decrease in incidents of contamination of this type. Such use of human hair in food is forbidden in Islam. The presence of these contaminants in processed foods cannot be entirely avoided. There is also the possibility of metal chips from the processing equipment contaminating food. These can be identified using metal detection equipment. In many conveyor lines, the line will be stopped, or when weighing the product with a Check weigher , the item can be rejected for being over- or underweight or because small pieces of metal are detected within it. Emerging food contaminants[edit] While many food contaminants have been known for decades, the formation and presence of certain chemicals in foods has been discovered relatively recently. The maximum concentrations of contaminants allowed by legislation are often well below toxicological tolerance levels, because such levels can often be reasonably achieved by using good agricultural and manufacturing practices. Regulatory officials, in order to combat the dangers associated with foodborne viruses, are pursuing various possible measures. For manufacturers, the testing for food contaminants can minimize the risk of noncompliance in relation to raw ingredients, semi-manufactured foods, and final products. Also, food contaminant testing assures consumers safety and quality of purchased food products and can prevent foodborne diseases , and chemical, microbiological, or physical food hazards.

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3: Food contaminant - Wikipedia

Chemical substances can play an important role in food production and www.enganchecubano.com additives can, for example, prolong the shelf life of foods; others, such as colours, can make food more attractive.

Livestock Feed Meats and Poultry One major group of foods - seafoods - are not currently covered within the regulations. The National Organics Standards Board has officially adopted recommendations for seafood including both finfish and mollusks like oysters, clams, mussels and scallops , but these recommendations have not been added to the National List and implemented into the law as official USDA regulations. Are there any foods that are not covered by the federal organic standards? As mentioned above, seafood is a major exception to the organic regulations and has yet to be legally certified by the USDA. Honey is also a food not directly regulated by the USDA. Certified organic honey has been a confusing issue for consumers, since the USDA allows its official organic logo to be placed on honey that has been certified as organic by other agencies. Can you give me some examples of organically labeled foods? You might see the following types of labels on federally certified organic foods: Another label might read simply "Vegetable Soup" and include the word "organic" only alongside individual items found on the Ingredients List on the side or back of the packaging. For example, the Ingredients List might read: Can organic foods really improve my health? Consumption of organically grown food is a great way to reduce your exposure to contaminants commonly found in foods that have been grown using conventional agricultural practices. These contaminants may include not only pesticides - many of which have been classified as potential cancer-causing agents - but also heavy metals such as lead and mercury, and solvents like benzene and toluene. Minimizing exposure to these potential toxins is an important benefit for your health. Heavy metals can damage nerve function, contributing to diseases such as multiple sclerosis, and interfere with hemoglobin production in a way that increases risk of anemia. In addition to lessening your exposure to these potentially harmful substances, organically grown foods, on average, contain higher levels of many nutrients including vitamins and minerals. These two aspects of the organic consumption - decreased intake of contaminants and increased intake of nutrients - have both been topics of controversy in research. While we understand the reasons for this controversy, we are also firmly convinced that organically grown foods contain significantly fewer contaminants than their conventionally grown counterparts, as well as significantly richer nutrient content. One of the largest scale studies, conducted by the U. Almost half of the pesticide residues found on organically grown vegetables involved DDT or its metabolites. DDT is a pesticide that has been banned for 40 years for use on food, but because it can be very persistent in the environment, it often shows up in foods decades later. Studies have been conducted in countries throughout Europe and the Mediterranean comparing one or two specific, organically grown foods to their conventional counterparts, and the results have consistently shown lower contaminant levels in the organically grown foods. One early piece of research in this area - a review of 34 studies comparing the nutritional content of organic versus non-organic food - was published in In this research, compared to conventionally grown food, organically grown food was found to have: Higher flavonoid content has also been shown in one study of organic versus non-organic foods. Organics regulations are quite extensive in their lists of prohibited substances, and lower levels of contaminants in certified organic foods make perfect sense. Foods depend on soil and water for their nourishment, and cleaner soil and water means cleaner food. The nutrient concentrations in organic versus non-organic food are another matter, however. Here the relationship is not so simple. Soil quality can vary greatly from region to region, and many differences in soil quality cannot be overridden by organic farming practices. In short, nutrient composition in plants is the result of many different factors that interact in a complex way, and organic farming practices - while beneficial - would not be expected to function like an "overriding factor" in terms of nutrient content. What substances do we avoid by eating organic food? Several thousand contaminants routinely present in the U. By far the largest group of contaminants to be largely prohibited from organically grown foods are

synthetic pesticides, which are found virtually everywhere else in the food supply. Several hundred different chemicals and several thousand brand-name pesticide products are legally used in commercial food production. The Environmental Protection Agency has classified dozens of pesticides as potential carcinogens cancer-causing agents. These pesticides can affect much more than the crops on which they are directly sprayed. Many of these pesticide residues found in tap water started out in the form of crop sprays to help control infestation of food crops. The toxic metals cadmium, lead, and mercury can enter the food supply through industrial pollution of soil and groundwater and through machinery used in food processing and packaging. Cadmium exposure, which can be concentrated in plant tissues at levels higher than those in soil, has been linked to increased risk of lung, prostate and testicular cancers. Despite a well-documented negative impact on health - especially health of young children - lead residues can be found in many foods, including canned foods, which may still contain lead solder. Even low levels of lead intake can be harmful and have been associated with impaired neurobehavioral development, decreased stature and growth, and impaired hearing. Used to dissolve food components and produce food additives, solvents are found in a wide variety of commercially processed foods. Excessive exposure to solvents such as benzene and toluene has been linked to increased risk of several types of cancer. Excessive exposure to benzene has also been lined to increased risk of rheumatoid arthritis. While food is by no means our only source of exposure to potentially harmful synthetic chemicals or heavy metals, food is something that passes continuously through our bodies, meal after meal, day after day, and year after year. What are the environmental benefits of organic farming over conventional farming methods? Organically grown foods are cultivated using farming practices that can work to preserve and protect the environment. Most conventional farming methods depend on a wide range of "off-farm inputs" for success. If the soil does not contain enough minerals, minerals are purchased from off the farm in the form of bagged synthetic fertilizers from a farm supply store. If there is not enough water available, irrigation pumps are installed and natural gas is used to run the pumps and irrigate the fields with groundwater. If insects are a threat to crops, pesticides are purchased from a supply store and sprayed to prevent crop infestation. These methods may result in successful crop production, but they do not result in sustainable use of resources. And in many cases, they can pose a risk to health by contaminating soil, water and air with levels of synthetic chemicals that cannot be readily absorbed by the earth. Organic farming practices try to minimize "off-farm inputs" and seek to develop farming environment that is more self-contained. Along with the composting of plant materials, animals on the farm may be able to provide much of the necessary fertilizer in the form of composted manure. Crop rotation and the planting of cover crops may be able to improve soil nourishment. Avoidance of moldboard plowing may be able to help preserve soil integrity. Interplanting of crops may help reduce the need for pesticides as might biological balances in which natural predators take care of unwanted pests. Berms may help protect soil and plants from wind. According to many experts in the field of resource conservation and global warming, changes in farming practices worldwide could very likely form a centerpiece for climate stabilization across out planet. Organic farming practices may be able to greatly reduce carbon emissions associated with production and transport of synthetic fertilizers, and carbon sequestration retention by agricultural land could be greatly increased through organic farming practices. By cutting down on carbon emissions and capturing more carbon in croplands themselves, organic farmers might be able to change U. Can you give me a one or two sentence summary of "organic" as it applies to USDA food labeling? When the USDA certifies a food as organic, it is guaranteeing that the food was produced through USDA-approved methods designed to improve food quality and environmental conditions associated with food production. As part of this guarantee, the USDA forbids the use of sewage sludge, irradiation, or genetic engineering in any certified organic food, and at present, certified organic food is one of the few ways that U. How are organic foods regulated? Federal regulations are the laws authorized by major legislation enacted by the U. As part of the Farm Bill, the U. Congress included a title called Title XXI: In this section of the Farm Bill, Congress instructed the U. Once the Farm Bill was approved and signed into law, the USDA became responsible for developing organic standards. What is the

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National Organic Standards Board? The NOSB is appointed by the Secretary of Agriculture and is comprised of representatives from the following categories: NOSB committees typically meet on a quarterly basis to review petitions and consider proposed changes in organic regulations. What factors led up to U. Organic production had been practiced in the United States since the late s. From that time, the industry had grown from experimental garden plots to large farms with surplus products sold under a special organic label. Food manufacturers developed organic processed products and many retail marketing chains specialized in the sale of "organic" products. This growth stimulated a need for verification that products are indeed produced according to certain standards. Thus, the organic certification industry also evolved. More than 40 private organizations and state agencies certifiers currently certify organic food, but their standards for growing and labeling organic food may differ. For example, some agencies may permit or prohibit different pesticides or fertilizers in growing organic food. In addition, the language contained in seals, labels, and logos approved by organic certifiers may differ. By the late s, after an attempt to develop a consensus of production and certification standards, the organic industry petitioned Congress to draft the Organic Foods Production Act OFPA defining "organic. Certification standards establish the requirements that organic production and handling operations must meet to become accredited by USDA-accredited certifying agents. This plan describes among other things practices and substances used in production, record keeping procedures, and practices to prevent commingling of organic and non-organic products. The certification standards also address on-site inspections. They may label their products organic if they abide by the standards, but they cannot display the USDA Organic seal. Retail operations, such as grocery stores and restaurants, do not have to be certified. Accreditation standards establish the requirements an applicant must meet in order to become a USDA-accredited certifying agent. The standards are designed to ensure that all organic certifying agents act consistently and impartially. Successful applicants will employ experienced personnel, demonstrate their expertise in certifying organic producers and handlers, and prevent conflicts of interest and maintain strict confidentiality. Imported agricultural products may be sold in the United States if they are certified by USDA-accredited certifying agents. Imported products must meet the NOP standards. USDA has accredited certifying agents in several foreign countries. In lieu of USDA accreditation, a foreign entity also may be accredited when USDA "recognizes" that its government is able to assess and accredit certifying agents as meeting the requirements of the NOP called a recognition agreement. Rulemaking is the process of creating, amending, or removing regulations from the organics standards. The National Organics Program typically conducts rulemaking using four sequential steps:

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4: Modern Analysis of Chemical Contaminants in Food - Food Safety Magazine

Toxic Legacy Synthetic Toxins in the Food, Water, and Air of American Cities AN INTRODUCTION TO SYNTHETIC CHEMICAL CONTAMINANTS IN FOOD. 2 - AN INTRODUCTION TO.

Chemical contaminants may occur in our food from various sources. They typically pose a health concern, resulting in strict regulations of their levels by national governments and internationally by the Codex Alimentarius Commission. Therefore, analysis of relevant chemical contaminants is an essential part of food safety testing programs to ensure consumer safety and compliance with regulatory limits. Modern analytical techniques can determine known chemical contaminants in complex food matrices at very low concentration levels. Moreover, they can also help discover and identify new or unexpected chemical contaminants. Sources of Chemical Contaminants in Food Chemical contaminants can be present in foods mainly as a result of the use of agrochemicals, such as residues of pesticides and veterinary drugs, contamination from environmental sources water, air or soil pollution , cross-contamination or formation during food processing, migration from food packaging materials, presence or contamination by natural toxins or use of unapproved food additives and adulterants. Pesticide Residues The use of pesticides, such as insecticides, fungicides or herbicides, has become an integral part of modern agriculture to increase crop yields and quality by controlling various pests, diseases and weeds. Registration of new pesticides is a strictly regulated process that evaluates their toxicity and environmental fate, and sets maximum residue limits tolerances in raw and processed commodities. There are over 1, known pesticides. Some of them should no longer be used but may still be present in the environment. Older pesticides are being reevaluated based on currently available scientific data. Approved uses of pesticides following Good Agricultural Practices should result in pesticide residues below maximum residue limits established in a given country. However, global sourcing of raw commodities and global distribution of food products complicate the situation because pesticide registrations, uses and limits can be and are different in different countries. Consequently, an approved use in one country may result in an illegal pesticide residue in a food imported into another country, such as the recent case of the fungicide carbendazim in orange juice imported into the United States from Brazil. Furthermore, pesticides can be misused or present in food due to contamination during application spray drift , storage or transportation or from environmental sources, such as contaminated water or soil. The major classes of veterinary drugs include antibiotics, anthelmintics, coccidiostats, nonsteroidal anti-inflammatory drugs, sedatives, corticosteroids, beta-agonists and anabolic hormones. These drugs, which are administered to live animals, can remain as residues in animal tissues. Liver and kidney are highly susceptible to residues given their biological function. Certain antibiotics, such as penicillin, can cause severe allergic reactions in sensitive individuals, which is an important reason for enforcing their residue limits in foods of animal origin. Another important justification for limiting antibiotic usage in food-producing animals is to reduce the risk of pathogenic microorganisms becoming resistant to antibiotics. Most veterinary drugs are not of acute toxicological concern, but some substances, such as nitrofurans, chloramphenicol, clenbuterol and diethylstilbestrol, have been banned in most countries due to their carcinogenicity. Concern about endocrine-disrupting effects has become another reason for regulation of certain veterinary drugs, such as beta-agonists and hormones. Environmental Contaminants Environmental contaminants can be man-made or naturally occurring substances present in air, water or soil. They can enter the food chain and even bioaccumulate. Some can pose an acute health risk if present at higher concentrations, but the major concern related to the presence of environmental contaminants in foods is their potential endocrine disruption, developmental, carcinogenic and other chronic effects. The manufacture and use of PCBs and other persistent organic pollutants POPs have been banned for years, but they remain in the environment due to their high stability. PAHs can be found in the environment as a result of industrial pollution or can originate from oil spills; thus, they were of concern in seafood after the oil spill accident in the Gulf of Mexico in Food Processing Contaminants Certain toxic or undesirable compounds can be formed

in foods during their processing, such as during heating, baking, roasting, grilling, canning, hydrolysis or fermentation. Precursors of these contaminants can occur naturally in the food matrix, such as in the case of acrylamide being formed during the Maillard reaction between the amino acid asparagine and a reducing sugar especially in potato- and cereal-based, heat-treated products. Alternatively, certain processing contaminants, such as nitrosamines, can be formed by interaction of natural food components with food additives. Carcinogenic and genotoxic chlorpropanols, such as 3-monochloropropane-1,2 diol 3-MCPD , are formed during the acid hydrolysis of wheat, soya and other vegetable protein products. Food processing may also be a source of cross-contamination, such as contamination of nonallergenic foods with known food allergens. Migrants from Packaging Materials Direct contact of foods with packaging materials can result in chemical contamination caused by migration of certain substances into foods. Examples of migrants of health concern may include bisphenol A or phthalates from plastic materials, 4-methylbenzophenone and 2-isopropylthioxanthone from inks, mineral oil from recycled fibers or semicarbazide from a foaming agent in the plastic gaskets that are used to seal metal lids to glass packaging. Toxins Toxins are naturally occurring substances that are produced by various organisms, with mycotoxins and marine biotoxins typically representing the major concerns in foods. Other examples of toxins in foods may include bacterial toxins e. Mycotoxins are toxic secondary metabolites produced by fungi molds that can colonize various crops. They are of concern mainly in cereals, nuts, infant formula, milk, dried fruit, baby food, coffee, fruit juice and wine. Different mycotoxins are prevalent in different climates and in various growing and storage conditions. Marine biotoxins, such as saxitoxin, domoic acid, okadaic acid or ciguatoxin, are highly toxic compounds produced by phytoplankton. During so-called harmful algal bloom events, they can accumulate in fish or shellfish, such as clams, mussels, scallops or oysters, to levels that can pose serious health risks or even be lethal to humans. Unapproved Food Additives and Adulterants Food adulteration can happen accidentally when unapproved additives are introduced to the food, or the wrong additive is introduced through formulation error. This results in mislabeled food. Perhaps a larger health issue is when foods are adulterated intentionally for economic reasons to sell a low-value food or material for more or to mask food spoilage. Some adulteration may just mislead or cheat consumers, such as adding high fructose corn syrup to honey, but some may be harmful to them. The most notorious example from recent years is the addition of melamine to whey and other protein concentrates to increase their apparent protein content analyzed as total nitrogen. Other examples include the use of toxic Sudan dyes in adulterated chili powders or adulteration of virgin olive oil with hazelnut oil, which can cause unexpected allergic reactions in sensitive individuals. Analysis of Known Chemical Contaminants in Food Most known chemical contaminants in foods are small organic molecules. Except for high-level adulterants, they are typically present in foods at low concentrations parts per trillion to parts per million ; thus, their analyses in complex food matrices are often quite challenging. The basic analytical approach involves an extraction using a suitable solvent, cleanup to remove interfering matrix components, a chromatographic separation and a selective detection. It is not an exaggeration to say that the implementation of mass spectrometry MS as a detection technique has truly revolutionized the analysis of chemical contaminants in foods. As opposed to element-selective or nonselective detectors, MS can detect a wide range of compounds independent of their elemental composition and provide simultaneous quantitation and structural identification of detected analytes. More polar, thermolabile and less volatile analytes were difficult to analyze until the more recent introduction of atmospheric ionization techniques, such as electrospray, for liquid chromatography-mass spectrometry LC-MS. LC-MS has opened the door to the direct analysis of many more polar contaminants, including modern, new-generation pesticides, and the majority of veterinary drugs and toxins, such as mycotoxins. Many of the emerging and recently identified contaminants, including acrylamide, melamine or Sudan dyes, are analyzed preferably by LC-MS. Thus, modern food contaminant testing laboratories utilize both GC-MS and LC-MS to cover the wide polarity range of possible organic chemical contaminants. Identification of Unknown Chemical Contaminants in Food Detection and identification of unknown contaminants is not an easy task, especially if they are present at low concentration

levels. It requires expertise and a good analytical strategy that is based on all gathered information about the sample and potential sources of contamination. Any clues, such as changes in smell, taste or texture, as well as a description of potential poisoning symptoms may be important in this respect. For a truly unknown analysis, different extraction and separation approaches should be used to isolate compounds with a wide range of physicochemical properties polarity, solubility, volatility, etc. Nontargeted analysis should be performed, such as MS with full-spectra acquisition. Statistical analysis of the acquired chromatographic and MS data of contaminated and noncontaminated samples may help identify differences and reduce the number of components that have to be examined. The acquired MS spectra of suspected contaminants can be compared with MS spectral libraries and compound databases. In addition, tandem MS should be employed to help elucidate the structure of unknown contaminants. In the end, strong knowledge and expertise in both analytical and food chemistry are typically required to succeed in this task. Current and Future Trends in Chemical Contaminant Analysis in Food The current and future trends in the analysis of chemical contaminants are and will be strongly affected by developments in analytical instrumentation. The speed, sensitivity and selectivity of state-of-the-art MS instruments enable analysis of many compounds in one analytical run. Consequently, streamlined sample preparation approaches, such as QuEChERS Quick, Easy, Cheap, Effective, Rugged and Safe , can be used that require minimum extract cleanup without any preconcentration stepsâ€”thus, they can be miniaturized and automated. Sidebar The Importance of Moisture in Samples Prior to Chemical Analyses Moisture content is an important consideration during sampling procedures, in part because it affects the extent of sample heterogeneity. It may be necessary to determine the moisture content through sample drying to express analytical results on a uniform scale. Precautions must be considered when drying foods at elevated temperatures, since chemical reactions such as hydrolysis can occur and these reactions can be accelerated. Moisture determinations can be erroneous if hydrolysis has occurred, since the water of hydrolysis has not been released from the sample. A general rule of thumb for sample drying is that it should be as rapid and at as low a temperature as possible. Vacuum methods that can used to dry a sample include vacuum ovens and lyophilization, or freeze-drying. Another method is microwave drying. Unlike external heating devices that operate through the sample vessel, microwaves rapidly heat the sample, keeping temperature gradients to a minimum. For certain chemical testing applications, such as the presence of metals in food as well as the extraction of crude fat and nutrients from food, microwave digestion is the preparation method of choice. The ability of microwave sample prep to dissolve almost any matrix, leaving target species behind, provides preparative capabilities unavailable through other methods. The inherent variability in the composition of raw materials, basic ingredients and processed foods requires the use of proper sampling and sample pretreatment techniques, in addition to statistical methods for obtaining representative and replicate samples. Using the proper sample preparation methodology can reduce analytical error and costly detection mistakes that could jeopardize the safety of the food produced as well as lead to an even more costly food safety-related recall.

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5: Foodborne Illness and Food Safety

Chemical contaminants can be present in foods mainly as a result of the use of agrochemicals, such as residues of pesticides and veterinary drugs, contamination from environmental sources (water, air or soil pollution), cross-contamination or formation during food processing, migration from food packaging materials, presence or contamination by.

The potential effects of these substances on health are one of the greatest concerns to consumers. Before looking at these substances individually, let us look at some of the factors that determine whether a particular food component - natural, deliberately added or contaminant - is likely to be harmful. The most important factor is the amount of the component that we consume which is determined by both the amount of a particular food eat and the level in the food. Even if the level of a particular contaminant is low, it could still be hazardous if you eat a lot of the food or foods in which it is present. Just as some people may be sensitive to particular foods, food ingredients or food additives, some may be sensitive to residues of pesticides, antibiotics and hormones in food. There is no evidence to suggest that this is a common phenomenon and it is certainly far less common than reactions to foods such as milk, eggs, fish, and shellfish and nuts. The WTO Appellate Body only upheld the finding that prohibition of imports of meat from hormone-treated animals to the EU did not comply with the requirement that such a measure should be based on a relevant assessment of the risks to human health. In reaction to these findings, the EU mandated a new assessment of the risks to human health from hormone residues in bovine meat and meat products treated with six hormones used for growth promotion. Antibiotics This is a group of drugs approved for use in animal led to stimulate growth and improve feed efficiency so that less feed is required for growth and also to reduce infection and stock loss. Higher levels are sometimes used on prescription for the prevention or treatment of infection. Following their use, a suitable lag time is necessary to prevent food contamination where use of antibiotics in food production poses certain public health risks, including the emergence of antibiotic-resistant microorganisms and possible sensitive reactions in certain people. Resistance to antibiotics is not harmful in itself, but it may create health hazard if humans become infected with a strain microorganism that cannot be controlled by available antibiotics. The majority of allergic reactions have occurred with penicillin. The treatment of bovine mastitis with large doses of penicillin requires a withholding period before the residues in milk are reduced to acceptable levels. If the treatment procedure is not followed the residues may cause allergic reactions in sensitive people. It is possible that oral exposure to penicillin in milk may also cause some individuals to become sensitized. Although antibiotic residues in foods can have a detrimental effect on the processing of cultured products such as cheese, and are important in terms of consumer confidence, the public health significance of residue concentrations of some of these compounds in foods from animals appears to be low, based on substantial scientific assessment. Most of the antibiotic drugs currently used in animal agriculture are relatively non-toxic, even at high concentrations, but there are a few antibiotics which pose a small but significant threat to public health when present in sufficiently high concentrations in foods. Among these is chloramphenicol, which has been associated in a non-dose related manner with aplastic anaemia due to bone marrow depression in a small proportion of human patients to whom the drug was administered for therapeutic purposes. Some of the patients who survive the bone marrow depression have developed leukaemia, which creates concerns about possible carcinogenicity. Based on animal bioassay data, nitrofurans and some anti-parasitic drugs, such as dimetridazole, also raise some concern of carcinogenicity. Other antibiotics have been associated with allergic reactions of varying severity in people. An estimated four to ten allergic reactions occur per , courses of penicillin treatment administered directly to people, but actual incidents of allergic reaction to penicillin residues in foods are few and poorly documented. Based on experimental evidence, however, there is concern that residue concentrations of antibiotics have the potential to encourage the development of antibiotic resistance in the microbial flora of people eating contaminated foods. Hormones

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Hormones can be used to accelerate the growth rate of animals so that they can reach market earlier. The most effective growth promoters are natural sex hormones or substances which imitate the action of the natural hormones. If hormones are used appropriately, the residues in food should be very low or undetectable and not result in a significant hormonal effect. In some countries, abuses in the use of these substances have occurred and hormonal treatment has left high residues in poultry, veal and eggs which have resulted in breast enlargement, premature cessation of pubertal development and ovarian cysts in children. In view of these potential health hazards it is important that foods are monitored for hormone use and residue levels. This does not appear to be done on a suitable scale in Australia. The use of hormones for growth promotion in meat animals, or for enhancement of milk production in dairy animals remains a very controversial issue. Two items continue to be debated, where the effects of residues of these chemicals on human health and the economic, social and political implications of banning the use of these compounds in agriculture. At present, these compounds are used legally to a varying degree in many countries; thus European Union has considered a repeal of the ban on these compounds which was instituted a few years ago as a result of public and political pressure. Historically, some of the public health concern over these compounds emerged from the observed association of DES treatment of women with reproductive problems and cancer in some female offspring. Secondly, there have been a few generally unconvincing reports in the literature which link precocious sexual development in children and possible exposure to foods contaminated with hormonal residues in foods. However, in the context of food safety, the hormonal substances used in food animals can be usefully considered as belonging to two main groups: Among the naturally-occurring compounds are testosterone, progesterone, oestrogen and somatotropin: As a general rule for risk assessment, the presence of residues of the active hormone in foods should be no cause for concern with regard to public safety if the concentrations of the exogenous, naturally-occurring hormone in edible tissues from treated animals do not differ significantly from those in untreated animals. This can be justified although some of these compounds i.

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6: Chemical contamination | NIWA

Preface --Confronting the Unknown --An Introduction to Synthetic Chemical Contaminates in Food --The Number of Synthetic Chemicals in Food --Synthetic Chemicals in a Balanced Diet --Diets and Chemical Mixtures --Food Contamination at the City and Regional Level --Synthetic Chemical Contaminates in Drinking Water --Synthetic Chemical.

Numbering[edit] To regulate these additives, and inform consumers, each additive is assigned a unique number, termed as " E numbers ", which is used in Europe for all approved additives. This numbering scheme has now been adopted and extended by the Codex Alimentarius Commission to internationally identify all additives, [3] regardless of whether they are approved for use. E numbers are all prefixed by " E ", but countries outside Europe use only the number, whether the additive is approved in Europe or not. For example, acetic acid is written as E on products sold in Europe, but is simply known as additive in some countries. Additive , alkannin , is not approved for use in Europe so does not have an E number, although it is approved for use in Australia and New Zealand. Since , Australia has had an approved system of labelling for additives in packaged foods. Each food additive has to be named or numbered. The numbers are the same as in Europe, but without the prefix "E". See list of food additives for a complete list of all the names. Categories[edit] Food additives can be divided into several groups, although there is some overlap because some additives exert more than one effect. For example, salt is both a preservative as well as a flavor. Common acidulents include vinegar , citric acid , tartaric acid , malic acid , fumaric acid , and lactic acid. Acidity regulators Acidity regulators are used for controlling the pH of foods for stability or to affect activity of enzymes. Anticaking agents Anticaking agents keep powders such as milk powder from caking or sticking. Antifoaming and foaming agents Antifoaming agents reduce or prevent foaming in foods. Foaming agents do the reverse. Antioxidants Antioxidants such as vitamin C are preservatives by inhibiting the degradation of food by oxygen. Bulking agents Bulking agents such as starch are additives that increase the bulk of a food without affecting its taste. Food coloring Colorings are added to food to replace colors lost during preparation or to make food look more attractive. Emulsifiers Emulsifiers allow water and oils to remain mixed together in an emulsion , as in mayonnaise , ice cream , and homogenized milk. Flavors Flavors are additives that give food a particular taste or smell, and may be derived from natural ingredients or created artificially. A popular example is monosodium glutamate. Some flavor enhancers have their own flavors that are independent of the food. Flour treatment agents Flour treatment agents are added to flour to improve its color or its use in baking. Glazing agents Glazing agents provide a shiny appearance or protective coating to foods. Humectants Humectants prevent foods from drying out. Tracer gas Tracer gas allow for package integrity testing to prevent foods from being exposed to atmosphere, thus guaranteeing shelf life. Preservatives Preservatives prevent or inhibit spoilage of food due to fungi , bacteria and other microorganisms. Stabilizers Stabilizers , thickeners and gelling agents, like agar or pectin used in jam for example give foods a firmer texture. While they are not true emulsifiers, they help to stabilize emulsions. Sweeteners Sweeteners are added to foods for flavoring. Sweeteners other than sugar are added to keep the food energy calories low, or because they have beneficial effects regarding diabetes mellitus , tooth decay , or diarrhea. Thickeners Thickening agents are substances which, when added to the mixture, increase its viscosity without substantially modifying its other properties. Packaging Bisphenols , phthalates , and perfluoroalkyl chemicals PFCs are indirect additives used in manufacturing or packaging. In July the American Academy of Pediatrics called for more careful study of those three substances, along with nitrates and food coloring, as they might harm children during development. Many countries regulate their use. For example, boric acid was widely used as a food preservative from the s to the s, [7] [8] but was banned after World War I due to its toxicity, as demonstrated in animal and human studies. During World War II , the urgent need for cheap, available food preservatives led to it being used again, but it was finally banned in the s. In the United States, this led to the adoption of the

Delaney clause , an amendment to the Federal Food, Drug, and Cosmetic Act of , stating that no carcinogenic substances may be used as food additives. However, after the banning of cyclamates in the United States and Britain in , saccharin , the only remaining legal artificial sweetener at the time, was found to cause cancer in rats. Widespread public outcry in the United States, partly communicated to Congress by postage-paid postcards supplied in the packaging of sweetened soft drinks , led to the retention of saccharin, despite its violation of the Delaney clause. This includes five years of safety testing, followed by two years for evaluation by the European Food Safety Authority and another three years before the additive receives an EU-wide approval for use in every country in the European Union. For example, safrole was used to flavor root beer until it was shown to be carcinogenic. Due to the application of the Delaney clause, it may not be added to foods, even though it occurs naturally in sassafras and sweet basil. Preservatives also reduce spoilage from sources such as air, bacteria, fungi, and yeast. This absorbance can be used to determine the concentration of an additive in a sample using external calibration. However, additives may occur together and the absorbance by one could interfere with the absorbance of another.

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7: Chemical contaminants | European Food Safety Authority

Chemical residues are the remaining parts of the substances which are used during a particular process say for crop production or for pest control and the presence of such toxic substances in food items is called food contamination.

Market authorisation of chemical substances used in the food chain. Before chemicals can be authorised in the EU for use in food and feed, EFSA carries out strict risk assessments to determine which substances can be used safely and at which levels. Risk managers may take measures to limit human and animal exposure to such substances if EFSA indicates a potential health impact. Why are there chemicals present in food? All foods, living matter and, indeed, our bodies themselves are made up of chemicals. Many of the chemicals found in food occur naturally and include nutrients such as carbohydrates, protein, fat, fibre and a host of other elements and compounds. Chemical substances can play an important role in food production and preservation. Food additives can, for example, prolong the shelf life of foods or can make food more attractive, such as colours. Flavourings are used to make food tastier. Food packaging materials and containers such as bottles, cups and plates contain chemical substances such as plastic, elements of which can migrate into food. Other chemicals can be used to fight diseases in farm animals or crops. All chemical substances authorised for use in foods must first undergo a thorough risk assessment to ensure that they are safe. The possible effect of such chemicals on our health and safety depends on our level of exposure to them, for instance through the foods we eat or other sources of environmental exposure. That is why regulatory bodies carry out strict risk assessments of all chemicals proposed for use in food to determine which substances can be used and at which levels. This ensures that the use of chemicals in foods or on crops for instance, pesticides will not have adverse effects on animal and human health, and on the environment. People can also be exposed to both naturally occurring and man-made chemical compounds present at various levels in the environment, e. The presence of these substances in the body can lead to harmful effects over time. Risk assessment bodies such as EFSA, therefore, also evaluate possible adverse health effects from exposure to these environmental chemicals, which may also be found in food. What role does EFSA play in assessing the safety of chemicals in food? There is a robust regulatory system in place in the European Union to protect consumers from possible risks related to chemicals in foods. EFSA has an important role to play in this system. EFSA, as risk assessor, provides independent scientific advice to support the risk managers EU Institutions and Member States in defining appropriate regulatory frameworks and making decisions to protect consumers. These may involve adopting or revising European legislation on food or feed safety, or deciding whether to approve regulated substances such as pesticides and food additives, and if so in which foods or crops, and at what levels. The ANS Panel deals with questions on the safety of the use of food additives, nutrient sources and other substances deliberately added to food, excluding flavourings and enzymes. The CEF Panel deals with questions on the safety of use of materials in contact with food, enzymes, flavourings and processing aids, and also with questions related to the safety of processes. The PPR Panel deals with plant protection products commonly known as pesticides and their residues. The CONTAM Panel provides scientific advice on contaminants, undesirable substances and residues of unauthorised substances in the food chain, not covered by the other Panels. How does EFSA assess the safety of chemicals in food? The evaluation stage is the main part of the risk assessment. It is carried out by scientific experts tasked to deliver opinions on specific issues. Their work involves the review of relevant data including the results of studies on experimental animals and, where possible, observations in humans. With respect to regulated substances, experts review applications submitted by industry such as those from food or feed manufacturers. When considering industry applications, experts assess all available information and data to determine what risk, if any, and in what amounts the substance may pose a risk for human and animal health, and where appropriate, the environment. The Acceptable Daily Intake or ADI is the amount of a specific substance for instance a food additive, or a residue of pesticide in food or drinking water that can be ingested daily over a lifetime without

an appreciable health risk. ADIs are expressed by body weight, usually in milligrams of the substance per kilograms of body weight per day. This is the greatest concentration or amount of a substance, found by observation or experiment, which causes no detectable adverse effect in the exposed population. The NOAEL is scaled by a safety factor, conventionally of , to account for the differences between test animals and humans factor of 10 and possible differences in sensitivity between humans another factor of Exceeding the ADI on an occasional basis is not necessarily a cause for concern as such because the ADI takes into account daily exposure of a substance over a lifetime. They are similar but not the same. ADIs relate to chemical substances which are deliberately added to a product or ingredient or which can be found on food following for instance treatment of crops with pesticide sprays or antifungal agents. A Tolerable Daily Intake TDI , on the other hand, is an estimate of the quantity of a chemical contaminant to which we may be exposed through environmental contamination, and which when found in food can be ingested daily over a lifetime without posing a significant risk to health. Exposure to such contaminants whilst not desirable may not be avoidable as some may be found in foods as a result of environmental pollution e. How can EFSA be sure it is using the best scientific methodologies when it carries out its risk assessment? EFSA uses internationally recognised approaches in its risk assessments in order to help safeguard the health of consumers and animals and to help protect the environment. EFSA has developed a comprehensive body of good risk assessment practices to guide the experts on its Scientific Committee and its Scientific Panels and to help ensure that EFSA opinions respect the highest scientific standards. The Scientific Committee is responsible for general co-ordination to ensure consistency in the scientific opinions prepared by the Scientific Panels. It focuses on developing harmonised risk assessment methodologies in fields where EU-wide approaches are not already defined. The Scientific Committee has also laid down guidance for EFSA and its Panels with respects to the transparency of its risk assessments. Amongst the other requirements, it must also document all data used, the source of the data, their quality and relevance, and any assumptions made by experts in their analysis of them. Importantly, risk assessments should indicate clearly what is known and what is not known, highlighting areas of scientific uncertainty including gaps in the data and evidence base. Of course, science does not stand still. EFSA continually seeks to build on good risk assessment practices and develops further guidance, recommendations and processes to enhance its approaches. Does EFSA evaluate food additives such as food colours? Under a regulation issued by the European Commission in , all food additives must undergo a safety evaluation by EFSA before they can be authorised by EU risk managers. The same law also requires that EFSA re-evaluates all food additives authorised for use in the EU before 20 January using current risk assessment methods. The Commission has set deadlines for re-evaluating various groups of additives, including food colours, sweeteners, preservatives, etc. The deadline for all such re-evaluations is 31 December , but many re-evaluations have already been completed. EFSA scientists, with the help of experts in behaviour, child psychiatry, allergy and statistics, concluded that the study provided limited evidence that the mixtures of additives tested had a small effect on the activity and attention of some children. The Panel also looked at the safety of some by-products resulting from the production of these colours and recommended to keep their levels in caramel colours as low as technologically possible. Has EFSA done any work recently on artificial sweeteners? EFSA assesses the safety of artificial sweeteners. Aspartame The ANS Panel has also recently looked at steviol glycosides, sweeteners extracted from the leaves of the stevia plant. In an opinion published in April , it concluded that these substances are neither genotoxic damaged genetic material of cells , nor carcinogenic and established an ADI of 4 mg per kg body weight per day. Following a request from the European Commission, in January , EFSA reviewed its previous assessment of consumer exposure to these sweeteners based on revised levels of use proposed by applicants. EFSA concluded that although the revised exposure estimates are slightly lower than those of the April opinion, adults and children who are high consumers of foods containing these sweeteners, could still exceed the ADI established by the Panel if the sweeteners are used at maximum levels. What about flavourings used in food? Flavourings have a long history of safe use and are used in comparatively small amounts so that consumer exposure is relatively low. In , the

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Panel on food contact materials, enzymes, flavourings and processing aids the CEF Panel completed the first stage of a comprehensive safety review of 2, flavouring substances used in the EU. Has the Panel raised any concerns over flavourings? The Panel found that the majority of flavouring substances 1, do not give rise to safety concerns. EFSA has asked manufacturers to provide further data on around substances. These have been put on hold and EFSA will re-assess those substances once the required data have been received. The Panel in also completed the first ever review of the safety of 11 smoke flavourings used in the EU. Two of the smoke flavourings did not give rise to safety concerns. However, the experts concluded that the use of eight smoke flavourings at the proposed uses and use levels would be of safety concern due to low margins of safety. Additionally, based on the available data the experts could not rule out concerns regarding possible genotoxicity damage to the genetic material of cells for one of these eight smoke flavourings and could not assess the safety of one further smoke flavouring due to the lack of adequate data available. Has an assessment ever led to any food additive being removed from the market? Does EFSA assess the safety of food contact materials? Food contact materials are all materials and articles intended to come into contact with food, such as packaging and containers, kitchen equipment, cutlery and dishes. The safety of these materials must be evaluated as molecules can migrate from them into food. One prominent example is bisphenol A BPA. BPA is a chemical mainly used together with other chemicals to manufacture plastics and resins used to make food containers, such as returnable beverage bottles, tableware plates and mugs and storage containers. The Panel also stated that the data currently available do not provide convincing evidence of neurobehavioural toxicity of BPA. One Panel member expressed a minority opinion, saying some recent studies point to uncertainties regarding adverse health effects below the level used to determine the current TDI. In the light of scientific uncertainty and in order to further reduce exposure of infants to BPA, the European Commission deemed it both necessary and appropriate to ban the manufacture in the EU of plastic infant feeding bottles containing BPA, starting from 1 March, How are EU consumers protected from the possible harmful effects of pesticides and their residues? There is a long history of legislation in place in the EU to protect consumers, operators such as farm workers, animals and the environment from any adverse effects that are posed by pesticides and their residues. Since August , EFSA has been responsible for the EU peer review of risk assessments of active substances used in plant protection products. For each substance an initial draft risk assessment is carried out by experts in one Member State. This evaluation is then peer-reviewed by EFSA in cooperation with all Member States in order to guarantee the highest possible standards. EFSA drafts conclusions summarising the outcome of the peer review process, which are sent to the European Commission. The European Commission and EU Member States take a decision on whether or not to include an active substance in the list of authorised active substances in the EU. Consumers are exposed to pesticides because small amounts can be found on harvested crops. These amounts are called pesticide residues. MRLs are the upper levels of pesticide residues that are legally tolerated in or on food or feed. These must be safe for all consumers and are set as low as possible to protect vulnerable consumers such as children. MRLs are based on good agricultural practices, that is the minimum amount of pesticide needed to protect crops. MRLs are set for a wide range of food types, such as fruit and vegetable, and also animal products such as milk, and they usually apply to the product as put on the market. What is the situation in Europe with respect to pesticide residues on foods?

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8: Food additive - Wikipedia

Contaminants are chemical substances that have not been intentionally added to food or feed. These substances may be present in food as a result of the various stages of its production, processing, or transport.

Further information Introduction Food businesses are responsible for ensuring their food is safe, and that it complies with legislation on food additives and rules on reducing or eliminating human health risks caused by contaminants. Chemical contaminants can come from: Natural components of plants may also be toxic - such as glycoalkaloids in potatoes - while some may be harmful if not cooked properly - for example lectins in pulses. There are also some foodstuffs that can cause allergies in some people - such as peanuts. This guide provides food businesses with information on safety rules and procedures with regard to food additives, pesticides, contact materials and processes such as high temperature cooking and irradiation. Food additives Food additives are intentionally added to food for a technological purpose during its manufacture and processing. Most additives are restricted to certain foods at maximum specified levels. EU legislation states that most additives used in foods must be labelled clearly in the list of ingredients, either by name or by an E number. If an additive has an E number, it means it has passed EU safety tests. You must ensure that any additives you use in your food have been approved for use, and that you comply with relevant legislation about the levels of additives and the foods in which they are used. Under the Food Labelling Regulations you must also ensure that any food you supply to caterers or consumers is clearly labelled with a list of the ingredients used, including any additives. It is not found in food that has not been heated, or that has been cooked using methods such as boiling or microwaving. Since these foods have been cooked at high temperatures for hundreds of years, it is likely that acrylamide has been present in our food for many generations. It is thought to form from two chemicals that occur naturally in the food - an amino acid called asparagine and certain types of sugar. Acrylamide is also found in: It is also considered to be a carcinogen. There are currently no regulatory limits set for acrylamide in food. However, there is a limit for the amount of acrylamide allowed to migrate from food contact plastic into food. The specific migration limit in force means that acrylamide migrating into food from food contact plastic should not be detectable at a limit of 0. The formation of acrylamide is a product of the Maillard reaction - the browning of food when cooking caused by a reaction of natural sugars. Current advice for reducing acrylamide includes: The pamphlets are food sector-specific and have recently been updated. They are now available in 22 European languages. You can find the pamphlets on the Europa website. It provides a single source of information on existing and ongoing research into the effects of acrylamide in food and links to external resources. Other contaminants in food derived from food processing Process contaminants have the potential to increase the risk of cancer, so levels in food have to be kept as low as is reasonably practical. The survey is a three-year rolling programme which started in and covers:

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9: Everything You Need to Know About Organic Foods

Food contamination refers to the presence of harmful chemicals and microorganisms in food, which can cause consumer illness. This article addresses the chemical contamination of foods, as opposed to microbiological contamination, which can be found under foodborne illness.

Most of us recognize that certain insects, weeds, and rodents that are pests, but the use of pesticides is not limited to the control of these pests, where other harmful pests can include birds, snails, fungi, algae, and bacteria which needs specific concerns while controlling them. Inability to control pests has had a tremendous impact on world history, i. Millions of people died from bubonic plague the infamous Black Death before it was discovered that rat fleas carried the disease. A similar number have died from malaria, which is transmitted by mosquitoes. Today, bubonic plague is of little concern, the potato fungus is an insignificant problem, and malaria has been greatly reduced in the world. The use of pesticides is the primary reason these problems are no longer a threat. But pesticides are also potentially toxic to humans, which may induce adverse health effects including cancer, immune or nervous systems and it may cause effects on reproduction. Thus, it needs proper investigations before it can be authorized for use where pesticides should be tested for all possible health effects and the results should be analyzed by experts to assess any risks to humans. Scientific studies of the potential health effects of hazardous chemicals, such as pesticides, allow them to be classified as carcinogenic can cause cancer , neurotoxic can cause damage to the brain , or teratogenic can cause damage to a fetus. These problem creating compounds after usage are called pesticide residues. Residue analysis provides a measure of the nature and level of any chemical contamination within the environment and of its persistence. They can, however, show whether an animal or site has been exposed to chemicals and identify the potential for future problems. The rates of degradation and dissipation vary greatly from pesticide to pesticide and situation to situation. Type of Pesticides There are various kinds of pesticides in use based on the type of pest and intensity of the pest attack which can be summarized as: Organochlorines Mobility of organochlorines in soil is generally limited; although it is greater in sandy soil. They tend to be bound in clay soils with limited leaching. Their solubility in water is low, although residues can be detected in water where there is extreme contamination and, particularly, on suspended matter in water. Water solubility is variable but higher than with the organochlorines; residues generally break down quite quickly in water hydrolysis which is not generally detected except where the contamination is quite recent. Soil residues are similarly short-lived. Residues are probably only of interest for 5â€”15 days after spraying unless in shaded areas or where the concentrations applied are high. Carbamates Residues of parent compounds are generally not environmentally persistent; metabolites are rapidly excreted by vertebrates where wWater solubility is moderate; greater for the metabolites. Most carbamates are relatively stable in water of neutral pH. Stability and mobility in soil varies between compounds. Environmental residues are probably only of interest for 10â€”20 days after spraying, although in certain soils and in water, extended monitoring may be required. Pyrethroids Pyrethroids are insecticides and generally non-persistent in the environment. It is being rapidly degraded in the presence of strong sunlight, where residues are probably only of interest for 5â€”7 days after spraying, unless in shaded areas and where the concentrations applied are particularly high. Proper and accurate detection of residues requires a specialist laboratory. Insect Growth Regulators Benzoyl urea IGRs generally act by inhibition of chitin synthesis and moulting, thus interfering with the formation of the insect cuticle. They are increasingly used for the control of leaf-eating insects mandibulate herbivores in forestry, ornamentals and fruit. Their low water solubility and adsorption by soil reduces their environmental impact and in general use, residues are only likely to be detected in soil. There may be some, limited non-target effects in treated areas. There are also IGRs which act as juvenile hormone mimics, disrupting or preventing maturation of immature invertebrates. Herbicides Although of relatively low acute toxicity to most animals, herbicides can indirectly affect a variety of species through the removal of vegetative cover. Environmental persistence of the herbicides varies; some

are readily absorbed by and degraded in soil e. Residues in wildlife are generally transient with rapid metabolism and excretion. The significance of residues depends upon the applied material e. The persistence of sulphonyl urea herbicides varies although at the extremely low rates they are applied under normal use, the residues present are particularly low and the analysis can be difficult. Water solubility and stability are variable; some fungicide residues can be detected in water for periods of days through to months. Under controlled use, soil fumigants do not pose a substantial environmental problem unless they are allowed to contaminate watercourses methyl bromide is highly soluble in water, The materials are volatile and dissipate to atmosphere on aeration of the soil. The use of toxic pesticides to manage pest problems has become a common practice around the world. Pesticides are used almost everywhere, not only in agricultural fields, but also in homes, parks, schools, buildings, forests, and roads. In addition, pesticides can be found in the air we breathe, the food we eat, and the water we drink. Pesticides and Human Health Pesticides have been linked to a wide range of human health hazards, ranging from short-term impacts such as headaches and nausea to chronic impacts like cancer, reproductive harm, and endocrine disruption. Acute dangers - such as nerve, skin, and eye irritation and damage, headaches, dizziness, nausea, fatigue and systemic poisoning - can sometimes be dramatic, and even occasionally fatal. Chronic health effects may occur years after even minimal exposure to pesticides in the environment, or result from the pesticide residues which we ingest through our food and water. A July study conducted by researchers at the Public Health Institute, the California Department of Health Services, and the UC Berkeley School of Public Health found a six fold increase in risk factor for autism spectrum disorders ASD for children of women who were exposed to organochlorine pesticides. Pesticides can cause many types of cancer in humans where some of the most prevalent forms include leukemia, non-Hodgkins lymphoma, brain, bone, breast, ovarian, prostate, testicular and liver cancers. In February , the Agency for Toxic Substances and Disease Registry published a study that found that children who live in homes where their parents use pesticides are twice as likely to develop brain cancer versus those that live in residences in which no pesticides are used. Studies by the National Cancer Institute found that American farmers, who in most respects are healthier than the population at large, had startling incidences of leukemia, Hodgkins disease, non-Hodgkins lymphoma, and many other forms of cancer. There is also mounting evidence that exposure to pesticides disrupts the endocrine system, wreaking havoc with the complex regulation of hormones, the reproductive system, and embryonic development. Endocrine disruption can produce infertility and a variety of birth defects and developmental defects in offspring, including hormonal imbalance and incomplete sexual development, impaired brain development, behavioral disorders, and many others. Examples of known endocrine disrupting chemicals which are present in large quantities in our environment include DDT which still persists in abundance more than 20 years after being banned in the U. Exposure to pesticides is a common way for individuals to develop MCS, and once the condition is present, pesticides are often a potent trigger for symptoms of the condition. The variety of these symptoms can be dizzying, including everything from cardiovascular problems to depression to muscle and joint pains. Over time, individuals suffering from MCS will begin to react adversely to substances that formerly did not affect them. For individuals suffering from MCS, the only way to relieve their symptoms is to avoid those substances that trigger adverse reactions. For some individuals, this can mean almost complete isolation from the outside world. Do We Need Pesticides? Supporters argue that pesticide use is necessary to keep the cost of food production low and to maintain an abundant, affordable supply of fruits and vegetables in the market. However, opponents argue that since pesticide-free agriculture has never been tried on a large enough scale, we really do not know if the cost of food production would increase, or by how much. Researchers have studied the profitability of farms that do not use synthetic pesticides and found that results can vary depending on the kind of crop and region of the country. There are other advantages of using pesticides. For example, pesticides can help prevent some types of food poisonings. Food that is damaged by insects is more easily attacked by mold. Pesticides that prevent insect-damage also help prevent the growth of a mold that produces a natural, but potent cancer-causing poison called aflatoxin in food. To remove pesticides, as well as for

general health, it is a good idea to wash food with clean, potable water before it is cooked or eaten. Peeling helps reduce the levels of pesticides that may be on the surface. Peeling does not remove all pesticide residues, since some residues are absorbed into the food. Trim the fat from meats. Some pesticides collect in animal fat. Trimming excess fat from meats helps to reduce the amount of such pesticides that would be eaten. Cooking helps reduce some of the pesticide residues in food that are not removable by washing or peeling. Eat a varied diet rich in fruits and vegetables. Specific pesticides are used for specific food crops. Eating a diet with many different fruits, vegetables and grains is a healthy practice in itself. It also prevents eating an unbalanced amount of a particular food or the pesticide residues that it may carry. If still concerned, consider buying food that has been grown using "Integrated Pest Management" or "Certified Organic Methods" Buying food grown using less or no synthetic chemicals may help reduce the intake of pesticide residues. However, that even organically grown food is not guaranteed to be totally free of pesticide residues.

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